



# **PROGRAMME OF STUDIES FOR THE CLASS OF 2030**

*correct as of 4 Feb 2026*

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## ABOUT NUS HIGH SCHOOL

The NUS High School of Mathematics and Science is an independent, specialised co-educational school in Singapore that offers its own unique six-year diploma programme for Math and Science talents. Established in 2005 by the Ministry of Education (MOE) Singapore and the National University of Singapore (NUS), we offer the only school-based gifted education programme in Singapore for Math and Science talents. The curriculum is designed for the top 180 students who are gifted in and have passion for math and science in each cohort. The students graduate with the NUS High School Diploma, which is officially accredited by MOE and NUS and is recognised by renowned local and overseas universities.

The compacted and accelerated curriculum engages the students. All students will go beyond the math and science standard of other Singapore school as well as complete compulsory research / innovation project as a graduation requirement. It also allows the best to skip courses and accelerate even further to take university courses. Students enjoy self-directed learning, multi-disciplinary curriculum and inter-disciplinary projects. With the support of tertiary institutions and the industry, the school's academic and character-building programmes develop students who can wrestle with complex problems and think differently; who are not afraid to venture into the unknown, innovate and provide unique solutions for the betterment of humanity.

### 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 of 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 courses that are offered to the Class of 2029.

### **1. Curriculum Structure**

NUS High School designs and implements a unique curriculum that is relevant, 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.

<b>Foundation Years</b>	Years 1 - 3	Students will acquire the fundamentals and build their base knowledge. They will have the opportunity to enhance and apply their knowledge.
<b>Specialisation Years</b>	Years 4 - 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 courses.

##### **1.1.1 Types of Courses**

<b>CORE</b>	Essential courses with the core knowledge and skills expected of a student majoring in the discipline at the high school level in all academic subjects other than Mother Tongue.
<b>ELECTIVE</b>	Courses that build on the Core courses 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 courses.
<b>ENRICHMENT</b>	Courses that are offered to students who wish to broaden their interest It is not compulsory to take enrichment courses.
<b>HONOURS</b>	Honours courses are advanced courses designed at university undergraduate level for students specifically reading Mathematics or Science subject at Major with Honours level. Honours courses are offered in Years 5 and 6. It is not compulsory to take Honours courses.
<b>MOTHER TONGUE LANGUAGE CORE</b>	Essential Mother Tongue courses with the core knowledge and skills expected of a student at the pre-tertiary level. The courses prepare students for the SEC or GCE A-level syllabus for the relevant Mother Tongue courses.

### 1.1.2 Course Codes

Each course of study has a unique course 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 course offered.
- The second digit is used to indicate the type of course: 1 for **Core**, 2 for **Elective**, 3 for **Enrichment**, 4 for **Honours** and 5 for **Mother Tongue Language Core** courses which follow the MOE syllabus.
- The last two digits indicate the course number.

For some courses, there is a suffix letter.

- A letter 'A' indicates that the course is a preclusion and taken in lieu of the core course, with different assessment weighting.
- A letter 'M' indicates an approved Mother Tongue Language in-lieu course conducted in MOE approved language centers.
- A letter 'V' indicates that the course is offered by external agencies or Institutes of Higher Learning, but is considered a school course.

#### List of Subject Codes

<b>AR</b> Art	<b>CM</b> Chemistry	<b>EN</b> English Literature	<b>HY</b> History	<b>MU</b> Music	<b>UD</b> Urdu
<b>BG</b> Bengali	<b>CS</b> Computer Science	<b>GE</b> Geography	<b>IC</b> Interdisciplinary Curriculum	<b>PC</b> Physics	
<b>BL</b> Biology	<b>DV</b> Da Vinci	<b>GJ</b> Gujarati	<b>JP</b> Japanese	<b>PE</b> Physical Education	
<b>CE</b> Character & Citizenship Education	<b>EC</b> Economics	<b>GM</b> German	<b>MA</b> Mathematics	<b>PJ</b> Punjabi	
<b>CH</b> Higher Chinese	<b>EG</b> Engineering	<b>HD</b> Hindi	<b>MH</b> Higher Malay	<b>TH</b> Higher Tamil	
<b>CL</b> Chinese	<b>EL</b> English Language	<b>HU</b> Humanities	<b>ML</b> Malay	<b>TL</b> Tamil	

Examples:

- **EL2131** is an English course (EL) taught at academic level two (2). It is a core course (1).
- **CM1331** is a Chemistry course (CM) taught at academic level one (1). It is an enrichment course (3).
- **MA2232V** is a Mathematics course (MA) taught at academic level two (2). It is an elective course (2) that is conducted at an external agency (V).
- **CH3531** is a Higher Mother Tongue Language course (CH) taught at academic level three (3). It is a Mother Language Core course that follows the MOE Syllabus (5).

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

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

### **1.1.4 Units**

Under the modular system, course workloads are expressed in terms of Units. A unit of the effort, stated in terms of time, expected of a typical student in managing his/her workload. The unit value of a course is derived by dividing the estimated total number of workload hours per week for that course by the unit factor of 2 for Senior High courses. For Junior High courses, the unit factor is 1.75. For example, a 4-unit semester-long Senior High course 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-unit year-long (2 semesters) Senior High course would require 6 hours of academic work per week for an academic year.

## 1.2 Foundation Years

Students are to read all Core courses of the following academic subjects during their Foundation Years – English Language, Mother Tongue Language, Mathematics, Computer Science, 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 courses under the *Da Vinci* Programme. Please refer to the *Da Vinci* Programme for details.

### Compulsory Academic courses and Units in the Foundation Years

Year 1	Year 2	Year 3
English Language & EN 8	English Language 6	English Language 6
Mother Tongue <sup>1</sup> 6	Mother Tongue <sup>1</sup> 6	Mother Tongue <sup>1</sup> 8
Mathematics & CS 8	Mathematics 8	Mathematics 8
Biology 4	Biology 6	Biology 6
Chemistry 4	Chemistry 6	Chemistry 6
Physics 4	Physics 6	Physics 6
Art & Music 4	1 from AR, MU, GE, HY & EN 4	Continue choice in Yr 2 (1 from AR, MU, GE, HY & EN) 6
Humanities 4	Humanities 2	
<i>Da Vinci</i> 5	<i>Da Vinci</i> 5	<i>Da Vinci</i> 3
<b>Total<sup>2</sup> 42</b>	<b>Total<sup>2</sup> 44</b>	<b>Total<sup>2</sup> 46</b>

<sup>1</sup> It is compulsory for students to take up Mother Tongue Language courses, with the exception of students who have been exempted by the Ministry of Education. The figures shown assume students read Higher Mother Tongue courses. Students who read Mother Tongue course will have 6 units in Year 3 instead of 8 units.

<sup>2</sup> The total number of units in the Academic Year of Studies excludes courses in the *Da Vinci* Programme as these courses do not have a Grade Point (refer to section 2.2 for details). *Da Vinci* Programme is reflected in this table to provide a complete representation of compulsory academic load.

### 1.3 Specialisation Years

Students are to complete the following during their Specialisation Years:

<b>English Language</b>	Students have to read all English Language Core courses from Years 4 - 6.
<b>Mother Tongue Language</b>	Students have to continue taking Mother Tongue Language courses, if they have not already fulfilled the requirements by Year 4. Please refer to the Mother Tongue Courses Offered, for details.
<b>Three Compulsory Major Subjects</b>	Students have to read <b>Mathematics</b> and <b>TWO Sciences</b> <sup>1</sup> as Major subjects. <ul style="list-style-type: none"> <li>• Mathematics</li> <li>• Science Subject 1</li> <li>• Science Subject 2</li> </ul>
<b>Innovation / Research Project</b>	Students have to complete an Innovation / Research Project in any Mathematics, Science or Engineering domain. It is part of the <i>Da Vinci</i> Programme.
<b><u>Optional</u> Major Subject</b>	Students <b>may</b> read <b>ONE</b> 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 <b>maximum</b> of <b>FOUR</b> Major subjects, which can be from the following subjects: <ul style="list-style-type: none"> <li>• Science Subject 3<sup>1</sup></li> <li>• Art</li> <li>• Economics</li> <li>• English Literature</li> <li>• Geography</li> <li>• History</li> <li>• Music</li> </ul>
<b><u>Optional</u> Major with Honours</b>	Students <b>may</b> read any of the following subjects at Major with Honours level (refer to section 1.3.1), which is built on the Major curriculum. <ul style="list-style-type: none"> <li>• Mathematics</li> <li>• Biology</li> <li>• Chemistry</li> <li>• Physics</li> <li>• Engineering</li> <li>• Computer Science</li> </ul>

<sup>1</sup> Science Subjects include Biology, Chemistry, Physics and Computer Science

### Compulsory Academic courses and Units in Specialisation Years

Year 4		Year 5		Year 6	
English Language	6	English Language	6	English Language	6
Mother Tongue <sup>1</sup>	8				
Mathematics	8	Mathematics	8	Any Y6 Electives	16
Science subject 1	8	Science subject 1	8		
Science subject 2	8	Science subject 2	8		
		Interdisciplinary Curriculum	2	Interdisciplinary Curriculum	10
		<i>Da Vinci</i>	6		
<b>Total<sup>3</sup></b>	<b>38</b>	<b>Total<sup>3</sup></b>	<b>32</b>	<b>Total<sup>3</sup></b>	<b>32</b>

<sup>1</sup> This assumes students read Higher Mother Tongue courses and clear the MOE MT requirement. If not, students will continue to read Mother Tongue course(s) in Year 5 or even Year 6.

<sup>2</sup> A Humanities Capstone course for students who do not have a Major in Humanities, Art or Music.

<sup>3</sup> Total number of units in the Academic Year of Study excludes courses in *Da Vinci* Programme. *Da Vinci* Programme is reflected in this table so as to provide a complete representation of compulsory academic load.

#### 1.3.1 Major with Honours

For Mathematics, Biology, Chemistry, Physics, Engineering and Computer Science, 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 courses 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.

To complete a Major with Honours, student must read at least 8 units of Honours courses besides completing the 8 units of Year 6 electives of that subject.

## 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** and **ELECTIVE** courses is measured by Grade Points on a 5-point scale (including Mother Tongue Language courses):

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	

D grade and above are considered as passing grades.

Students who drop their 4<sup>th</sup> major by the end of Year 4 will be provided the option to exclude up to 8 units of completed Year 4 4<sup>th</sup> major courses from the Graduation GPA computation at the end of Year 6.

All core and elective courses excluded from the Graduation GPA computation will be assigned with a Satisfactory (S) or Unsatisfactory (U) grade.

Satisfactory (S)	if the 4 <sup>th</sup> major course has been awarded a D grade or above
Unsatisfactory (U)	if the 4 <sup>th</sup> major course grade is an F

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

Distinction	Merit	Pass	Unclassified
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No Grade Points are awarded for Honours courses, Enrichment courses and Da Vinci Programme courses. The performance of these types of courses is not used in the computation of GPA.

<b>Additional Indicators for Courses</b>	Exempted (EXE)	Students exempted from taking a Core course by the relevant academic Department will be awarded the Unit(s) but will not receive a Grade Point. Refer to section 2.4.
	In Progress (IP)	For courses that extend beyond the semester, the Grade Point will be given at the conclusion of the course. The status "IP" is assigned during the intervening semesters.
	Accelerated	Students completed a higher-level course. Refer to section 2.5.

### 2.3 Grade Point Average (GPA)

Academic progress is tracked by the Grade Point Average (GPA), which is the weighted average grade point of all courses taken by a student. Therefore, a student's GPA is the sum of the course grade points multiplied by the number of units for the corresponding course, divided by the total number of units. This is represented as follows:

$$\text{GPA} = \frac{\text{Sum (course grade point} \times \text{units assinged to course)}}{\text{Sum (units assigned to all courses used in calculating the numerator)}}$$

All GPA scores will be computed to 1 decimal place.

Courses with no grade point such as Honours, exempted and Enrichment courses do not contribute to GPA.

There are two different GPAs with different time frames and purposes – Promotion GPA and Graduation GPA.

Promotion GPA	Graduation GPA
To determine promotion to next Academic Year of Study	To determine the Classification of Diploma (refer to section 3.3)
Year 1 to 5	Year 4 to 6
Shows the academic performance in the Year of Study	Shows the academic performance of all the semesters from Year 4 Semester 1 up to the current semester
Grade points of ALL Core courses including Mother Tongue Language (MTL) Core courses and Elective courses read in the Year are used for the computation of the Promotion GPA	The higher value of either computation <ul style="list-style-type: none"> <li>• Grade points of ALL Core courses and Elective<sup>1</sup> courses but excluding MTL Core courses</li> <li>• Grade points of ALL Core courses and the MTL Core courses read in the final two years of academic studies to fulfill the MOE MTL requirement<sup>2</sup> as well as Elective<sup>1</sup> courses</li> </ul>

<sup>1</sup> Electives are selected by the system, which will maximize the GPA for students. Exception is at Year 6 Semester 2, where students will select electives of their choice for inclusion into their Graduation GPA.

<sup>2</sup> For students taking Higher Mother Tongue Language, it will be courses in Year 3 and 4 (total 16 UNITS). For students taking Mother Tongue Language, it will be courses in Year 4 and 5 (total 16 UNITS).

### 2.3.1 Subject GPA

The Subject GPA is computed from grades of all Year 4-6 Core and selected Elective<sup>1</sup> courses in that subject. The elective courses that are included in these Subject GPAs are the same set that students have selected for inclusion into their Graduation GPA.

The following Subject GPAs will be displayed in the Academic Transcript:

Subject GPA	Additional Remarks
English Language	Nil
Mother Tongue Language	The Mother Tongue Language (MTL) Subject GPA will include MTL Core courses read in the final two years of academic studies to fulfil the MOE MTL requirement as well as selected elective MTL courses. Students who read MTL Syllabus B or are exempted from MTL by MOE will not have a MTL Subject GPA.
Mathematics	Compulsory Major
Biology	Only for students who read the subject at Major or Major with Honours level
Chemistry	
Physics	
Computer Science	Only for students who read a 4th Major in Art, Economics, English Literature, Geography, History or Music. E.g. a History Major student will have a History Subject GPA.
Humanities, Art and Music	

### 2.4 Exemption from Courses

Teachers will recommend suitable students for diagnostic tests. Students can be granted exemption from reading a course if they fulfil 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 course and no grade point is awarded. Units are fulfilled and will be reflected in the semester’s progress report when the student is granted the course exemption. Courses that are exempted will not affect Promotion GPA, Graduation GPA or Subject GPA since it has no grade point. Interested students who wish to seek course exemption should approach the respective academic Departments for more information.

## **2.5 Acceleration of Courses**

A student can accelerate his/her studies by reading courses at an earlier semester(s) as compared to peers in the same academic level provided he/she meets the course's pre-requisite and gain approval from the Academic Department. For example, a Year 3 student may accelerate to read MA4141 in his/her Year 3 Semester 1 of study. The grade of the accelerated course MA4141 will be reflected in the Year 3 Semester 1 progress report and computed into the Promotion GPA just like all courses he/she read in that semester. However the grade of MA4141 will be computed into the Graduation GPA when he/she is in academic Year 4.

## **2.6 Failing and Repeating Courses**

Students who fail a **Core** course (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 course. For GPA computation, the D grade will be used instead of the original F grade. A student who fails the Viva will have to repeat the course when it is offered again. Upon passing the repeated course, the student will be awarded a new grade.

Students who fail a course which is a pre-requisite to a higher level course would not be allowed to read the higher level course. However, a student may read both courses 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 GPA of 2.5 to promote to the next academic Year of Study.

Students who fail an Honours course (Unclassified Grade), shall not be offered a Viva. The student is deemed to be unsuitable to handle the rigour of the Honours curriculum, and will not be offered to continue with the Department's Honours programme.

## **2.7 Optional Examinations**

Years 5 and 6 students can 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 GPA for Promotion**

A student must obtain a minimum Promotion GPA of 2.5 to promote to the next academic Year of Study. A student who is unable to meet the minimum Promotion GPA will repeat the Year of Study. This essentially means repeating all Core courses 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 GPA of 2.5
- Pass all Year 4-6 Core courses for English Language
- Complete respective Mother Tongue Language courses, as required (refer to Mother Tongue Language Policy)

- Pass all Year 4-5 Core courses for Mathematics Major and two Science Majors
- Pass at least 28 units of Year 5-6 electives which include
  - 12 units of Year 5-6 Interdisciplinary Curriculum courses
  - 16 units of Year 6 electives
- Pass Innovation/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.*

*All students are also expected to fulfil the national mother tongue policy, unless exempted by the Ministry of Education, Singapore.*

### **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 GPA computed to the first decimal place.

<b>Class of Diploma</b>	Pass	Merit	Distinction	High Distinction
<b>Graduation GPA</b>	2.5 – 2.9	3.0 – 3.9	4.0 – 4.4	4.5 – 5.0

-----END -----

## PROGRAMME OF STUDIES BY SUBJECT

### **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 3), students are given a broad-based mathematical study of algebra, geometry, statistics and trigonometry. These topics serve as a foundation for many courses offered in the later years. Pre-calculus topics such as functions will also be taught. 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. Simple concepts of calculus are introduced too.

Students in the Specialization Years (Years 4 to 6) are required to read calculus at an extensive level that is comparable to calculus courses in colleges and universities. Vectors, numerical methods and mathematical proofs will also be touched upon. Students 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 courses.

Students are advised to follow the more appropriate choice on the basis of their academic performance. Students offering Major can opt to sit for the AP Calculus AB in their Year 5 whereas students offering Major with Honours can choose to sit for the AP Calculus BC in their Year 6. Students may also have the option of sitting for the 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 Courses. Interested students shall approach the Head of Department for details on these matters.

**Official (Open) / Non-Sensitive**

<b>Level</b>	<b>Sem</b>	<b>Course Code</b>	<b>Course Type</b>	<b>Course Title</b>	<b>Description</b>	<b>Unit</b>	<b>Pre-requisites</b>	<b>Preclusions</b>	<b>Co-requisites</b>	<b>Hrs/wk</b>	<b>Remarks</b>
1	1	MA1231	Elective	Math Olympiad Training I	This course provides students with a taste of Olympiad-type mathematics. Students are expected to participate in the Singapore Mathematical Olympiad (Junior).	2	None			1.5	
1	2	MA1232	Elective	Math Olympiad Training II	This course targets high ability students who are keen to prepare themselves rigorously for the Singapore Mathematical Olympiad (Junior).	2	MA1231, Department Approval		MA1232V	1.5	
1	2	MA1232V	Elective	Math Olympiad Training II	This course 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.	2	MA1231, Department Approval			1.5	
1	1 and 2	MA1133	Core	Foundations in Math I	This course aims to develop some understanding of the essential concepts of mathematics covering arithmetic, algebra and geometry. Topics include algebraic manipulation, indices laws, simultaneous linear equations, proportions, mensuration, loci, and coordinate geometry.	6	None			3	Year long course
1	1 or 2	MA1331	Enrichment	Fun with Fractals	This enrichment course 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 course.	2	None			1.5	
2	1	MA2231	Elective	Math Olympiad Training III	This course builds upon the previous Junior Olympiad training. It targets high ability students who are keen to prepare themselves rigorously for the Singapore Mathematical Olympiad (Senior).	2	MA1232, Department Approval		MA2231V	1.5	
2	1	MA2231V	Elective	Math Olympiad Training III	This course builds upon the previous Junior Olympiad training. It targets high ability students who are keen to prepare themselves rigorously for the Singapore Mathematical Olympiad (Senior). The course is taught by an external trainer.	2	MA1232V, Department Approval			1.5	
2	2	MA2232	Elective	Math Olympiad Training IV	This course targets high ability students who are keen to prepare themselves rigorously for the Singapore Mathematical Olympiad (Senior).	2	MA2231, Department Approval		MA2232V	1.5	
2	2	MA2232V	Elective	Math Olympiad Training IV	This course targets high ability students who are keen to prepare themselves rigorously for the Singapore Mathematical Olympiad (Senior). The course is taught by an external trainer.	2	MA2231V, Department Approval			1.5	
2	1 and 2	MA2133	Core	Foundations in Math II	Building on the year 1 foundations, this course aims to introduce trigonometry, matrices, set notation, probability, statistics & 2D vectors. Topics also include quadratic functions and inequalities, congruency and similarity, circle geometry.	8	MA1133			4	Year long course
3	1	MA3231	Elective	Math Olympiad Training V	This course builds upon the previous Senior Olympiad training.	2	MA2232, Department Approval		MA3231V	1.5	
3	1	MA3231V	Elective	Math Olympiad Training V	This course builds upon the previous Senior Olympiad training. The course is taught by an external trainer.	2	MA2232V, Department Approval			1.5	
3	1	MA3331	Enrichment	Foundation Mathematics (Bridging course)	This bridging course 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 course (For new Yr 3 intake only)

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3	1 and 2	MA3133	Core	Foundations in Math III	This course aims to model and solve problems through the study of functions including quadratic, polynomial, modulus, exponential, logarithmic, trigonometric and rational functions. Mathematical method taught include partial fractions, remainder-factor theorem and binomial theorem. Finally, this course will culminate with the introduction of calculus.	8	MA2133			4	Year long course
4	1	MA4241V	Elective	Math Olympiad Training VI	This course targets high ability students who are keen to prepare themselves rigorously for the Singapore Mathematical Olympiad (Senior and Open).	2	MA3231V, Department Approval			1.5	
4	1 and 2	MA4141	Core (Major)	Advanced Math I	This course covers topics such as number sequences, summation of series, arithmetic and geometric series. 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 various methods of proofs. Transformation of graphs and vectors in 3D are introduced in this course. 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.	8	MA3133			5	
5	1	MA5241V	Elective	Math Olympiad Training VII	This course targets high ability students who are keen to prepare themselves rigorously for the Singapore Mathematical Olympiad (Open).	2	MA4241V, Department Approval			1.5	
5	2	MA5441V	Honours in lieu	NUS/MA2001 Linear Algebra	This is an NUS course in-lieu of NUSHS Honours Mathematics I course. This course is a first course in linear algebra. Fundamental concepts of linear algebra will be introduced and investigated in the context of the Euclidean spaces $R^n$ . Proofs of results will be presented in the concrete setting. Students are expected to acquire computational facilities and geometric intuition with regard to vectors and matrices. Some applications will be presented. Major topics: Systems of linear equations, matrices, determinants, Euclidean spaces, linear combinations and linear span, subspaces, linear independence, bases and dimension, rank of a matrix, inner products, eigenvalues and eigenvectors, diagonalization, linear transformations between Euclidean spaces, applications. In this course, students will explore the polar coordinate system. Parametric equations are introduced. Derivatives and integrals of polar, parametric and vector functions will also be taught.	4	MA5141, Department Approval			4	In order to fulfil Math Honours, a student must take: 1.MA5441V (4UNIT) and MA6441V (4UNIT), OR 2.MA5441 (4UNIT) and MA6441V (4UNIT), OR 3.MA5441 (4UNIT), MA6441 (4UNIT)  A total of 8 UNIT.
5	1 and 2	MA5141	Core (Major)	Advanced Math II	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 and second order differential equations and their applications to real-life problems will also be taught. This course 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, and correlation coefficient.	8	MA4141			5	

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5	1 and 2	MA5441	Honours	Honours Mathematics I	This Honours course 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. In this course, students will explore the polar coordinate system. Parametric equations are introduced. Derivatives and integrals of polar, parametric and vector functions will also be taught.	4	MA4141			2	+ Students majoring with Honours in Mathematics must complete at least 8 UNITS of the Honours courses.
6	1	MA6441V	Honours in lieu	NUS/MA2002 Calculus	This is an NUS course in-lieu of NUSHS Honours Calculus course. This is a course in single-variable calculus which will introduce precise definitions of limit, continuity, the derivative and the Riemann integral. Students will be exposed to computational techniques and applications of differentiation and integration. This course concludes with an introduction to first order differential equations.	4	MA5141, Department Approval	Student can only take MA6431 or MA6431V to fulfil math honours program.		4	In order to fulfil Math Honours, a student must take: 1.MA5441V (4UNIT) and MA6441V (4UNIT), OR 2.MA5441 (4UNIT) and MA6441V (4UNIT), OR 3.MA5441 (4UNIT), MA6441 (4UNIT)  A total of 8 UNIT.
6	1 and 2	MA6241	Elective	Advanced Math III	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. This course revisits concepts covered in earlier Advanced Mathematics courses and extends it further. Students will learn recurrence relations and numerical methods such as the linear interpolation and Newton-Raphson Method.	8	MA5141, Department Approval			5	
6	1 and 2	MA6441	Honours	Honours Mathematics II	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. This course is 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. In this course, students will also 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.	4	MA5441			2	+ Students majoring with Honours in Mathematics must complete at least 8 UNITS of the Honours courses.

## **Computer Science**

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 Computer Science curriculum in NUS High School is divided into two key stages – Foundation and Specialisation Years.

In the Foundation Years (Year 1 to 3), students are exposed to a breadth of topics in Computing so that they can appreciate what the study of Computer Science is about. In particular, all students will be required to read CS1131 Computational Thinking in Year 1 Semester 2. Computational thinking is taking an approach to solving problems, designing systems and understanding human behaviour that draws on fundamental concepts in computer science. Via this course, students will be exposure to three key areas in Computer Science: 1) Problem Solving, 2) Programming Principles & Concepts and 3) Basic AI Literacy. The courses in the Foundation Years aim to ignite students' interest and passion in Computer Science, and also serve as a foundation for many courses offered in the later years.

In the Specialization Years (Year 4 to 6), students 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 Computer Science and Major with Honours in Computer Science. To qualify for reading a Major with Honours in Computer Science, students have to achieve consistently excellent results in their Core courses.

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

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<b>Level</b>	<b>Sem</b>	<b>Course Code</b>	<b>Course Type</b>	<b>Course Title</b>	<b>Description</b>	<b>Unit</b>	<b>Pre-requisites</b>	<b>Preclusions</b>	<b>Co-requisites</b>	<b>Hrs/wk</b>	<b>Remarks</b>
1	2	CS1131	Core	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 course 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.	2	None			2	
2	1	CS2241	Elective	Programming Fundamentals	This course introduces students to the fundamentals of programming and computational thinking. Students learn key concepts such as variables, data types, expressions, conditionals, loops, and lists, and apply them to write simple, functional programs. By the end of the course, students will be able to design and implement basic programs to solve real-world problems effectively.	2	CS1141			1.5	
2	2	CS2242	Elective	Problem Solving in Computing	The aim of this course is to introduce students to the discipline of computing and to the problem solving process. Students will apply the programming concepts learnt to solve various problems.	2	CS2241			1.5	
2	2	GC2332	Enrichment	STEAM Lab	This course offers a cross-disciplinary learning experience at the intersection of design, engineering, and technology, with a focus on sustainability and innovation. The programme fosters critical thinking, creative problem-solving and collaboration. Students explore sustainable materials, low-waste prototyping through sewing, embroidery, and 3D printing, and coding for embroidered designs, while learning how precision engineering drives innovation in BERNINA technology and the wider industry.	2	None			1.5	
3	1	CS3241	Elective	Object Oriented Programming	This course introduces Object-Oriented Programming (OOP) using Java. Students learn core OOP principles and Java fundamentals, including control flow, classes and objects, inheritance, arrays and ArrayLists, and Java API usage. The course also covers file input/output, exception handling, and the development of simple graphical user interface (GUI) applications, providing a strong foundation in software design and development.	3	CS2241			3	
3	1	CS3243	Elective	Informatics Olympiad Training I	The Informatics Olympiad emphasizes creativity in problem solving on one hand, and programming skill and expertise on the other. This course targets high ability computing students who are keen to prepare themselves rigorously for various Informatics Olympiad competitions and at the same time hope 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	CS2242		CS3241	1.5	
3	2	CS3242	Elective	Data Structures and Algorithms	This course introduces students to advanced data structures and algorithms in programming. Topics include the use and implementation of abstraction and encapsulation through classic structures such as lists, stacks, queues, and trees, as well as algorithmic analysis, recursion, and sorting algorithms. Students will learn to design efficient and well-structured solutions to complex computational problems.	3	CS3241			3	
3	2	CS3244	Elective	Informatics Olympiad Training II	This course 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 course.	2	CS3243		CS3242	1.5	

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4	1	CS4241	Elective	Informatics Olympiad Training III	This course 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 course.	2	CS3244			1.5	
4	1 and 2	CS4141	Core (Major)	Data Analytics & Machine Learning	This course introduces students to the Data Science Life Cycle, including data cleaning, exploratory data analysis (EDA), modeling, and visualization. Students will also gain foundational knowledge in Machine Learning, covering key topics such as supervised and unsupervised learning, neural networks, convolutional neural networks (CNNs), natural language processing (NLP), and large language models (LLMs). The course concludes with discussions on AI safety and ethics, emphasizing responsible and transparent use of intelligent systems.	8	CS3242			6	
5	1 and 2	CS5141	Core (Major)	Database Design & Web Development	This course introduces the fundamentals of database design and web development. Students learn relational modeling, ER diagrams, normalization, and SQL for creating and managing data. They also design and build reactive, responsive websites using HTML5, Bootstrap CSS, and JavaScript, developing modern, mobile-first interfaces that respond dynamically to user interactions.	8	CS4141			6	
5	1 or 2	CS5441V	Honours in lieu	NUS/CS1231 Discrete Structures	This course is offered by NUS School of Computing as CS1231. This course 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 Combinatorics: 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	CS4141			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 and 2	CS6141	Elective (Major)	Cybersecurity & Emerging Technologies	This course introduces the fundamental concepts of cybersecurity and emerging technologies. Students learn the principles of information security, including threats, vulnerabilities, and basic protection mechanisms for computers and networks. The course also explores the impact of new and emerging technologies on cybersecurity through industry talks and expert lectures, providing insights into current trends and real-world applications.	8	CS5141			6	
6	1 or 2	CS6441V	Honours in lieu	NUS/CS2100 Computer Organisation	This course is offered by NUS School of Computing as CS2100. The objective of this course is to familiarise students with the fundamentals of computing devices. Through this course 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	CS4141			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	CS6442V	Honours in lieu	NUS/CS2106 Introduction to Operating Systems	This course is offered by NUS School of Computing as CS2106. This course 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,	4	CS6441V			4	# Students majoring with Honours in Computer Science and chosen to read Honours

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					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.						Track from NUS School of Computing (SoC) must read at least 2 options.
6	1 or 2	CS6443V	Honours in lieu	SMU/CS440 Foundations of Cybersecurity	This course is CS440 offered by SMU School of Computing and Information Systems. The Foundations of Cybersecurity course provides fundamental knowledge and technical skills for protecting computing and networking systems against various cyber-attacks. Topics covered include cryptographic algorithms, public key infrastructure, network security, authentication, access control, web security basics, and malware basics. Classroom instructions will be integrated with hands-on exercises and group projects.	4	CS4141			4	# Students majoring with Honours in Computer Science and chosen to read Honours Track from SMU School of Computing and Information System must read at least 2 options.
6	1 or 2	CS6444V	Honours in lieu	SMU/CS424 Generative AI for Vision	This course is CS424 offered by SMU School of Computing and Information Systems. This course introduces the mathematical tools and concepts underlying image perception. These include deep learning, linear algebra, statistics and multi-view geometry. The goal is to get students comfortable with utilizing and interpreting the results of state-of-art machine learning techniques. At the end of the course, students should be aware of what can be achieved by current visual perception techniques, how to achieve it and what the limitations of these techniques are.	4	CS4141			4	# Students majoring with Honours in Computer Science and chosen to read Honours Track from SMU School of Computing and Information System must read at least 2 options.

## **Biology**

The Biology Curriculum is uniquely designed to cover both breadth and depth of the subject. Courses adopt a spiral and thematic approach that aims to enable students to build a solid foundation in biology and prepare them for advanced studies of biology and biology related disciplines. In chronological sequence of learning, these courses are Foundations in Biology I, Foundations in Biology II, Foundations in Biology III, Advanced Biology I, Advanced Biology II and Applied Biology.

The first three years are Foundation Years which will introduce students to the basic concepts of the various fields of biology, while allowing them to develop observation and inquiry skills. Besides equipping them with a good foundation, the experiential and hands-on learning will also provide an opportunity for them to pick up good habits of the mind and effective scientific skills. The topics covered include cell biology, human biology, botany, animal physiology, genetics and molecular biology.

The next three years are Specialization Years whereby students who are interested in pursuing biology related disciplines in universities will continue their learning in biology beyond the basics. The topics covered include evolutionary biology, ecology, biodiversity, molecular genetics and biochemistry. Students will explore biological phenomena, learn more extensively via outdoor field trips and engage in more in-depth investigations. There is more exposure to critical thinking and analytical skills in the more demanding courses, as well as an emphasis towards 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 Courses.

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 courses. Students who may have advanced knowledge in certain topics in biology will still be expected to go through the courses to attain hands-on experience in the laboratory and in the field, which unlike theoretical knowledge, cannot be acquired from textbooks.

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<b>Level</b>	<b>Sem</b>	<b>Course Code</b>	<b>Course Type</b>	<b>Course Title</b>	<b>Description</b>	<b>Unit</b>	<b>Pre-requisites</b>	<b>Preclusions</b>	<b>Co-requisites</b>	<b>Hrs/wk</b>	<b>Remarks</b>	
1	1 and 2	BL1131	Core	Foundations in Biology I	This is a year-long course 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 via the NUS High curriculum. The course begins with a macro perspective of life by getting students to explore how biotic and abiotic factors may influence the diversity and distribution of organisms, and discuss ethical issues related to the environment. Next, students will zoom into 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 mechanisms through which this can be facilitated are also subsequently studied. The biological molecules that move in and out of cells are also studied in detail; and students will also carry out investigations regarding how these substances can be identified. Lastly, students will explore the fate of biological molecules in plant systems with regards to nutrition. Three biological themes are addressed at various points during the course: 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 course, 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				2	Year long course
2	2	BL2233	Elective	Biology Olympiad Training I	This course is designed for selected Year 2 students with excellent performance in biology courses. These students will explore some challenging concepts not taught in the core courses. 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 course is by invitation only.	2	Department Approval			1.5		
2	1 and 2	BL2131	Core	Foundations in Biology II	This year-long course will continue to equip students with the basic foundational knowledge required to learn biology at a more advanced level subsequently. The main topics that are covered in this course include nutrition and transport in humans, reproduction in flowering plants and humans, as well as respiration, excretion and homeostasis in humans. Where appropriate, various bioethical issues and laboratory experimentation will be covered at suitable junctures throughout the course. Laboratory practical sessions will serve to enhance students' learning and understanding.	6	BL1131			3	Year long course	
3	1	BL3233	Elective	Biology Olympiad Training II	This course 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 course 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 course is by invitation only.	2	Department Approval			1.5		
3	1	BL3331	Enrichment	Foundations In General Biology	This is a bridging course offered to the yearly intake of new Year 3 students. Students will be guided to review the foundational knowledge in Year 1 and Year 2 biology courses such as ecology, cell biology and physiology. The key emphasis of the course is on the development and familiarization of hands-on practical skills that will facilitate the learning of biology. Laboratory skills involving microscopy, microbiological and physiological techniques will be taught.	2	None			1.5	Bridging course (For new Yr 3 intake only)	

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3	2	BL3234	Elective	Biology Olympiad Training III	This course is for students who have done well in BL3233. It is also open to Year 3 students whose Semester 1 performance in BL3131 is consistently excellent. These students will explore some challenging concepts not taught in the core courses. Students can expect rigorous training in biology topics that will prepare them for the following year's biology competitions. This course is by invitation only.	2	Department Approval			1.5	
3	1 and 2	BL3131	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, sensory, endocrine and excretory systems. 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 course focuses on in-depth study of the cell and molecules of life. It includes the functions of membrane systems and organelles in cells, the structures of biomolecules and their functions, as well as infectious diseases in humans. Where appropriate, various bioethical issues and laboratory experimentation will be covered at suitable junctures throughout the course.	6	BL2131			3	Year long course
4	1	BL4241	Elective	Biology Olympiad Training IV	This course is designed for selected Year 4 students with consistently excellent performance in their previous years' biology courses. They will be trained for the Singapore Junior Biology Olympiad (SJBO). Students can expect rigorous training in topics that are not taught in the core courses. This course is by invitation only.	2	Department Approval			1.5	
4	2	BL4242	Elective	Biology Olympiad Training V	This course is for students who have done well for BL4241 or those whose Semester 1 performance in BL4141 is consistently excellent. Students will be rigorously trained in topics of biology that are not covered in the core courses. The training is an important preparation for the Singapore Biology Olympiad (SBO) in the following year. This course is by invitation only.	2	Department Approval			1.5	
4	1 and 2	BL4141	Core (Major)	Advanced Biology I	Based on the foundation that students have built in the lower years, this course will explore various biological topics in greater depth. The topics covered include mode of action of enzymes, eukaryotic chromatin, genome organization, control of gene expression, mutations, cancer biology, energy and equilibrium, as well as biological evolution. Where appropriate, various bioethical issues and laboratory experimentation will be covered at suitable junctures throughout the course.	8	BL3131			4	Year long course
5	1	BL5441	Honours	Advanced Biology III	This course provides an exciting platform for the study of invertebrate animal diversity. It gives a brief introduction to the science behind classification by learning about taxonomy and phylogeny. Students will learn about the different invertebrate taxa, with an emphasis on diagnostic characteristics, evolutionary relationships, functional adaptations and environmental interactions. The interdisciplinary nature of this course aims to develop in students a deeper understanding and appreciation of the evolutionary innovations in the animal kingdom. Laboratory practicals conducted in this course will allow students to examine specimens in details. Field trips will also be organised for students to learn about taxonomical work and the natural heritage of Singapore.	2	BL4131			2	
5	1	BL5443	Honours	Biology Olympiad Training VI	This course is designed for selected students with consistently excellent performance in their previous years' biology courses. They will be trained for the Singapore Biology Olympiad (SBO). Students can expect rigorous training in a wide range of biology topics as well as answering techniques. This course is by invitation only.	2	Department Approval			1.5	
5	2	BL5442	Honours	Advanced Biology IV	This course focuses on vertebrate organisms and is a continuation of the previous course which focuses on invertebrates. Students will learn about the different vertebrate taxa, with an emphasis on diagnostic characteristics, evolutionary	2	BL4131			2	

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					relationships, functional adaptations and environmental interactions. The interdisciplinary nature of this course allows students to develop a deep understanding and appreciation of the evolutionary innovations in the animal kingdom. Laboratory practicals and relevant field trips will be conducted for students to learn about taxonomical work and the natural heritage of Singapore.						
5	2	BL5444	Honours	Biology Olympiad Training VII	This course is for students who have done well for BL5443 or those who are invited to read it due to their consistently excellent performance in their Year 5 biology courses. They will go through rigorous preparation for Singapore Biology Olympiad (SBO), which will be held in November (Theory Round) and December (Practical Round). A final selection of students to represent the school in SBO will be made at the end of this course.	2	Department Approval			1.5	
5	2	BL5445V	Honours in lieu	NUS/LSM2107 Evolutionary Biology	Evolutionary biology covers the history of life on our planet and the processes that produced the multiple life forms of Earth. Topics include: the origins of life, the eukaryotic cell, and multicellularity; the generation of genetic variation and the sorting of that variation through random processes and through natural and sexual selection; the origin of new traits, new life histories, and new species; the origins of sex, sociality, and altruism; the evolution of humans; and applications of evolutionary biology to solving modern-day problems.	4	BL4131			4	LSM2107 has a quota of 8 students per semester that is set by NUS
5	1 and 2	BL5141	Core (Major)	Advanced Biology II	This course builds on what students have learnt from BL4141, Advanced Biology I. Students will deepen their understanding of various advanced level biological topics which they will be exploring in a rigorous manner. The course deepens students' understanding of the following fields: ecology, physiology, genetics, and cytology. Students' knowledge of biochemistry, evolution and biodiversity is also strengthened and broadened through the infusion of concepts and ideas from these fields throughout the course. Focus is deliberately placed on the applications of concepts learnt within the course to issues encountered in daily life or at the national and global level, which involves the consideration of other disciplines. Besides cross-disciplinary links, the course focuses on drawing links between the different fields of biology. The course covers an ecology curriculum that is unique to NUS High School. It also covers infectious diseases, DNA technology, and neuronal signalling. Through the course, the big idea of evolutionary pressures and the trade-offs between different evolutionary strategies, across the different topics, is emphasised. Where appropriate, various bioethical issues will also be explored. Besides field work, students will also be given the opportunity to experience the following in a hands-on manner: running statistical simulations and analyses using ICT tools, simulating intra-specific and inter-specific competition, carrying out gene cloning, using ELISA to diagnose HIV, and measuring the effect of neuromodulators on action potentials generated in the nervous system of a cricket.	8	BL4131			4	Year long course
6	1	BL6441	Honours	Advanced Molecular Genetics I	This course builds upon students' foundational understanding of molecular genetics and its practical applications. It explores essential topics, including forward and reverse genetics, tools for studying gene expression, recombinant protein production, and protein-protein interactions. In the laboratory, students will conduct hands-on experiments, such as RNA extraction, reverse transcription PCR, gel electrophoresis, gel extraction, TA cloning, bacterial transformation, and blue-white selection, cultivating valuable proficiencies in molecular biology and genetics research. These skills are not only beneficial for future studies but also serve as a solid foundation for pursuing careers in biotechnology, biomedicine, and related fields.	2	BL4131 and BL5131			2	

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6	1	BL6443V	Honours in lieu	NUS/LSM2106 Fundamental Biochemistry	The objective is to provide the student with a firm and rigorous foundation in current concepts of the structure and functions of biomolecules in molecular cellular biology. These fundamental concepts form the basis of almost all recent advances in biological and the biomedical sciences. The lectures will introduce various cellular organelles as models to gain insights into how structures and functions of classes of biomolecules participating in important cellular processes.	4	BL4131			4	LSM2106 has a quota of 8 students per semester that is set by NUS
6	1	BL6444V	Honours in lieu	NUS/LSM2105 Molecular Genetics	This course covers topics on (i) the patterns of inheritance, (ii) the molecular properties of genes and chromosomes, (iii) transcription and translation, (iv) genetic methods and technology, and (v) genetic analysis of individuals and populations. This will include an in-depth understanding of mendelian patterns of inheritance and variations that could occur due to multiple alleles, lethal genes, chromosomal variations, linkage, gene interaction and other genetic phenomena. Emphasis is placed on the understanding of the underlying molecular and biochemical basis of inheritance. Quantitative and population genetics will also be discussed with the emphasis of understanding the processes and forces in nature that promote genetic changes.	4	BL4131			4	LSM2105 has a quota of 8 students per semester that is set by NUS
6	2	BL6442	Honours	Advanced Molecular Genetics II	This course builds upon students' foundational knowledge of molecular genetics and its practical applications, with a specific emphasis on the interplay between protein structure and function. It underscores the importance of comprehending the chemical properties of proteins when selecting appropriate and efficient laboratory methods for tasks such as protein extraction, detection, purification, and quantification. Students will gain a deep understanding of the core principles underpinning these laboratory techniques and how they are applied to protein studies. These studies act as a vital link between basic research and clinical medicine, offering valuable insights into diseases, aiding drug development, facilitating early diagnosis, and enabling personalized treatments.	2	BL4131 and BL5131			2	
6	1 and 2	BL6241	Elective	Applied Biology	After acquiring advanced-level knowledge in biology from previous courses, this course enables students to appreciate the application aspects of biology. The emphasis on current trends in biology and relevant contemporary issues will give students the opportunity to understand the significance of what they are learning and how knowledge and technology could be harnessed to tackle real life problems.	8	BL4131 and BL5131			4	Year long course

## **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 a spiral approach and is divided into two key stages – Foundation and Specialisation.

The objectives of the Foundation Years (Years 1, 2 and 3) 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 and basic laboratory skills.

In the Specialisation Years (Years 4, 5 and 6), students will be introduced to more advanced concepts. 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. Courses also 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.

Students will have the option of sitting for the AP Chemistry examination in Year 6.

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 courses.

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

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<b>Level</b>	<b>Sem</b>	<b>Course Code</b>	<b>Course Type</b>	<b>Course Title</b>	<b>Description</b>	<b>Unit</b>	<b>Pre-requisites</b>	<b>Preclusions</b>	<b>Co-requisites</b>	<b>Hrs/wk</b>	<b>Remarks</b>
1	1 and 2	CM1131	Core	Foundations in Chemistry I	This is a year-long course 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 course are essential to the understanding of Chemistry in the more advanced courses.	4	None			2	Year long course
1	1 and 2	CM1331	Enrichment	Chemical Potpourri I	This lab-based course 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			1.5	
2	2	CM2231	Elective	Chemistry Olympiad Training I	This introductory course serves to engage talented students with a more in-depth study of the concepts learnt in Year 1 and 2 core courses, with the incorporation of some new concepts. It also serves to train the students' problem-solving ability and nurture their scientific common sense.	2	Department Approval			1.5	
2	1 and 2	CM2131	Core	Foundations in Chemistry II	This year-long course is a continuation from Foundations in Chemistry I, and aims to strengthen the fundamental chemistry concepts required for chemistry students to appreciate and master the chemistry courses taught at higher levels. The emphasis in this course 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.	6	CM1131			3	Year long course
2	1 or 2	CM2331	Enrichment	Chemical Potpourri II	Chemistry plays an integral role in the daily running of our lives. This course 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	CM1131			1.5	
3	1	CM3231	Elective	Chemistry Olympiad Training II	This course serves to engage talented students in chemistry with a more in-depth study of topics learnt in Years 1-3 core courses. New concepts will be included and many are built on the key understanding of the concepts acquired previously. This course also aims to train the students' problem solving ability and nurture their scientific skills to get them better prepared for the Olympiad competitions.	2	Department Approval			1.5	
3	1	CM3332	Enrichment	Foundations in Chemistry (Bridging)	This is a bridging course for new students joining our school at Year 3. It aims to allow students to master fundamental chemistry knowledge which will be required for the understanding of higher chemistry courses. There will also be hands-on experience in volumetric analysis and basic chemical analysis.	2	Department Approval			1.5	Bridging course (For new Yr 3 intake only)
3	2	CM3232	Elective	Chemistry Olympiad Training III	This course serves to engage talented students in chemistry with a more in-depth study of topics learnt in Years 1-3 core courses. New concepts will be included and many are built on the key	2	Department Approval			1.5	

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					understanding of the concepts acquired previously. This course also aims to train the students' problem solving ability and nurture their scientific skills to get them better prepared for the Olympiad competitions.						
3	1 and 2	CM3131	Core	Foundations in Chemistry III	This course extends the concepts covered in the first two foundation courses. It will introduce students to the fascinating world of Organic Chemistry and also delve a little deeper into Chemical Bonding. Other topics covered include Energy Changes and Redox Reactions. Concluding this course, students will consolidate what they have learnt in the foundation years.	6	CM2131			3	Year long course
4	1	CM4241	Elective	Chemistry Olympiad Training IV	These are chemistry elective courses 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.	2	Department Approval			1.5	
4	2	CM4242	Elective	Chemistry Olympiad Training V	These are chemistry elective courses 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.	2	Department Approval			1.5	
4	1 and 2	CM4141	Core (Major)	Advanced Chemistry I	The course introduces the basic ideas of quantum theory, describes the electronic structures of the elements in the Periodic Table and explains the periodicity of the atomic properties of the elements. It continues with the Valence Bond Theory and the concept of hybridisation in describing the formation of covalent bonds. Structures and properties of gases, liquids and solutions are then examined in greater detail. Principles of Inorganic Chemistry, focusing on the key ideas such as the Uniqueness Principle, the Diagonal Effect, the Inert-pair effect, Lewis acid/base, $p\pi-d\pi$ bonding and the acid-base nature of oxides are also discussed. The course then transits to the study of rates of chemical reactions. It revisits the Collision theory to explain how various factors affect rates of reactions, and also covers in depth the quantitative description of reaction kinetics, followed by proposing reaction mechanisms that are consistent with experimental rate laws. The third part of the course covers the concept of equilibrium which is fundamental in almost all chemical reactions, as well as many physical processes. It explores the idea of reversible reactions, dynamic equilibrium in a closed chemical system, and how various factors can influence an equilibrium system. With this understanding, we will be able to describe chemical equilibrium quantitatively using equilibrium constants. The course also discusses the various homogeneous and heterogeneous equilibria, ranging from gaseous equilibria to aqueous equilibria of weak acids and bases, buffer solutions and sparingly soluble salts.	8	CM3131				Year long course
5	1	CM5441	Honours	Separation Science	This course covers the various aspects of separation techniques used in modern day chemistry. Students will gain an understanding of distillation, extraction, and various chromatographic methods, including Thin Layer Chromatography (TLC), gas chromatography (GC), ion-exchange chromatography and high performance liquid chromatography (HPLC). Students will also gain practical experience into these topics.	2	CM4141 and Department Approval			2	

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5	1	CM5444	Honours	Chemistry Olympiad Training VI	These are chemistry elective courses 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).	2	Department Approval			1.5	
5	2	CM5442	Honours Option	Structural Elucidation	This course covers the different approaches and methods that are employed by scientists in modern day chemistry to deduce the structural features of unknown compounds. Some of the characterization techniques covered will include nuclear magnetic resonance (NMR) spectroscopy, mass spectrometry (MS), and infrared (IR) spectroscopy. These analytical skills will aid them greatly in their pursuit, particularly in Science and Engineering.	2	CM4141 and Department Approval			2	
5	2	CM5443	Honours Option	Principles of Chemical Engineering	This course provides students with a basic concept of chemical engineering processes and related problem-solving methods. It provides an introduction to the principles of chemical engineering process analysis. The course discusses details of steady state material and energy balances, including recycle, bypass, purge, phase change and chemical reactions. Other topics include simultaneous mass and energy balances. Students taking this course must have a strong foundation in mathematics.	2	CM4141 and Department Approval			2	
5	2	CM5445	Honours	Chemistry Olympiad Training VII	These are chemistry elective courses 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).	2	Department Approval			1.5	
5	2	CM5446 V	Honours in lieu	NUS/CM1102 Chemistry - The Central Science	The course takes on a thematic approach to illustrate core concepts and the central role it plays in science. The three main themes are – the Environment, Materials and Life. Issues such as global warming, industrialization, energy, sustainability, biomedical advancement, etc. will be discussed. Students will get to appreciate key scientific fundamentals, explore real issues and deliberate on possible future solutions.	4	Department Approval		CM5141	4	
5	1 and 2	CM5141	Core (Major)	Advanced Chemistry II	The first part of the course talks about organic chemistry, which surrounds us in every part of our lives and its knowledge transcends all disciplines of science. Organic compounds vary greatly in size and complexity, from the simplest hydrocarbon, methane, to macromolecules, made up of thousands of atoms. The content builds on the foundation from Year 3 and students can expect to learn more organic reactions and delve deeper into the mechanisms. The second part of the course goes into chemical thermodynamics, which is the study of the interrelation of heat and work with chemical reactions. We make use of the First Law of Thermodynamics to establish an understanding of enthalpy change of reaction, and the calculations of enthalpy changes by the Hess' Law. The course further makes use of the Second Law of Thermodynamics, focusing on the use of Gibbs free energy change,	8	CM4141				Year long course

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					to predict and explain the spontaneity of a reaction under a specific set of conditions. The Third Law of Thermodynamics is also discussed in order to have a complete understanding of entropy changes of reactions. Building upon the redox as well as reactivity concepts covered in the foundation years, this course will delve deeper into electrochemistry, covering the principles underlying the function of galvanic cells and the selective discharge of ions in electrolytic cells.						
6	1	CM5446 V	Honours in lieu	NUS/CM1102 Chemistry - The Central Science	The course takes on a thematic approach to illustrate core concepts and the central role it plays in science. The three main themes are – the Environment, Materials and Life. Issues such as global warming, industrialization, energy, sustainability, biomedical advancement, etc. will be discussed. Students will get to appreciate key scientific fundamentals, explore real issues and deliberate on possible future solutions.	4	CM5141 and Department Approval			4	Re-offered by NUS this semester. Catered to students on the NUSH hybrid track
6	1	CM6446 V	Honours in lieu	NUS/CM2133 Foundations of Physical Chemistry	Students will learn how the wavefunction description of matter leads to energy quantization. This concept is applied to spectroscopic techniques of UV-visible, FTIR, Raman and NMR spectroscopy. The laws of thermodynamics that characterize and govern physical chemical systems will also be included and applied to phase and chemical equilibria. In chemical kinetics, the rate laws, reaction mechanisms and simple rate theories will be discussed.	4	NUS CM1102 and Department Approval			4	
6	2	CM6441	Honours	Emerging Trends in Chemistry	This course aims to equip students with an understanding of the current and emerging issues that affect us and how chemistry is linked to these issues. These include organocatalysis, graphene chemistry, organic chemistry, environmental chemistry, nanochemistry, medicinal chemistry and inorganic chemistry. Guest speakers will be invited to discuss their current research, and the latest technology and developments in Chemistry.	2	CM5141 and Department Approval			2	
6	2	CM6442	Honours Option	Advanced Organic Chemistry	Organic chemistry surrounds us in every part of our life and its knowledge transcends all disciplines of science. The vast majority of chemical compounds known to man are organic; that is, they are compounds built on a carbon framework. Organic compounds vary greatly in size and complexity, from the simplest hydrocarbon, methane, to macromolecules, made up of thousands of atoms. In this advanced course, students will go more in depth and scope of the types of reactions they have learnt in the previous organic chemistry course.	2	CM5141 and Department Approval			2	
6	2	CM6443	Honours Option	Quantum Chemistry and its Applications	This course aims to provide students with the understanding of the physical and mathematical aspects of quantum chemistry and molecular electronic structure. Areas to be covered include history and development, basic principles and Schrodinger equation, common approximations and molecular geometry predictions. A strong foundation in mathematics is important for this course.	2	CM5141 and Department Approval			2	
6	1 and 2	CM6241	Elective	Chemistry in Context	This course aims to allow students to explore various commonly encountered contexts where chemistry is applied in areas of industry, research, pharmaceuticals, forensics as examples. At regular junctures, key cornerstone chemical concepts – the big ideas, the enduring understanding and essential knowledge in chemistry will be revisited and consolidated. As part of the learning	8	CM5141			8	Year long course

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					experience, an introductory course in laboratory synthesis will also be included. Chemical synthesis is one of the most valuable skills to learn in a chemistry laboratory and the practical sessions are designed to provide a foundational training in elementary techniques commonly employed in synthetic chemistry, together with exposure to routine analytical techniques such as chromatography.							
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## **Physics**

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

Foundation courses (Year 1, 2 & 3) 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.

The Specialisation courses (Year 4, 5 & 6) build on what has been introduced in the earlier years, covering a wide range of topics from rotational mechanics to practical circuitry and modern physics. Honours students will extend their study in mechanics and electromagnetism through the use of calculus as well as offer a course on special relativity. The emphasis is on deepening students' understanding and extending their learning through a higher level of analytical and mathematical sophistication. These courses provide the necessary foundation for students to take university courses in Physics and Engineering.

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

Besides Major in Physics, the department also offers both Major with Honours in Physics and Major with Honours in Engineering. A summary of the required courses 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 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.

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<b>Level</b>	<b>Sem</b>	<b>Course Code</b>	<b>Course Type</b>	<b>Course Title</b>	<b>Description</b>	<b>Unit</b>	<b>Pre-requisites</b>	<b>Preclusions</b>	<b>Co-requisites</b>	<b>Hrs/wk</b>	<b>Remarks</b>
1	1	PC1331	Enrichment	Robotics I	This module aims to spark the interest of students in the field of robotics and artificial intelligence through the use of animatronics and applied A.I resources. They will be introduced to high-level programming with python, learn the history and beginnings of Markov Chains and LLMs in AI and how to use it to generate poems and/or lyrics, where they will then program their robot heads to mouth the words in a realistic manner. The course is conducted by an external vendor and the total cost per student is S\$100. For Singaporean students, Edusave Fund may be used for this payment.	2	None			1.5	This course is offered subject to teaching manpower availability
1	2	PC1332	Enrichment	Robotics II	This course is a hands-on introduction to robotics through the mechanical building and control of a tracked vehicle and a turret. Students will learn to integrate modular electronics and sensor technology with the Raspberry Pi Pico microcontroller, while controlling the mobile vehicle from the PC using the python programming language. The workshop culminates with a mini friendly competition on the final lesson based on a set course and terrain. The course is conducted by an external vendor and a course fee is applicable. For Singaporean students, Edusave Fund may be used for this payment.	2	None			1.5	This course is offered subject to teaching manpower availability
1	2	PC1333	Enrichment	Introductory Astronomy	This course provides an introduction to some introductory topics in astronomy. These include the structure of the universe, models of the solar system, the celestial sphere and tools of astronomy, including telescopes & charge-coupled devices.	2	None			1.5	This course is offered subject to teaching manpower availability
1	1 and 2	PC1131	Core	Foundations in Physics I	This course provides an introduction to some foundational topics in Physics. These include Physical Quantities, Units & Measurement, Mass, Weight & Density, General Wave Properties, Sound, Light and the Electromagnetic Spectrum.	4	None			2	Year long course
2	1	PC2331	Enrichment	Robotics III	This module aims to introduce students to retro game programming on a handheld retro game console. They will learn to program their own game using the retroPy game engine and micro python. Games will be run on a handheld game console running Raspberry Pi's micro controller that they will design and build. The module culminates in a mini game competition. The course is conducted by an external vendor and a course fee is applicable. For Singaporean students, Edusave Fund may be used for this payment.	2	None			1.5	This course is offered subject to teaching manpower availability
2	1	PC2333	Enrichment	Astronomy I	This course provides an introduction to further topics in astronomy. These include stars (including Herzsprung-Russell diagrams), the evolution of stars, galaxies and cosmology.	2	None			1.5	This course is offered subject to teaching manpower availability
2	2	PC2231	Elective	Physics Olympiad Training I	This course covers challenging problems in physics and can be taken as preparation for the Singapore Junior Physics Olympiad (SJPO).	2	None			1.5	
2	2	PC2332	Enrichment	Robotics IV	To be updated by Semester 2 of 2025	2	None			1.5	This course is offered subject to teaching manpower availability
2	1 and 2	PC2131	Core	Foundations in Physics II	This course provides an introduction to some foundational topics in Physics. These include Kinematics, Dynamics, Work, Energy, Power, Pressure, Kinetic Model of Matter, Thermal Physics, Internal Energy and Radioactivity.	6	PC1131			3	Year long course
3	1	PC3231	Elective	Physics Olympiad Training II	This course covers challenging problems in physics and can be taken as preparation for the Singapore Junior Physics Olympiad (SJPO).	2	PC2231			1.5	

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3	1	PC3333	Enrichment	Physics Bridging	This course 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 course (For new Yr 3 intake only)
3	2	PC3232	Elective	Physics Olympiad Training III	This course covers challenging problems in physics and can be taken as preparation for the Singapore Junior Physics Olympiad (SJPO).	2	PC3231			1.5	
3	2	PC3331	Enrichment	Astronomy II	This course provides an introduction to further topics in astronomy. These include the sun, the solar system and other planetary systems.	2	None			1.5	This course is offered subject to teaching manpower availability
3	1 and 2	PC3131	Core	Foundations in Physics III	This course provides an introduction to some foundational topics in Physics in Electricity and Magnetism. This course also develops concepts in Mechanics. Students will study topics of forces, dynamics, torque and equilibrium, and work, energy and power in greater detail.	6	PC2131			3	Year long course
4	1	PC4241	Elective	Physics Olympiad Training IV	This course covers challenging problems in physics and can be taken as preparation for the Singapore Junior Physics Olympiad (SJPO).	2	PC3232			1.5	
4	1	PC4341	Enrichment	Astronomy III	This course covers challenging topics in Astronomy and can be taken as a preparation for Singapore Astronomy Olympiad	2	None			1.5	This course is offered subject to teaching manpower availability
4	1	PC4342	Enrichment	Real to Reel: Explaining Physics Through Videos	This course introduces students to the basics of creating Physics explainer videos by combining the science of Physics with the art of video-making.	2	None			1.5	This course is offered subject to teaching manpower availability
4	2	PC4242	Elective	Physics Olympiad Training V	This course covers challenging problems in physics and can be taken as preparation for the Singapore Physics Olympiad (SPhO).	2	PC4231			1.5	
4	1 and 2	PC4141	Core	Advanced Physics I	This course provides an introduction to some advanced topics in Mechanics and E&M Physics. These include 2D motions, Momentum, Gravitation, Electric Fields & Interactions, Capacitance & Dielectrics, Direct Current Circuits, Electromagnetism, Electromagnetic Induction, and Alternating Currents.	8	PC3131			4	Year long course
5	1	PC5441	Honours	Calculus-based Physics I	This course provides an introduction to the use of advanced mathematical techniques such as differentiation and integration to analyse and solve physics problems. Some topics on Mechanics and Electricity & Magnetism will be revisited with the application of calculus in problem-solving, where appropriate.	2	PC4131 and PC4132			2	
5	1	PC5443	Honours	Physics Olympiad Training VI	This course covers challenging problems in physics and can be taken as preparation for the Singapore Physics Olympiad (SPhO).	2	PC4232			1.5	
5	2	EG5440V	Honours in lieu	NUS/BN1112 Introduction to Biomedical Design and Manufacturing	The practice of biomedical engineering often involves design and manufacturing of medical devices. This foundational course provides an introduction to the part of the design process where an idea is first communicated through engineering drawings and computer-aided design software, before being sent for manufacturing. Examples of common medical devices will be used to impart 3D modelling skills using industry-standard software. This course will further introduce key concepts in prototyping, 3D printing, and manufacturing for biomedical applications. Students will explore the principles and processes involved in transitioning designs from prototypes to production, including materials selection, manufacturing techniques, and design for manufacturability.	4	PC4131 and PC4132			4	
5	2	EG5441V	Honours in lieu	NUS/CN1101A Chemical Engineering Principles and Practice I	This course provides an experiential exposure to chemical engineering concepts through a series of hands-on experimental laboratories. Simple yet visually engaging demonstrations will bring these concepts to life, and act as a preview and bridge to the core courses in the undergraduate curriculum, while highlighting their practical relevance.	4	PC4131 and PC4132			4	

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					The students will prepare for each session by compulsory pre-laboratory readings on theoretical background and laboratory procedures. In the laboratory, they will learn to carry out measurement, data collection, analysis, modelling, interpretation and presentation. The laboratory sessions will be blended with real engineering applications of industrial and societal relevance to Singapore.					
5	2	EG5442V	Honours in lieu	NUS/CE1109 Structural Engineering Principles	This course introduces students to the fundamental principles governing the behaviour of structures under loading, methods for analysing the response of simple structures, and best practices in designing safe and efficient structures. Students will explore key concepts such as forces and moments, equilibrium, stress and strain, deformation and deflection, and stiffness and strength. The course emphasises both theoretical understanding and practical applications of these concepts for various structures including trusses, cables, beams, and planar frames. Upon completing this course, students will possess foundational knowledge that is essential for subsequent courses in structural engineering.	4	PC4131 and PC4132		4	
5	2	EG5443V	Honours in lieu	NUS/CG1111A Engineering Principles and Practice I	This course is the first of the two Engineering Principles and Practice (EPP) courses taken by computer engineering students, which aim to inculcate in them the computer engineer's way of thinking. They are first taught the fundamental principles of electronic circuits through experiential learning, along which they also build up their hands-on circuit designing, building, and debugging skills. They are then guided to apply these principles and skills to build a sensor-assisted autonomous robotic vehicle as a grand finale challenge. Upon completing the course, they can appreciate the importance of circuits, signals, and sensors in system implementation.	4	PC4131 and PC4132		4	
5	2	EG5444V	Honours in lieu	NUS/EE1111A Engineering Principles and Practice I	This is the first of a two-part course Electrical Engineering Principles and Practice (EPP) I and II that introduces first year EE students to the world of electrical engineering. They learn to analyse complex systems, and to conduct basic experiments. They learn fundamental principles that explain how electrical components interact with one another to make a system work, and how they may fail. They learn how systems get energy, and how to determine the size of energy source. Students learn how to use circuit simulation software and microcontroller-based system development tools. Students also learn about safety, and how to effectively communicate technical contents.	4	PC4131 and PC4132		4	
5	2	EG5445V	Honours in lieu	NUS/ESP1111 Engineering Principles in Action	Students will learn engineering fundamentals like forces and equilibrium, dynamics and understand how materials and structures work and fail. They will also learn the transport phenomena which includes the principles of heat transfer by conduction and convection as well as the mass transfer by diffusion and convection. They will learn the importance of safety in conducting engineering activities, units and dimensions, significant numbers, how to make good guesses to solve engineering problems, vector mechanics and create engineering drawings. The students apply these concepts through building a wooden tower, taking full control of its design, modelling and construction. They will test their towers on a shake-table, and the team with the best design, based on a pre-determined set of metrics, will be given due recognition. They will also conduct a few simple experiments to	4	PC4131 and PC4132		4	

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					appreciate the heat and mass transfer processes in different materials. Finally, they apply their knowledge of coupled heat and mass transfer processes for the design, fabrication and testing of a small-scale dryer for the drying of potato slices.						
5	2	EG5446V	Honours in lieu	NUS/ESE2101 Environmental Engineering Principles & Practice	This course aims to excite first year engineering students about Environmental Engineering and the science and engineering principles that underlie Environmental Engineering applications. The course equips students with knowledge, critical thinking, computer-aid analysis, and practical experiences that are fundamental to Environmental Engineering. Basic environmental chemistry, microbiology, and hydraulics will be examined through a project-based learning. Thus, students will learn basic principles of chemical and biological processes and will be exposed to the concept of hydraulics. The lab-style teaching provides opportunities for hands-on experiences in 3D model design, digitalization, big-data analysis, and system analysis for environmental pollution control.	4	PC4131 and PC4132			4	
5	2	EG5447V	Honours in lieu	NUS/I/E1111R Industrial & Systems Engineering Principles & Practice I	This course introduces first year industrial and systems engineering students to various problems in this field and how they can be analysed and tackled through mathematical modelling, data analytics, simulation and quantitative decision making. By working on a series of carefully curated problems, students gain an appreciation for the challenges faced when tackling large complex problems under uncertainty and the role that data can play in addressing them.	4	PC4131 and PC4132			4	
5	2	EG5448V	Honours in lieu	NUS/MLE1001B Materials Science & Engineering Principles & Practice I	This is the first of a two course set: Engineering Principle and Practice I and II (EPP I and EPP II) to introduce first year students to how materials engineers think and address societal problems. EPP I will use hands-on lab experiences with state-of-the-art applications of both soft materials (e.g. polymers whose applications span drug delivery to aircraft windows) and hard materials (e.g. silicon, whose applications span transistors to solar cells) integrated with targeted chemistry and physics lecture content to understand how these materials work. Instruction on experimental methods, and both oral and written scientific communication are key learning objectives.	4	PC4131 and PC4132			4	
5	2	EG5449V	Honours in lieu	NUS/ME1103 Principles of Mechanics and Materials	This course comprises two parts, namely: Part I on mechanics, and Part II on materials. Part I provides basic mechanical engineering knowledge and theory of mechanics of materials, and how they are used to solve practical engineering problems. It includes statics analysis of rigid body and assemblies, such as truss, frame and machines. It also covers the basic concept internal force and moment, which in turn translate to the stress in structures, such as axially loaded truss and laterally loaded beam. Part II introduces engineering materials and their properties, including the tests used to establish these properties. The structures of the various classes of materials will be discussed in relation to their different properties and deformation behaviour. The basics of materials selection will also be covered.	4	PC4131 and PC4132			4	
5	2	EG5450V	Honours in lieu	NUS/EG1311 Design & Make	This course covers the fundamentals of engineering design and prototyping. Students will learn design principles and tools through lectures and engage in experiential learning through group design projects. A stage-based design process will be covered. Students will	4	PC4131 and PC4132			4	This course is also offered in Year 6 Sem 1

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					develop skills in Arduino-controlled electronics, CAD modelling, and rapid prototyping to demonstrate their ideas.						
5	2	EG5451V	Honours in lieu	NUS/DTK1234 Design Thinking	In this course, students use design principles to develop their creative potential and practise design thinking using a people-centered approach to solve problems and create new possibilities. Through practical activities, students will discover tools and mindsets that guide them in navigating ambiguity in a creative process, observing and learning from others in unfamiliar contexts, and generating and experimenting with ideas quickly. While students draw on design thinking as a personal creative skillset, they will also value the impact of design that affords people the opportunity and privilege to shape the world that they, and others, inhabit.	4	PC4131 and PC4132			4	This course is also offered in Year 6 Sem 1
5	2	EG5452V	Honours in lieu	NUS/IPM1104 Built Environment Engineering Principles and Practice	This course provides an introductory exposure to the built environment through the discussion of fundamental engineering principles behind passive and active strategies for green buildings. International and local standards for green buildings are also discussed. Case studies along with industry speakers are incorporated for authentic learning. The course culminates in a mini-conference for students to present their work and learn together.	4	PC4131 and PC4132			4	
5	2	EG5453V	Honours in lieu	NUS/RB1101 Fundamentals of Robotics I	This is the first of two courses that introduces students to what engineers do and the engineer's thought process, with a particular orientation towards the field of robotics. This course focuses on how systems work and fail, and how they are designed. Through both theory and hands-on activities, students are introduced to the fundamental concepts that govern engineering systems (such as forces and motion, energy, material properties), and a holistic view of how a robotic system works. At the end of the course, students will have developed an understanding of the major topics relevant to the fundamentals of robotic systems engineering.	4	PC4131 and PC4132			4	
5	2	PC5440V	Honours in lieu	NUS/PC1101 Frontiers of Physics	This course gives students of all backgrounds the opportunity to understand the philosophical underpinnings of physics, and hence that of all natural sciences. Students will be exposed to the big ideas and fundamental concepts in physics, learn about the key historical experiments as well as the latest ideas at the frontiers in physics, such as quantum computing, exoplanets, and the grand unified theory.	4	PC5431			4	3 NUS courses can be read in lieu to fulfil NUSHS Physics Honours requirement: 1) PC1101/ Frontiers of Physics (Most students will take this in Y6Sem2 which will be NGNE only, special case can take it in Y5Sem2 to fulfil Honours in lieu) 2) PC2131/ Electricity & Magnetism I 3) PC2132/ Classical Mechanics I They can be read in either Y5 Sem 2 or Year 6 Sem 1
5	2	PC5442	Honours	Calculus-based Physics II	This course builds on PC5431 and exposes students to the use of advanced mathematical techniques such as solving ordinary differential equations to analyse and solve problems in Physics.	2	PC5431			2	

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5	2	PC5444	Honours	Physics Olympiad Training VII	This course covers challenging problems in physics and can be taken as preparation for the Singapore Physics Olympiad (SPhO).	2	PC5231			1.5	
5	2	PC6441V	Honours in lieu	NUS/PC2031 Electricity & Magnetism I	This course considers the fundamentals of Electricity and Magnetism and covers topics such as: electrostatic fields, Coulomb's law and Poisson's equation; magnetostatic fields, Biot-Savart's law and Poisson's equation; time-varying electric and magnetic fields, Faraday's and generalised Ampere's laws; Maxwell's equations and electromagnetic waves in vacuum.	4	PC5431			4	3 NUS courses can be read in lieu to fulfil NUSHS Physics Honours requirement: 1) PC1101/ Frontiers of Physics (Most students will take this in Y6Sem2 which will be NGNE only, special case can take it in Y5Sem2 to fulfil Honours in lieu) 2) PC2131/ Electricity & Magnetism I 3) PC2132/ Classical Mechanics I They can be read in either Y5 Sem 2 or Year 6 Sem 1
5	2	PC6442V	Honours in lieu	NUS/PC2032 Classical Mechanics I	This course considers the principles of Newtonian Mechanics and covers topics such as kinematics, inertial and non-inertial reference frames, linear momentum, kinetic energy, and angular momentum; Newton's laws of motion, forces and torques; systems of many particles including rigid bodies; conservation laws; Newtonian gravity and Kepler's laws of planetary motion.	4	PC5431			4	3 NUS courses can be read in lieu to fulfil NUSHS Physics Honours requirement: 1) PC1101/ Frontiers of Physics (Most students will take this in Y6Sem2 which will be NGNE only, special case can take it in Y5Sem2 to fulfil Honours in lieu) 2) PC2131/ Electricity & Magnetism I 3) PC2132/ Classical Mechanics I They can be read in either Y5 Sem 2 or Year 6 Sem 1
5	1 and 2	PC5141	Core	Advanced Physics II	This course provides an introduction to some advanced topics in physics. These include Fluids Mechanics, Thermodynamics, Simple Harmonic Motion, Waves, Physical Optics, Nuclear Physics and Quantum Physics.	8	PC4133			4	Year long course
6	1	EG5450V	Honours in lieu	NUS/EG1311 Design & Make	This course covers the fundamentals of engineering design and prototyping. Students will learn design principles and tools through lectures and engage in experiential learning through group design projects. A stage-based design process will be covered. Students will develop skills in Arduino-controlled electronics, CAD modelling, and rapid prototyping to demonstrate their ideas.	4	PC4131 and PC4132			4	This course is also offered in Year 5 Sem 2

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6	1	EG5451V	Honours in lieu	NUS/DTK1234 Design Thinking	In this course, students use design principles to develop their creative potential and practise design thinking using a people-centered approach to solve problems and create new possibilities. Through practical activities, students will discover tools and mindsets that guide them in navigating ambiguity in a creative process, observing and learning from others in unfamiliar contexts, and generating and experimenting with ideas quickly. While students draw on design thinking as a personal creative skillset, they will also value the impact of design that affords people the opportunity and privilege to shape the world that they, and others, inhabit.	4	PC4131 and PC4132			4	This course is also offered in Year 5 Sem 2
6	1	EG6440V	Honours in lieu	NUS/BN2112 Cell Biology and Analytics for Engineers	This course covers fundamental topics in cell biology with an emphasis on applications in biomedical engineering. Topics include cellular anatomy and physiology, types of biomolecules, cellular mechanics, cell cycle, cell signaling pathways regulating growth/differentiation/death, and analytical techniques for studying cells in a laboratory. The course includes a practical laboratory component that will provide hands-on experience in observing, analysing, and quantifying cellular structure/behaviour, as well as critically analysing and evaluating experimental data. The objective is to introduce a complete novice engineering student to the vocabulary and concepts of cell biology that provide a foundation for future study in biomedical engineering.	4	EG5430V (NUS/BN111)			4	
6	1	EG6441V	Honours in lieu	NUS/CN2102 Chemical Engineering Principles and Practice II	This course is the second part of a two-part course designed to provide first year Chemical and Biomolecular Engineering students with an experiential exposure to the foundational concepts of Biomolecular/Biochemical/Bioprocess Engineering, including mass and energy balances, biosafety and sterile handling, bioreaction kinetics, bioreactor design, downstream processing and purification, etc., through a series of hands-on experimental laboratories. In the laboratory, they will learn to carry out measurement, data collection, analysis, interpretation and presentation. The laboratory sessions will be blended with real engineering applications of industrial and societal relevance to Singapore.	4	EG5431V (NUS/CN101A)			4	
6	1	EG6442V	Honours in lieu	NUS/CE2155 Principles of Structural Mechanics and Materials	This course equips students with knowledge and skills in structural mechanics, and materials for structural engineering. The topics introduce the fundamentals of material constitutive behaviours and failure models to appreciate the use of materials in structural design. The topics also cover the composite, micro-structure and properties of concrete, steel and wood, with an emphasis on the mix-design of concrete. The course is compulsory for civil engineering undergraduate students without which he will not be qualified to practise as a professional civil engineer.	4	EG5432V (NUS/CE1103)			4	
6	1	EG6443V	Honours in lieu	NUS/CG2111A Engineering Principles and Practice II	This course will be for the students who have completed EPP I and the project scope extends to handle challenges in large-scale systems. Similar to EPP I, students will first learn the fundamental principles on certain advanced concepts and then design and programme a real-world system. The course involves designing a complex computer engineering system that facilitates information processing, real-world interfacing, and understanding the effects of certain useful metrics such as, scaling, safety, security, sustainability, societal impact, fault-tolerant design, etc.	4	EG5433V (NUS/CG111A) & NUS course CS1010 or CS1010 placement Exam			4	

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6	1	EG6444V	Honours in lieu	NUS/EE2111A Electrical Engineering Principles and Practice II	This course is the second part of a two-part course Electrical Engineering Principles and Practice (EPP) I and II and follows closely the same learning objectives. While it introduces alternating current circuits to the students, integration of a DC-powered engineering system is continued by enhancing the system's capability to sense the environment and to make changes in the environment. So, sensors, actuators, and actuator control occupy a significant part of the knowledge segment. Students also learn the skills of using a microcontroller. They design a complex engineering system from user specifications and build a prototype by integrating different components. Students learn how to analyse AC circuits using phasor and impedance.	4	EG5434V (NUS/EE111A)			4	
6	1	EG6445V	Honours in lieu	NUS/ESP2111 Sensor System Electronics	This course introduces students to the fundamental electronic principles of sensor systems for a variety of different disciplines. Particular emphasis will be given to circuits that are used in research and development, such as sensor amplifiers, filters, and data-acquisition. The course has both analogue and digital circuit principles, and involves project activities that involve hands-on construction of sensors, their circuits and translating their signals into digital data on to a computer.	4	EG5435V (NUS/ESP1111)			4	
6	1	EG6446V	Honours in lieu	NUS/ESE2102 Principles & Practice in Environmental Monitoring	Singapore is committed to become the World's greenest city but how can economic development and environmental sustainability combine to create a truly liveable place? Engineers have a significant role to play in developing technical solutions that must be practical and economically feasible. In this course, students practice environmental engineering outside the classroom by teaming up as consultancy firms to undertake real-life projects: for example, monitoring water quality in the Singapore Botanic Gardens or mapping air pollution by drone sensing.	4	EG5436V (NUS/ESE2101)			4	
6	1	EG6447V	Honours in lieu	NUS/IE2111 Industrial & Systems Engineering Principles & Practice II	This course introduces the principles and practice of engineering economics and financial decision making faced by engineers. Students will learn how to deal with the financial and economic aspects in the design, evaluation and management of engineering systems involving capital investments and cash flows over time. Topics covered include principles and practices of cash flow analysis, decision making involving single and multiple alternatives, depreciation of capital assets and after-tax project cash-flow analysis, replacement analysis of capital assets, and dealing with risk & uncertainty. Case studies and computational tools will be used to model, analyse and solve complex problems effectively.	4	EG5437V (NUS/IE111R)			4	
6	1	EG6448V	Honours in lieu	NUS/MLE2001A Materials Science & Engineering Principles & Practice II	We will explore what makes materials the way they are and why. We will discover the structure of the materials that make up our modern world and learn how it influences the properties, performance and applications of these materials. We will learn the difference between amorphous and crystalline materials, learn how the materials structure can be measured, and show that materials defects are responsible for the functionality of our computers, steel bridges or airplanes. The significance of these issues in modern industry will be emphasized through case studies.	4	EG5438V (NUS/MLE1001B)			4	

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6	1	EG6449V	Honours in lieu	NUS/ME2105 Principles of Mechatronics and Automation	This course is designed to equip Mechanical Engineering students with fundamental knowledge and skills in Mechatronics and Automation. The curriculum covers key topics such as circuit analysis, basic electronics, sequential circuits, sensors, signal conditioning, AC circuits, AC power, and the conversion of electrical energy to mechanical energy. By the end of the course, students will be able to design and construct basic mechatronic systems. To reinforce theoretical concepts, the course includes three laboratory sessions. These hands-on sessions provide students with the opportunity to work with mechatronic instruments and sensors, construct electrical circuits, and operate both DC and AC motors, offering practical insights into the operation and integration of mechatronic components.	4	EG5439V (NUS/ME 1102)			4	
6	1	EG6452V	Honours in lieu	NUS/IPM2101 Introduction to Building Performance	This course covers aspects of building performance in relation to technical and human requirements. Major topics include external and climatic effects including pollution, humidity, solar radiation sky illuminance, and noise; role and performance of building elements; passive and active control; air-conditioning and natural ventilation, artificial and daylighting; indoor air quality; building acoustics; human requirements.	4	EG5443V			4	
6	1	EG6453V	Honours in lieu	NUS/RB2101 Fundamentals of Robotics II	This introductory course in robotics covers electrical analysis, sensors, microcontrollers, and DC motors, exploring how these components can be integrated to build a mobile platform capable of autonomous behavior using low-cost sensors. Through a combination of theoretical learning and hands-on activities, students gain essential knowledge that provides a solid foundation for further studies in robotics.	4	EG5444V			4	
6	1	PC5440V	Honours in lieu	NUS/PC1101 Frontiers of Physics	This course gives students of all backgrounds the opportunity to understand the philosophical underpinnings of physics, and hence that of all natural sciences. Students will be exposed to the big ideas and fundamental concepts in physics, learn about the key historical experiments as well as the latest ideas at the frontiers in physics, such as quantum computing, exoplanets, and the grand unified theory.	4	PC5431			4	3 NUS courses can be read in lieu to fulfil NUSHS Physics Honours requirement: 1) PC1101/ Frontiers of Physics (Most students will take this in Y6Sem2 which will be NGNE only, special case can take it in Y5Sem2 to fulfil Honours in lieu) 2) PC2131/ Electricity & Magnetism I 3) PC2132/ Classical Mechanics I They can be read in either Y5 Sem 2 or Year 6 Sem 1
6	1	PC6441	Honours	Numerical Modelling of Physical Systems	This course provides an introduction on the application of numerical methods and computational modelling to Physics problems. Through these, students pick up valuable computational modelling skills to analyze physical systems and gain greater physical insights into the phenomena or systems under study.	2	PC5431			2	

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6	1	PC6441V	Honours in lieu	NUS/PC2031 Electricity & Magnetism I	This course considers the fundamentals of Electricity and Magnetism and covers topics such as: electrostatic fields, Coulomb's law and Poisson's equation; magnetostatic fields, Biot-Savart's law and Poisson's equation; time-varying electric and magnetic fields, Faraday's and generalised Ampere's laws; Maxwell's equations and electromagnetic waves in vacuum.	4	PC5431			4	3 NUS courses can be read in lieu to fulfil NUSHS Physics Honours requirement: 1) PC1101/ Frontiers of Physics (Most students will take this in Y6Sem2 which will be NGNE only, special case can take it in Y5Sem2 to fulfil Honours in lieu) 2) PC2131/ Electricity & Magnetism I 3) PC2132/ Classical Mechanics I They can be read in either Y5 Sem 2 or Year 6 Sem 1
6	1	PC6442V	Honours in lieu	NUS/PC2032 Classical Mechanics I	This course considers the principles of Newtonian Mechanics and covers topics such as kinematics, inertial and non-inertial reference frames, linear momentum, kinetic energy, and angular momentum; Newton's laws of motion, forces and torques; systems of many particles including rigid bodies; conservation laws; Newtonian gravity and Kepler's laws of planetary motion.	4	PC5431			4	3 NUS courses can be read in lieu to fulfil NUSHS Physics Honours requirement: 1) PC1101/ Frontiers of Physics (Most students will take this in Y6Sem2 which will be NGNE only, special case can take it in Y5Sem2 to fulfil Honours in lieu) 2) PC2131/ Electricity & Magnetism I 3) PC2132/ Classical Mechanics I They can be read in either Y5 Sem 2 or Year 6 Sem 1
6	2	PC6442	Honours	Introduction to Current & Emerging Topics in Physics	The course aims to give students an introductory understanding of selected current and emerging topics in Physics.	2	PC5431			2	
6	1 and 2	PC6241	Elective	Advanced Physics III	This module provides an introduction to advanced topics in Physics such as Rotational Mechanics, Special Relativity and Practical Circuitry and Electronics.	8	PC5133			4	Year long course

## **English Language and Literature**

### **1 Introduction**

The English Language curriculum is a six-year programme with nine core courses 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 course, EL1131 and EL2131. Students can opt for Literature as their choice of humanities in Year 2 and 3, and their 4<sup>th</sup> major in Year 4, 5 and 6.

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

### **2 Overview of the courses**

#### **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 course, 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 courses aim to develop students' language and literary skills. The study of Literature and skills of literary analysis will be incorporated in the English Language courses. 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 Year 3, 4 and 5, students will be introduced to expository and argumentative 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 Year 3 and 4, 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, science and technology, and prejudice and discrimination will be studied.

In Year 5, students acquire knowledge and understanding of diverse topic areas through extensive reading, group discussions and independent research. These topic areas include the study of globalisation; nation and policies; politics; science and ethics as well as local and 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 1, students will be introduced to academic writing and reading skills to prepare them for the university, and to expand their potential as thinkers, writers and communicators. In Year 6 semester 2, students will opt for one reading/writing or linguistic course based on their interest and ability.

Students must pass all English Language core courses in Year 3 to 6 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 courses.

### **English Literature**

Through a broad selection of literary texts that 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 courses, EL1131 and EL2131. These foundational courses are pre-requisites for optional higher-level courses offered in the subject.

Students can opt for Literature as their choice of humanities in Year 2 and 3, and their 4<sup>th</sup> major in Year 4, 5 and 6.

Years 2 and 3 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 course will be grounded within an over-arching theme as a focal point of exploration for both breadth and depth.

Years 4, 5 and 6 will progress students from developing 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 courses

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.

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<b>Level</b>	<b>Sem</b>	<b>Course Code</b>	<b>Course Type</b>	<b>Course Title</b>	<b>Description</b>	<b>Unit</b>	<b>Pre-requisites</b>	<b>Preclusions</b>	<b>Co-requisites</b>	<b>Hrs/wk</b>	<b>Remarks</b>
1	1 and 2	EL1131	Core	Language and Literary Studies I	This year-long course aims to deepen students' understanding of Self & Identity through four distinct thematic units: Friendship, Family, Choices and Belonging. Through these thematic units, students will acquire the skills to write various text types/genres spanning from prose, poetry and play. Students will also explore and engage with a litany of multi-modular texts including the course's main novel Wonder, as well as short stories, plays poems and movies. Students will also develop their reading comprehension skills as well as poetry analyses. Students will also learn how to construct structured responses in the form of P-E-E to express their appreciation of writer's style, characterisation and setting in short prose excerpts. Additionally, students will also develop their oratorical skills through exploring collaborative discussions, oral presentations and Readers' Theatre.	8	None			4	Year long course
2	1 and 2	EL2131	Core	Language and Literary Studies II	This year-long course will build on students' existing knowledge and language skills and help them further develop the reading, writing, listening and speaking skills acquired from EL1131: Language and Literary Studies I. The course will explore the overarching theme of Self and Conflict through four underlying sub-themes: Man Vs Self, Man Vs Society, Man Vs Man and Man Vs Nature. In Semester 1, students will explore the themes of Man Vs Society and Man Vs Self through a compilation of short prose from Singapore and beyond. Students will enhance their narrative writing skills through the study of advanced literary devices such as foreshadowing, symbolism, irony and internal monologue; as well as by exploring alternative plot structures. For their reading component, students will continue to hone their close and critical reading skills by examining authors' intentions and effects achieved through the use of literary devices in narrative text types. For their project work, students will complete a multimedia literacy project that will develop their skills in factual recounts and pictorial communication. In Semester 2, students will explore the themes of Man Vs Man and Man Vs Nature through a compilation of crime stories. Students will gain a deeper knowledge of crime narratives genre conventions and get the opportunity to generate original crime stories of their own. They will develop a video trailer to promote their stories to an audience of their peers. Students will also expand their reading repertoire by being introduced to expositions where they can reinforce their summary skills and develop an informed and substantiated opinion on issues of relevance to the themes of the course in both the written and oral forms.	6	EL1131			3	Year long course
3	1 and 2	EL3131	Core	Exposition and Argumentation: Community and Society	This year-long course introduces the skills of critical reading and expository writing. Students will learn foundational skills in expository writing—to form claims, substantiate them with ample relevant evidence and elaboration and to put forth a convincing argument. They will be exposed to themes of family, education, youth and the aged through reading material, writing activities and class discussions. This course 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	EL2131			3	Year long course
4	1 and 2	EL4141	Core	Critical Reading and Writing I: Social	This course 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 and convincing manner. Through the analysis of emerging	6	EL3131			3	Year long course

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				Institutions and Issues	issues/trends in the mass media; crime and punishment; science and technology; 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 course that spans two semesters. In the course of the course, students are encouraged to take a proactive and independent approach in broadening current affairs knowledge.						
5	1 and 2	EL5141	Core	Critical Reading and Writing II: The Global Connection	<p>As an intermediate course in the English Language in the senior years, this course seeks to further develop students' fluency and confidence in expressing arguments and opinions about global issues. Through close analysis of emerging global issues as well as the study of political ideologies, international relations and emerging issues on conflicts and security, students will become critically aware of the ongoing and emerging concerns as global citizens.</p> <p>Students will also examine theoretical views useful for the construction and deconstruction of exposition, persuasion and argumentation in reading, writing, listening and speaking within an academic context, which will develop the students' critical and creative thinking abilities. Other than argumentative essays and application questions, 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.</p> <p>This is a year-long course that spans two semesters. In the course of the course, students are encouraged to take a proactive and independent approach towards broadening their current affairs knowledge.</p>	4	EL4131			3	Year long course
6	1	EL6141	Core	Critical reading and writing III: Emerging issues in a changing world	This is a semester long course which will further develop the foundational critical thinking skills built in the last two years' courses. This course aims to enhance their reasoning skills in terms of synthesising various themes of knowledge for insightful conclusions. Through the study of emerging socio-political issues in Singapore and the global context, students will become critically aware of the current and evolving concerns as global citizens. Aside from essay writing, students will also be assessed through a literature review, personal reflection and panel discussion. Varied text types such as newspapers, magazines and periodicals will be used to promote critical thinking and inquiry.	2	EL5131 and EL5132			3	
6	2	EL6143	Core	Advanced Academic Reading and Writing: Language and Society	* This course considers how language use relates to broader variation in the daily experiences of individuals and groups. Students examine how language constructs social class, gender, and power relations and how these abstractions shape language(s). Students will explore the interaction of language and understand the practical implications of language variation for language policy and language education in multilingual societies such as Singapore. As an academic writing course, the course will focus on the development of basic competencies in academic writing and research. Students will develop skills in data collection, analysis and literature review, and	2	EL6131			3	*Students have a choice of one course, subject to department's approval

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					produce an original research paper through process writing. 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.						
6	2	EL6144	Core	Understanding Discourse	* This course 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.	2	EL6131			3	*Students have a choice of one course, subject to department's approval
6	2	EL6145	Core	Advanced Creative Writing	* This semester-long course will allow students to generate fiction, poetry or creative non-fiction. It will include significant close reading and discussion of notable literary models, completion of writing assignments and prompts, and peer review workshops. Students are expected to work on their own portfolios of poems, stories or creative non-fiction. The workshop framework is at the heart of the writing, reading and discussion of creative writing in this course. Selected readings will cover both canonical as well as contemporary creative writing. The best works may be published in school periodicals and other publications, as well as entered in competitions.	2	EL6131			3	*Students have a choice of one course, subject to department's approval
2	1 and 2	EN2141	Core	Literary Genres I	This is a year-long course to familiarise students with the core Literary genres of Poetry, Prose and Play. Students will engage with the themes of revelation, denial, acceptance and responsibility through the study of the novel "A Monster Calls" by Patrick Ness and the play "An Inspector Calls" by J.B. Priestley. Students will also be introduced to a repertoire of local and international poems to hone their analysis and appreciation.	4	EL1131			2	Year long course
3	1 and 2	EN3141	Core	Literary Genres II	This is a year-long course that will expose students to the literary stylistics of the novel and play. Students will study the novel "Haroun and the Sea of Stories" by Salman Rushdie which will immerse them in the world of fantastical storytelling and inspire them to think about how stories shape our identity, kinship, and our society. The course 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, Family, Individual vs Society amongst others. On top of the novel and play, students will also be enriched through a diverse range of poetry from "Poetry Moves".	6	EN2131			3	Year long course
4	1	EN4143	Core (Major)	Environmental Literature	In this course, students will study of specific areas such as the purpose and function of the natural environment in our lives and how we can co-exist harmoniously through a study of fiction, non-fiction, film and ecopoetry texts from Singapore and the rest of the world. Students will also write informed and persuasive essays to display their interpretation of authors' intentions as well as their engagement with themes/issues within the novels with a discerning selection of persuasive literary evidence. Additionally, students will have to work on an alternative assessments and deliver an oral presentation on one of the course's core texts.	3	A minimum of 'B' grade for EL1131/EL2131/EL3131			3	
4	1	EN4241	Elective	Games and Narratology	As a relatively newer medium for storytelling and communication, video games have brought new possibilities for readers to experience a story. In this course, students will study the appeal games as a literary text. Students will explore the unique affordances	2	EL3131				

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					that a game, as a multimedia medium, has in creating meaning, story and art. Students will learn how to analyse game elements such as interactivity, game mechanics and other conventions of the medium. Students also learn how to express their interpretation of themes through close reading. The course will then explore concepts of narratology in the context of games. The texts in this course includes Araby by James Joyce (short story), scenes from Alfred Hitchcock's Psycho (film), Florence by Ken Wong (video game), Dread by Epidiah Ravachol (tabletop game) and Nathaniel Barnmorem, Emily is Away by Kyle Seeley (video game).					
4	2	EN4144	Core (Major)	19th Century British Literature	In this course, students will study selected works representing 19th Century British Literature and its relevant themes. Students will write informed and persuasive essays to display their interpretation of the authors' intentions as well as their engagement with themes/issues within the novels with a discerning selection of persuasive literary evidence. Additionally, students will have to work on an independent research project by studying a related secondary text of their choice as well as deliver an oral presentation on one of the course's core texts.	3	A minimum of 'B' grade for EL1131/EL 2131/EL3 131		3	
5	1	EN5144	Core (Major)	Utopias and Dystopias	In this course, students will explore notions of Utopias and Dystopias with respect to societal structures, politics and governance and gender roles. Students will also write informed and persuasive essays to display their interpretation of authors' intentions as well as their engagement with themes/issues within the novels with a discerning selection of persuasive literary evidence. Additionally, students will have to work on an alternative assessments and deliver an oral presentation on one of the course's core texts.	4	Year 4 Literature		3	
5	2	EN5142	Core (Major)	20th Century American Literature	In this course, students will study selected works representing 20th Century American Literature and its relevant themes. Students will write informed and persuasive essays to display their interpretation of the authors' intentions as well as their engagement with themes/issues within the novels with a discerning selection of persuasive literary evidence. Additionally, students will have to work on an independent research project by studying a related secondary text of their choice as well as deliver an oral presentation on one of the course's core texts.	4	Year 4 Literature		3	
6	1	EN6142	Core (Major)	Postcolonial Literature	In this course, students will study selected works representing Postcolonial Literature and its relevant themes. Students will write informed and persuasive essays to display their interpretation of the authors' intentions as well as their engagement with themes/issues within the novels with a discerning selection of persuasive literary evidence. Additionally, students will have to work on an independent research project by studying a related secondary text of their choice as well as deliver an oral presentation on one of the course's core texts.	4	Year 5 Literature		3	
6	2	EN6141	Core (Major)	Advanced Research in Literature	This is an independent research in literature course 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 course, 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 5 Literature		3	Year long course - 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 courses to our students. These courses 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 courses offered are Higher Mother Tongue and Mother Tongue for Chinese, Malay and Tamil. Third Languages, namely Malay as Third Language and Chinese as Third Language are offered as elective courses. The enrichment courses offered are Mother Tongue at Intermediate and Basic levels, as well as Conversational Japanese I.

Courses 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 SEC 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 SEC 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 COURSES (CHINESE/ MALAY/ TAMIL)**

Mother Tongue language courses are offered to students as Core Courses. These core courses 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. Upon completion of either course, students are required to sit for the SEC 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 course in our school. For such courses, 'M' is indicated at the end of the course code. For example, BG1531M denotes the course code for Bengali I in the case of students taking the Bengali (Non-Tamil Indian Language) course conducted at an MOE-approved centre.

For students who find it difficult to cope with MTL courses, they can opt to take up MTL courses at Intermediate level (G2) or Basic level (G1) instead. However, approval must be sought from the school before opting for MTL course at Intermediate level (G2) or Basic level (G1), and the opting can only be carried out at appropriate stages. MTL course at Intermediate level (G2) or Basic level (G1) is offered to students as an Enrichment Course. Upon taking up the MTL course at Intermediate level (G2) or Basic level (G1), students are to complete this course and pass GCE A Level MTL 'B' Exam at end of Year 5.

### **FOREIGN/ THIRD LANGUAGE COURSES (FRENCH/ JAPANESE/ CHINESE/ MALAY)**

The school offers Chinese as 3<sup>rd</sup> Language and Malay as 3<sup>rd</sup> Language as Elective Courses. The school also offers Conversational Japanese as an Enrichment Course. These courses are offered to the following categories of students:

- Having the interest to study a Third Language on top of their Mother Tongue
- Having the interest to study one of these languages purely for interest, even if they are exempted from MTL (this applies to some foreign students)

The four-year Chinese as 3<sup>rd</sup> Language and Malay as 3<sup>rd</sup> Language courses equip students with language competencies required for sitting for SEC Chinese/Malay Special Programme at the end of Year 4.

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<b>Level</b>	<b>Sem</b>	<b>Course Code</b>	<b>Course Type</b>	<b>Course Title</b>	<b>Description</b>	<b>Unit</b>	<b>Pre-requisites</b>	<b>Prelusions</b>	<b>Co-requisites</b>	<b>Hrs/wk</b>	<b>Remarks</b>
1	1	CL1231	Elective	Chinese as 3rd Language IA	This course is opened to students who have no prior Chinese language background. This course touches on the basics, such as an overview of the evolution of Chinese characters and an introduction to phonetics (the Hanyu Pinyin system). At the end of the course, pupils will acquire basic conversational and writing skills in Mandarin.	3	None			2.5	Sem long course
1	2	CL1232	Elective	Chinese as 3rd Language IB	This course is a continuation of CL1231. At the end of the course, pupils will acquire basic conversational and writing skills in Mandarin. Please refer to Description for CL1231.	3	CL1231			2.5	Sem long course. *Pre-requisites refer to students having to pass the course 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 CL1231 in order to advance to CL1232.
1	1 and 2	CH1531	Core	Higher Chinese I	This course 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	Eligible to offer HMT/MT at G3 level			3	Year long course
1	1 and 2	CL1531	Core	Chinese I	This course 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	Eligible to offer MT at G3 level			3	Year long course
2	1	CL2231	Elective	Chinese as 3rd Language IIA	This course is a continuation of Chinese as 3rd Language I and it is meant only for students who have completed and passed CL1231. The course emphasises the learning of new vocabularies, the constructing of simple sentences and writing of short compositions. The course also aims to equip pupils with comprehension and conversational skills in Chinese.	3	CL1232			2.5	Sem long course. *Pre-requisites refer to students having to pass the course 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 CL1232 in order to advance to CL2231.

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2	2	CL2232	Elective	Chinese as 3rd Language IIB	This course is a continuation of CL2231. Please refer to Description for CL2231.	3	CL2231			2.5	Sem long course. *Pre-requisites refer to students having to pass the course 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 CL2231 in order to advance to CL2232.
2	1 and 2	CH2531	Core	Higher Chinese II	In this course, 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	CH1531			3	Year long course
2	1 and 2	CL2531	Core	Chinese II	This course 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	CL1531			3	Year long course
3	1	CL3231	Elective	Chinese as 3rd Language IIIA	This course is a continuation of Chinese as 3rd Language II and it is meant only for students who have completed and passed CL2232. The course 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	CL2232			2.5	Sem long course. *Pre-requisites refer to students having to pass the course 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 CL2232 in order to advance to CL3231.
3	2	CL3232	Elective	Chinese as 3rd Language IIIB	This course is a continuation of CL3231. Please refer to Description for CL3231.	3	CL3231			2.5	Sem long course. *Pre-requisites refer to students having to pass the course 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 CL3231 in order to advance to CL3232.

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3	1 and 2	CH3531	Core	Higher Chinese III	The course 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.	8	CH2531			3	Year long course
3	1 and 2	CL3531	Core	Chinese III	This course 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	CL2531			3	Year long course
4	1	CL4231	Elective	Chinese as 3rd Language IVA	This course is a continuation of Chinese as 3rd Language III and it is meant only for students who have completed and passed CL3231. The course 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	CL3232			2.5	Sem long course. *Pre-requisites refer to students having to pass the course 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 CL3232 in order to advance to CL4231.
4	2	CL4232	Elective	Chinese as 3rd Language IVB	This course is a continuation of CL4231. Please refer to Description for CL4231. Completing this course marks the completion of the entire programme (level 1 to level 4).	3	CL4231			2.5	Sem long course. *Pre-requisites refer to students having to pass the course 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 CL4231 in order to advance to CL4232.
4	1 and 2	CH4531	Core	Higher Chinese IV	In this course, 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	8	CH3531			3	Year long course

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					comprehension and presentation skills required in oral reports based on video clips.						
4	1 and 2	CL4531	Core	Chinese IV	In this course, 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.	8	CL4531			3	Year long course
5	1 and 2	CL5531	Core	Chinese V	This course 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.	8	CL4531			3	Year long course
1	1 and 2	JP1331	Enrichment	Conversational Japanese I	Conversational Japanese is an enrichment course, which covers the basics of the Japanese language. It allows students to explore their interest in learning the Japanese language. With this intent in mind, the course is non-examinable.	4	None			1.5	Year long course
1	1	ML1231	Elective	Malay as 3rd Language IA	This course is opened to students who have no prior Malay language background. This course aims to equip pupils with the skills of understanding standardised spoken Malay language. At the end of the program (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 course, 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.	3	None			2.5	Sem long course
1	2	ML1232	Elective	Malay as 3rd Language IB	This course is a continuation of the skills developed in Semester One. Oral and listening skills will continue to be emphasised in this course. 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	ML1231			2.5	Sem long course. *Pre-requisites refer to students having to pass the course 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 ML1231 in order to advance to ML1232.
1	1 and 2	MH1531	Core	Higher Malay I	This course 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	6	Eligible to offer HMT/MT			3	Year long course

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					language, history and culture. There will be emphasis on building strong communication skills, critical-thinking and problem-solving, more lesson time will be allocated to oral presentations and debate sessions.		at G3 level				
1	1 and 2	ML1531	Core	Malay I	This course 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	Eligible to offer MT at G3 level			3	Year long course
2	1	ML2231	Elective	Malay as 3rd Language IIA	This course will build on the skills of Malay as 3rd Language I. Students 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	ML1232			2.5	Sem long course. *Prerequisites refer to students having to pass the course 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 ML1232 in order to advance to ML2231.
2	2	ML2232	Elective	Malay as 3rd Language IIB	This course will build on the skills taught in Semester One. Students 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	ML2231			2.5	Sem long course. *Prerequisites refer to students having to pass the course 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 ML2231 in order to advance to ML2232.
2	1 and 2	MH2531	Core	Higher Malay II	In this course, students will be exposed to literature, which include poetry, plays, essays, biography, and autobiography. This course focuses on the development of skills in expository and persuasive writing.	6	MH1531			3	Year long course
2	1 and 2	ML2531	Core	Malay II	This course 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 email. More platforms will be provided for students to hone their presentation skills.	6	ML1531			3	Year long course
3	1	ML3231	Elective	Malay as 3rd Language IIIA	This course will build on the skills of Malay as 3rd Language II. Students will be more exposed in their four language skills of	3	ML2232			2.5	Sem long course. *Prerequisites refer to students

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					listening, speaking, reading and writing. It also aims to provide the students with more communicative competence in simple everyday situations and personal interaction. As with the other earlier courses, 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.					having to pass the course 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 ML2232 in order to advance to ML3231.
3	2	ML3232	Elective	Malay as 3rd Language IIIB	This course is a continuation of the skills developed in Semester One. Students 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	ML3231		2.5	Sem long course. *Pre-requisites refer to students having to pass the course 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 ML3231 in order to advance to ML3232.
3	1 and 2	MH3531	Core	Higher Malay III	This course aims to equip students with a higher order of critical thinking skills. As such, language skills acquisition at this level will be deeply entrenched 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.	8	MH2531		3	Year long course
3	1 and 2	ML3531	Core	Malay III	This course 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	ML2531		3	Year long course
4	1	ML4231	Elective	Malay as 3rd Language IVA	This course will build on the skills of Malay as 3rd Language III. It 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 course.	3	ML3232		2.5	Sem long course. *Pre-requisites refer to students having to pass the course 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 ML3232 in order to advance to ML4231.
4	2	ML4232	Elective	Malay as 3rd Language IVB	As the final course of the 4-year programme, students 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, students will gain more exposure into the language,	3	ML4231		2.5	Sem long course. *Pre-requisites refer to students having to pass the course by attaining at least 50% (overall) in order to advance to the next level. For example, students will be required to attain at

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					culture and lifestyle of the Malay community, local and beyond for further insights. Completing this course marks the completion of the entire programme (level 1 to level 4).						least 50% for ML4231 in order to advance to ML4232.
4	1 and 2	MH4541	Core	Higher Malay IV	This course 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 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.	8	MH3531			3	Year long course
4	1 and 2	ML4541	Core	Malay IV	This course 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.	8	ML3531			3	Year long course
5	1 and 2	ML5541	Core	Malay V	This course 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.	8	ML4531			3	Year long course
1	1 and 2	TH1531	Core	Higher Tamil I	This course helps to develop students' reading, writing, listening and speaking skills needed to become effective users of the Tamil language. This course 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	Eligible to offer HMT/MT at G3 level			3	Year long course
1	1 and 2	TL1531	Core	Tamil I	This course 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 course 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	Eligible to offer MT at G3 level			3	Year long course
2	1 and 2	TH2531	Core	Higher Tamil II	This course 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.	6	TH1531			3	Year long course

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					Through classroom 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.					
2	1 and 2	TL2531	Core	Tamil II	This course 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 course develops and further enhances students with narrative and descriptive writing skills. They will also learn to write emails with reference to current affairs.	6	TL1531		3	Year long course
3	1 and 2	TH3531	Core	Higher Tamil III	This course focuses on equipping students with more advanced writing skills. More emphasis will be given to argumentative and expository writing. This course emphasizes more on summary writing, 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.	8	TH2531		3	Year long course
3	1 and 2	TL3531	Core	Tamil III	This course 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	TL2531		3	Year long course
4	1 and 2	TH4541	Core	Higher Tamil IV	This course will further refine students' comprehension and summary writing skills. The overall aim of this course 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 course, students should be proficient in the speaking, reading, and writing of Tamil language, as well as in their listening skills.	8	TH3531		3	Year long course
4	1 and 2	TL4541	Core	Tamil IV	This course focuses more on sharpening the students' writing skills. This course 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.	8	TL3531		3	Year long course
5	1 and 2	TL5541	Core	Tamil V	This course 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	8	TL4531		3	Year long course

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					will learn the command of the language in more depth through the more advanced marabhuthodargal, enaimozhigal and uvamaiththodargal. They will also learn sorpunarchi.							
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## **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 by means of an Integrated Humanities course of study. They shall then have the option of pursuing either History or Geography in Years 2 – 3; and History, Geography or Economics in Years 4 - 6.

### **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.

### **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.

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<b>Level</b>	<b>Sem</b>	<b>Course Code</b>	<b>Course Type</b>	<b>Course Title</b>	<b>Description</b>	<b>Unit</b>	<b>Pre-requisites</b>	<b>Preclusions</b>	<b>Co-requisites</b>	<b>Hrs/wk</b>	<b>Remarks</b>
1	1 or 2	HU1141	Core	Introduction to the Humanities	This foundational course invites students to explore what it means to study the Humanities and to understand how human experiences, values, and ideas are expressed across time and place. Through an inquiry-based approach, students will be introduced to key disciplines of History and Geography, examining how each helps us interpret people, places, and cultures. Students will develop core skills in observation, critical thinking, interpretation, and communication through engaging activities, discussions, fieldtrips and mini projects. By the end of the course, students will appreciate the relevance of the Humanities in making sense of the world around them and in shaping thoughtful, empathetic perspectives on contemporary issues.	2	None			2	Semester-long course
4	1 and 2	EC4141	Core	Economic Insights I	This course introduces the central problem of economics and the decision-making process of economics. For Microeconomics, the course guides students to use concepts of demand and supply to analyse markets and provides the foundation for firms' theory and spectrum of market competitions. For Macroeconomics, students will learn and apply the tools economists use to describe and explain the macroeconomy. They will analyse macroeconomic problems and government policies. Students will apply comparative trade theory to explain for international trade and evaluate reasons for protectionism.	8	HU1131, HU2131			3	
5	1 and 2	EC5141	Core	Economic Insights II	This course deepens students' understanding of Microeconomics and Macroeconomics by examining both market failures and macroeconomic instability. Students will analyse the causes of market failure—such as externalities, public goods, and market dominance—and evaluate the effectiveness of government interventions in addressing these inefficiencies. Building on prior knowledge, students will study the role of money and monetary policy, external stability in the balance of payments and exchange rates, and assess the effectiveness of governments, particularly Singapore's, in responding to economic crises.	8	HU1131, HU2131, EC4141			3	
6	1 and 2	EC6241	Elective	Research in Economics	This year-long course deepens students' mastery of Economics by integrating advanced theoretical understanding with independent research. Through the study of rational and irrational decision-making, consumer behaviour theory, and behavioural economics, students develop analytical tools to investigate how individuals, firms, and governments make economic choices under risk, uncertainty, and asymmetric information. Centred on the process of research, students will learn how to write research proposals, conduct literature reviews, identify research gaps, design research methodologies, analyse data and findings, draw evaluative conclusions, and recognise limitations in their work.	8	HU1131, HU2131, EC4141, EC5141			3	
2	1 and 2	GE2141	Core	Geographical Thinking: People-Environment Connections I	This is a first year-long Geography course for students which includes both Physical and Human Geography topics. It focuses on developing geographical thinking in students through the exploration and investigation of familiar environments such as the urban spaces that they live in. Environment-development dilemma is the overarching theme of this course. Students have the opportunity to learn about the weather elements and the atmospheric processes that give us our tropical climates as well as weather hazards. They would also	6	HU1141			3	

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					study how the tropical rainforests and mangrove ecosystems play critical roles in preserving our physical environments and in mitigating the effects of climate change. Through the study of development, students examine the issues of urbanisation, population growth and demographic change, focusing on the opportunities and challenges that arise, and how countries manage these issues within their unique cultural contexts. As part of developing geographical thinking, students would make use of primary and secondary evidences, fieldwork skills and map reading techniques to make sense of their world and to develop perspectives and personal insights into the topics covered.					
3	1 and 2	GE3141	Core	Geographical Thinking: People-Environment Connections II	This course develops students' geographical thinking by examining how physical processes, human activities, and spatial patterns shape the world around us. Students explore plate tectonics to understand the Earth's structure, hazards, and the varied impacts of earthquakes and volcanoes across different regions. They study coastal environments, analysing how waves, currents, and human interventions interact to produce dynamic landscapes that require careful management. In human geography, students study and analyse the impacts of tourism development on people and the environment, and examine the issue of sustainable tourism management in different countries. The course also examines food production and food security, focusing on how geographic factors such as climate, land use, and global trade affect supply, vulnerability, and resilience. It looks at the perplexing issue of food shortage leading to hunger in some countries and excess food resulting in obesity and food wastage in others. Students will also critically examine the role of technology in affecting food supply. The topic on Health and Diseases focuses on the health of people and the main diseases affecting them. It examines the significance of people-environment interactions on diseases and mortality, the disease transmission cycles and intervention strategies to reduce disease burden. The course also studies the physical and socio-economic causes influencing the speed and agents of spread. Students will gain a deepened understanding of the relationship between unequal access to resources and physical well-being of people, as well as the importance of individual and collective responsibilities in responding to infectious diseases.	6	HU1141, GE2141		3	
4	1 and 2	GE4141	Core	Geographical Perspectives: Change & Sustainability I	This course continues the discourse on the deep interconnections between environment and development covered in the Junior High courses. It develops advanced geographical thinking by examining how natural and anthropogenic causes of climatic variations affect temperatures leading to a change of sea levels. It also examines the impacts on the hydrological cycle, the river systems, slopes, and landscapes. Students analyse how increased temperatures and altered rainfall regimes, increased evapotranspiration, and intensified extreme-weather events influence deforestation, desertification, and watershed health. They explore how climatic variations and shifts modify river discharge, sediment loads, and channel behaviour, deepening their understanding of fluvial geomorphology and the evolution of riverine landforms. The course also investigates how intensified rainfall, prolonged drought, and destabilised soil-moisture conditions heighten vulnerabilities to mass movements and flooding, especially in densely populated or environmentally fragile regions. Through spatial analysis, case studies, and	8	HU1141		3	

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					process-based inquiry, students learn to interpret the interconnectedness of climate, water, and Earth surface processes, and to propose evidence-based strategies for mitigating and adapting to rapid environmental change.					
5	1 and 2	GE5141	Core	Geographical Perspectives: Change & Sustainability II	This course develops students' understanding of sustainable development by examining the interconnected themes of global economic change, resource management, and urban development. Students first investigate the uneven development of the global economy and the transformative impacts of globalisation on Less Developed Countries (LDCs), Newly Industrialising Economies (NIEs) and Developed Countries (DCs). They explore how global production networks, international trade and the strategies of transnational corporations (TNCs) shape regional development and contribute to shifting global geographies of opportunity and inequality. Through analysing trends in manufacturing, outsourcing and trade flows, students gain insight into how global economic restructuring gives rise to a constantly evolving map of economic activities. This global lens extends into the study of critical natural resources, where students examine renewable and non-renewable resources through named examples and country case studies. Focus areas include extractive industries, water resource management and alternative energy. Students evaluate political and economic decisions made at different scales, and assess their impacts on people, economies and the environment. Building on this foundation, the course turns to urban development and management to further deepen students' grasp of sustainability. Students analyse the spatial patterns of residential areas in cities and the factors that shape them, such as physical conditions, land values, ethnicity and planning choices. They examine issues of poverty, deprivation and informal activity across cities at different stages of development, and consider how these challenges evolve over time. The course also highlights economic and demographic processes—including gentrification, urban renewal, suburbanisation and counter-urbanisation—that drive urban change and influence social, economic and environmental outcomes. Students explore the concept of liveability through the perspectives of different population groups, such as the elderly, and compare strategies used by cities around the world to meet diverse needs and aspirations.	8	HU1141, GE4141			3
6	1 and 2	GE6241	Elective	Research in Geography	This course equips students with the essential skills and dispositions for independent inquiry in the Humanities. Centred on the process of research, students will learn how to write research proposals, conduct literature reviews, identify research gaps, design research methodology, analyse data and findings, drawing evaluative conclusions and identifying limitations in their research. Students will develop and present their own research projects, demonstrating intellectual curiosity, academic rigour, and ethical awareness. By the end of the course, students will appreciate how research in the Humanities deepens understanding of complex social, cultural, and environmental issues, and prepares them for higher-level study and interdisciplinary	8	HU1141, GE4141, GE5141			3
2	1 and 2	HY2141	Core	History Studies I	Extension of European control in Southeast Asia and challenges to European dominance (1870s–1942) ~ This course focuses on the key events and forces that shaped the world order from 1870s to the outbreak of World War II. It examines	8	HU1141			3

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					how the extension of colonial rule in Southeast Asia shaped the development of different Southeast Asian states like Malaya and Indonesia/Vietnam. Students will also examine the interactions between the locals and colonial powers, and how the locals responded, challenged and managed the extension of European control in Southeast Asia. The paper also examines the key forces and developments that shaped the post-World War I world, including the attempts at collective security, the rise of authoritarian regimes in Nazi Germany and Militarist Japan, and the developments that led to the outbreak of World War II in Europe and the Asia-Pacific.						
3	1 and 2	HY3141	Core	History Studies II	Developments in the post-World War II World: The Cold War and Decolonisation in Southeast Asia (1940s–1991) ~ This course continues to trace the development of the shifting world order after World War II. Students will look specifically at the Cold War by examining the confrontation between the United States of America (USA) and the Union of Soviet Socialist Republics (USSR), and their emergence as superpowers during this period. They also examine the causes and consequences of this rivalry on Europe and Asia. The course also explores the forces, developments and actors that shaped the decolonisation and the emergence of independent nations in Southeast Asia, and examines the interplay of Cold War tensions and local politics in the 1950s–1970s.	8	HU1141, HY2141			3	
4	1 and 2	HY4141	Core	History Insights I	The Changing International Order (1945–2000) ~ In this course, students will explore the interactions between historical actors and the Cold War environment, which influenced the development of the international security and economic order in the latter half of the 20th Century. The Cold War fundamentally transformed the global economy and international security. Superpower rivalry on a global scale exerted significant influence on new and existing nation-states to produce deep and far-reaching political and economic changes in them. The varied political and economic responses of local and regional actors to superpower rivalry in turn shaped the development of the international order. Even after the end of the Cold War, aspects of this international order continued to loom large as the world adapted to the post-Cold War era. Studying this course will allow students to appreciate the changes and continuities in the period under study, the legacies of the Cold War and the developments in the global order today.	8	HU1141			3	
5	1 and 2	HY5141	Core	History Insights II	Developments in Southeast Asia (1940s - 2000) ~ In this course, students will examine the key developments that took place within Southeast Asian countries and in the region after independence. Using a thematic-comparative approach, students will learn about the varied experiences of Southeast Asian countries in forming nation-states, pursuing economic goals and forging relations with other Southeast Asian countries. These individual trajectories were shaped by factors internal and external to each country, as well as its past. As Southeast Asian countries charted their own paths, they responded to domestic opportunities and challenges, and to Cold War developments and changes in the global economy. Collectively, these countries formed new relationships with external powers and developed a new identity as the Association of Southeast Asian Nations (ASEAN). Studying this course will allow students to better understand the patterns of	8	HU1141, HY4141			3	

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					developments in Southeast Asia, and the interactions among different historical actors within each country and in the region. These historical perspectives will equip students to better understand Southeast Asia today.					
6	1 and 2	HY6241	Elective	Research in History	This elective takes the form of a taught element (Investigating History) and a research element (Research Paper). Investigating History builds students' capacity to undertake a critical approach to examining their chosen history research question by equipping them with a theoretical understanding of the nature of history and guiding them in applying their understanding of how the past is constructed. Students will then submit a Research Paper based on a topic of their choice which had been approved in advance by the school's Humanities Department. They will conduct research in an area of historical interest, examine a variety of evidence, and interpret and evaluate the evidence to reach informed conclusions.	8	HU1141, HY4141, HY5141		3	

## **Music**

### **Welcome to the NUS High School Music Program**

Music education in the NUS High School aims to refine the aesthetic sensitivities of all humanities. It is our mission to provide a quality music program that is an integral part of the entire education as well as a reflection of a well-balanced education experience. 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 higher institutions. The music program will enhance students' learning through the acquisition of

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

The music program will develop students in achieving these learning 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 examination boards such as the ABRSM or *Trinity College London* (TCL). Each level grows from those experiences previously presented.

\*Please check with HOD for the approved applied instruments

#### 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 1<sup>st</sup> 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**

Music curriculum is deliberately made flexible in order to meet the needs of students within a variety of facilities and school timetable structures. Students will gain an introduction to Music in Year 1. They will then have the option of pursuing Music in Years 2 and 3, as well as majoring in Music from Years 4 to 6. Each course represents a minimum of 12-15 weeks of classroom instruction per semester. Each unit is equivalent to 50 minutes of the class time. Some of the courses can be self-contained while others are taught in spiral sequence.

Students aiming to choose Music as a 4<sup>th</sup> major may do so by completing **all CORE music courses**. These **CORE Courses** 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 courses lay a strong foundation for the fundamental concepts and principles of music. Grades of Year 3 to 6 Core courses are counted toward the Grade Point Average (GPA).

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. most of the students will be the mass audience for the culture of their times.

However, we want to foster in our students the appreciation and understanding of the arts so to allow them a lifelong source of enjoyment.

## Assessment

The music program 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); and **Summative** (Of learning—record the overall achievement of a student-end of a course or project—measures learning outcomes).

The assessment ranges from individual practical examinations to submitted projects and presentations—with emphasis on authentic assessments. Each course carries its own specific Continual Assessment (60%) requirement such as Quizzes/Tests, Assignment (in theory or in practical aspects), Projects, Concert Reports; and a Final Examination or Project (40%) 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 or Trinity for benchmarking purposes.

## Learning Outcomes

The Music & Art Department promotes and cultivates awareness and appreciation through the Aesthetic Appreciation Program, nurtures passionate students through curriculum and department activities that contribute to the total development of the individual. This development enhances also the 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 and art in a manner both meaningful and relevant to students. Majoring students would have attained the skills and knowledge that will prepare them for tertiary level education and beyond.

When students can relate and apply their **knowledge and ideas**, and are able to, **associate, apply, analyze** and **synthesize** through the learning processes for themselves, they are equipped with skills and competencies which will allow for lifelong learning to occur. In short, students will experience satisfying and valuable means to explore and develop their composite talents and abilities.

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<b>Level</b>	<b>Sem</b>	<b>Course Code</b>	<b>Course Type</b>	<b>Course Title</b>	<b>Description</b>	<b>Unit</b>	<b>Pre-requisites</b>	<b>Preclusions</b>	<b>Co-requisites</b>	<b>Hrs/wk</b>	<b>Remarks</b>
1	1 or 2	MU1134	Core	Foundations in Music	This course explores music's connections to the world and disciplines like Math and Science through an interdisciplinary approach. Students create, perform (vocal and instrumental), listen to, and analyze music while integrating AI tools and understanding copyright in music creation. A process-oriented platform fosters inquiry, play, aesthetic values, and critical thinking. By semester's end, students will gain skills and perspectives for lifelong learning, ready to navigate and enrich the evolving musical landscape.	2	Positive Learning Attitude and Growth Mindset			2	
2	1	MU2134	Core	Basic Musicianship	This course aims to acquaint students with fundamental aspects of music, fostering an understanding of musical principles and honing the skills essential for expressive musical communication. The course encompasses foundational ear-training and singing, delving into various facets such as music notation, duration, harmony, terminology, and symbols. Additionally, the course addresses the art of crafting melodies and lyrics, along with collaborative ensemble playing.	2	MU1134			2	
2	2	MU2135	Core	Music in Society (Asian)	This course introduces students to the essential role of music in society, focusing on understanding musical principles and developing the skills necessary for expressive and meaningful musical communication. Students will explore the rich musical heritage of Asian cultures through themes such as national anthems, festive music, dance, and theatre music, while engaging in creative analysis and collaborative activities. Through this course, students will be inspired to connect with music on both technical and cultural levels, equipping them for creative and informed engagement with the broader musical world.  By the end of semester, students will: -enhance purposeful listening skills to identify and appreciate diverse musical sounds. -cultivate an open-minded perspective toward the music of various cultures, recognizing its societal significance. -fosters a deeper appreciation of music's role in society while building students' technical and creative capacities.	2	MU2134			2	
3	1	MU3134	Core	Music in Society (Western)	This course enhances students' listening and musical appreciation skills by exploring music across diverse eras and genres, including symphonies, operas, chamber music, concertos, and contemporary compositions. Students will examine the dynamic relationship between music, art, society, and national identity. The course emphasizes the aesthetic qualities of musical works, delving into how these qualities function and influence listeners on emotional and intellectual levels. Critical listening is approached as an active and creative process, fostering intellectual engagement that leads to deeper emotional and aesthetic experiences. By the end of the semester, students would have -cultivated purposeful listening skills and heightened aural awareness of	3	MU2135			3	

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					musical elements. -enhanced the ability to describe and analyse the structure and expression of various musical styles and compare different forms of music. -developed a deeper appreciation and understanding of music as an art form.						
3	2	MU3135	Core	Elements of Music Theory	This course 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, etc. Majoring students (without the earned certificate) must sit for the external examination: ABRSM Grade 5 Music Theory.	3	MU3134			3	
4	1 and 2	MU4141	Core (Major)	Music Studies	<p>Music Studies offers a comprehensive exploration of tonal/atonal organization in 18th- to 20th-century music, with a focus on harmony, figured bass, musical forms, and advanced analytical techniques. It also delves into the principles of composition and instrumentation, aimed at enhancing students' creativity through guided exercises in diverse forms of musical composition. Key topics include melodic ornamentation, suspension techniques, modulation, advanced four-part writing, as well as the use of diatonic secondary seventh chords, the Neapolitan 6th, diminished 7th, and augmented 6th chords. Instrumentation will cover orchestral instrument ranges, techniques, and timbres, while orchestration topics will address challenges in scoring, transcription, and vocal transpositions. Students will also gain skills in identifying and analysing compositions across a wide range of genres and styles.</p> <p>Coursework will involve writing an analytical or comparative essay on selected compositions, offering insights into stylistic developments and the evolution of musical forms. Practical applications will include harmonizing melodies, rewriting chorale passages, transcribing sonata movements, and refining melodic writing for treble instruments and basso continuo. Students will also have the opportunity to arrange and score for piano, choral ensembles, orchestras, bands, and chamber groups, working with both existing works and their own original compositions.</p> <p>By the end of the semester, students would have</p> <ul style="list-style-type: none"> <li>-gained proficiency in music technology, with practical experience using music notation software such as MuseScore, Dorico, or Finale.</li> <li>-developed a foundational understanding of MIDI sequencing tools like GarageBand and Band Lab for composing and arranging.</li> </ul> <p>Majoring students are strongly encouraged to sit for the ABRSM Grade 8</p>	4	MU3135. For non-track, you will need to meet the stipulated criteria for consideration: 1. Successfully audition on the primary instrument with a minimum proficiency of Grade 5. 2. Obtain a Grade 5 Music Theory certificate with at least a Merit, or achieve an 'A' on the written diagnostic test.			3	Refer to criteria checklist for eligibility to major.

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					Music Theory exam, further advancing their theoretical knowledge and expertise.		3. Participate in an interview.				
5	1 and 2	MU5141	Core (Major)	Music Showcase	<p>Music Showcase is an engaging course that combines ear-training, sight-singing, conducting, and ensemble performance to prepare students for a collaborative and expressive final presentation. Through targeted exercises, students will refine their ability to recognize melodies, harmonies, rhythms, intervals, and scales, while developing conducting and performance techniques.</p> <p>At its core, the course fosters collaboration, encouraging meaningful musical dialogue and teamwork. The final performance showcases students' growth in musicianship, creativity, and ensemble skills, reflecting their technical and artistic development through instrumental playing, singing, and optional acting or dancing.</p> <p>This holistic approach equips students with the technical and expressive skills necessary for effective musical collaboration. The Music Showcase serves not only as a platform for performance but as a testament to the students' journey of growth, creativity, and mastery as part of a unified ensemble.</p>	4	MU4141			3	
6	1 and 2	MU6241	Elective	Music Practice & Performance	<p>This course prepares music majors for their recital through an in-depth study of technical mastery, stylistic interpretation, and artistic growth. Students will explore performance practices from Baroque to Contemporary eras, focusing on stylistic elements, ornamentation, and cultural traditions. Emphasis is placed on understanding the historical, philosophical, and cultural contexts of music to foster interpretive depth and respect for diversity.</p> <p>Beyond performance, the course explores broader themes such as the social, psychological, and pedagogical roles of music education. Through discussions and assignments, students will engage with the social and educational dimensions of music, enhancing their critical thinking and creative problem-solving skills. To deepen their understanding, students will submit a research paper on a topic related to performance or composition, supported by representative recordings, literature, and multimedia resources.</p> <p>Key requirements include:</p> <ol style="list-style-type: none"> <li>1. a 40–50-minute recital showcasing the primary instrument (performed from memory), with an option for a secondary instrument.</li> <li>2. achieving ABRSM Grade 8 (or equivalent) proficiency on the primary instrument.</li> <li>3. completing two mini-performances, including a lecture recital.</li> </ol>	4	MU5141			3	Students must have attained a minimum standard of ABRSM Grade 8 or equivalent for the primary musical instrument. For the optional second instrument, a minimum ABRSM Grade 5 or equivalent.

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					4. passing a jury evaluation one month before the recital. 5. submitting a research paper on a performance or composition topic.  Throughout the course, students will be guided in repertoire selection and performance preparation. The goal is to ensure that their final performance demonstrates technical excellence, cultural awareness, and artistic growth.							
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## Art

### Welcome to the NUS High School Art Program

The Art program in NUS High School aims to cultivate the student's interest and curiosity in fields of art study. Students can put into practice what they have learnt in the Math and Science courses to enhance their holistic learning within the art classroom: 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 program 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 analyze the role of visual art in the development of human cultures all around the world.
- **Critical Analysis:** Students will learn to analyze 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 courses. It aims to cultivate the understanding and knowledge of architecture, sculpture, painting, and other art forms within diverse historical and cultural contexts.

Students will gain an introduction to Art in Year 1. They will then have the option of pursuing Art in Years 2 and 3, as well as majoring in Art from Years 4 to 6. Students aiming to choose Art as a 4th major may do so by completing all CORE art courses. These CORE courses 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 courses lay a strong foundation and the fundamental concepts and principles of the subject. Core course grades are counted toward the Grade Point Average (GPA).

## 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. join Media Club – photo/AV (if that's their strength and Medium for Art) or one of the performing arts and/or Music & Art Ambassadors (objective is to ensure Team Collaboration).

Students aiming to choose Art as a 4th major may do so by completing all CORE art courses. These CORE courses offer students a broad-based exposure and a general overview of the subject. Core course grades are counted toward the Grade Point Average (GPA). Majoring 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.

## Learning Outcomes

The Music & Art Department promotes and cultivates awareness and appreciation through the Aesthetic Appreciation Program, nurtures passionate students through curriculum and department activities that contribute to the total development of the individual. This development enhances also the 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 and art in a manner both meaningful and relevant to students. Majoring students would have attained the skills and knowledge that will prepare them for tertiary level education and beyond.

When students can relate and apply their **knowledge and ideas**, and are able to, **associate, apply, analyze** and **synthesize** through the learning processes for themselves, they are equipped with skills and competencies which will allow for lifelong learning to occur. In short, students will experience satisfying and valuable means to explore and develop their composite talents and abilities.

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<b>Level</b>	<b>Sem</b>	<b>Course Code</b>	<b>Course Type</b>	<b>Course Title</b>	<b>Description</b>	<b>Unit</b>	<b>Pre-requisites</b>	<b>Preclusions</b>	<b>Co-requisites</b>	<b>Hrs/wk</b>	<b>Remarks</b>	
1	1 or 2	AR1134	Core	Foundations in Art	Foundations in Art invites students to explore art as a creative lens and investigative tool for understanding their environment and the world. The course adopts an interdisciplinary approach, highlighting the natural connections between art and other subjects, such as Math and Science. Students engage in a dynamic, process-oriented platform that encourages inquiry, experimentation, and play. Collaboration is also included to foster respectful and positive relationships while helping students understand others' perspectives . By reflecting on their processes and experiences, students connect with peers and explore art as a means of understanding both themselves and the world around them. Traditional art methods are supplemented with the introduction of AI tools, which enhance artistic expression, generate ideas, and analyse visual elements. Foundational key art terms are also developed, providing students with a strong base for further exploration of the subject.	2	Positive Learning Attitude and Growth Mindset				2	
2	1	AR2134	Core	Elements of 2D Art & Design	This course introduces art fundamentals in theory and practice. Students will learn and apply the elements of art in a variety of ways to create unique and diverse works of art in different mediums. Concurrently, they acquire essential knowledge of the terminology to facilitate the contextual appreciation and description of art. The course also aims to provide students with an environment for inquiry, imagination and self-expression through discussion and artmaking.	2	AR1134			2		
2	2	AR2135	Core	Principles of 2D Art & Design	This course delves deeper into the art fundamentals in theory and practice. Students will learn and apply the principles of art in a variety of ways to create unique and diverse works of art in different mediums. Concurrently, they acquire essential knowledge of the terminology to facilitate the contextual description and analysis of art. The course also aims to provide students with an environment for inquiry, imagination and self-expression through discussion and artmaking.	2	AR2134			2		
3	1	AR3134	Core	Creative Visual Art I	Creative Visual Art I embarks students on a creative practice of art and design while incorporating influences from relevant art history, theories and movements. To develop their skills, artmaking techniques in both 2D and mixed media will equip students with visual strategies to create innovative representations through problem-solving and creative thinking. Students will begin to build a portfolio based on their explorations and practice in this course. The course also aims to provide students with an environment to sharpen their critical thinking and communication skills through using Feldman's Model of Art Criticism, namely: Describe, Analyze, Interpret and Evaluate (DAIE).	3	AR2135			3		
3	2	AR3135	Core	Creative Visual Art II	Creative Visual Art II delves deeper into the creative practice and process of art and design by using a variety of methods while incorporating influences from relevant art history, theories and movements. To further develop their skills, artmaking techniques across the spectrum of art in 2D, 3D and mixed media will challenge students in visual conception and representations through project-based learning and creative thinking. Students will continue to build on the portfolio based on their explorations and practice in this course. The course also aims to provide students with an environment to sharpen their critical thinking and communication skills through using Feldman's Model of Art Criticism, namely: Describe, Analyze, Interpret and Evaluate (DAIE).	3	AR3134			3		

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3	1 and 2	AR3331	Enrichment	Ceramictivity	<p>Discover the art of shaping clay with your hand. You will learn techniques such as slab rolling, coil construction with an introduction to the slab roller and other ceramics tools. This enrichment will focus on the fundamentals of hand building, from creating a piece to glazing and firing it. Ceramictivity is not just about creating art; it's about expressing yourself through the tactile and therapeutic process of working with clay. This course promises to be a rejuvenating experience that allows you to tap into your creativity and explore the limitless possibilities of ceramic art.</p> <p>By the end of the course, students would have been able to:</p> <ul style="list-style-type: none"> <li>• develop and cultivate aesthetic values in art so to allow lifelong learners.</li> <li>• acquire self-awareness and apply self-management skills to achieve personal well-being and effectiveness.</li> <li>• acquire social awareness and apply interpersonal skills to build and maintain positive relationships based on mutual respect.</li> </ul>	2	No prior experience is required - just bring your enthusiasm and a willingness to learn!			2	8 weeks course or 3-4 intensive days
4	1 and 2	AR4141	Core (Major)	Visual Art & Society	<p>Visual Art &amp; Society deepens students' knowledge of art and design as they expand, refine, and connect their 2D and mixed-media skills, through hands-on creative explorations and practice, with the study of art history. Students will focus on a specific area of investigation during the artmaking process, culminating in a portfolio of works. Authentic assignments, including a visual art task and an art showcase, provide students with opportunities to apply their learning in meaningful ways.</p> <p>The course emphasizes the use of Feldman's model of art criticism, encouraging an in-depth understanding of art terminologies as tools for effective communication and writing about art. Through rigorous theory and studio practice, students develop critical and creative thinking skills, as well as visual strategies, to enhance their formal and technical approaches.</p> <p>By the end of the course, students would be able to:</p> <ul style="list-style-type: none"> <li>-describe, analyze, and evaluate images, interpreting artworks and integrating insights into their artmaking processes.</li> <li>-produce artworks that demonstrate strengths in selected mediums and material use.</li> <li>-become self-directed learners, actively questioning and reflecting on the visual qualities of artworks.</li> <li>-develop independent and critical thinking skills, confidently creating a comprehensive portfolio.</li> <li>-gain experience in preparing and planning for the semester-end Art Showcase.</li> </ul>	4	AR3135. For non-track, you will need to meet the stipulated criteria for consideration: 1. Art portfolio 2. A written paper on the Study of Visual Arts (SOVA)/ on visual art of curating and exhibition. 3. Participate in an interview.			3	Refer to criteria checklist for eligibility to major
5	1 and 2	AR5141	Core (Major)	Visual Art Showcase II	<p>The Visual Art Showcase is a dynamic exploration of two portfolio types—2-D Design and Drawing—integral to advanced studio practice, with 3-D art forms included as a complementary addition where suitable. This course guides students in refining their artistic portfolios, emphasizing three critical areas:</p> <ol style="list-style-type: none"> <li>1. Quality: Mastery of craftsmanship and the thoughtful articulation of artistic intent.</li> <li>2. Focused Inquiry: A focused exploration of materials, processes, and ideas,</li> </ol>	4	AR4141			3	

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					<p>integrating practice, experimentation, and refinement to develop and enhance 2D design and drawing skills.</p> <p>3. Curated Pieces: The synthesis of materials, processes, and ideas through carefully curated pieces integral to the portfolio type.</p> <p>The course explores significant art-making approaches from pre-modern to contemporary eras, enabling students to critically analyze the evolution of visual imagery. Guided by Feldman's model of criticism, students articulate and write about art, deepening their engagement with aesthetic theories and historical contexts. This theoretical foundation enhances their creative strategies and critical analysis skills in preparing for an Art Showcase.</p> <p>Through a comprehensive integration of studio practice, critical theory, and reflective analysis, students emerge from the Visual Art Showcase with heightened creativity, critical thinking, and a profound appreciation for art's transformative power. This course equips students to navigate the artistic landscape with confidence, encouraging critical thinking and thoughtful engagement with cultural and societal issues.</p>					
6	1 and 2	AR6241	Elective	Visual Art Practice & Exhibition	<p>The Visual Art Practice &amp; Exhibition marks the culmination of students' artistic journeys at NUS High School, showcasing their learning, growth, and creative achievements. The process involves meticulous planning, conceptualization, and curation for an art exhibition. Students will present their past and current artworks thematically, reflecting their individual artistic development, within the school premises. Additionally, they will present their body of work to a panel of judges, which includes two art teachers and an external assessor.</p> <p>Art majors have the option to consolidate a portfolio for submission to and evaluation by an external examination board, choosing between two categories: 2-D Design or Drawing. This forms an integral part of their studio practice. In preparing the portfolio, students must address key criteria: (1) the quality of the artwork, (2) a focused exploration of materials, processes, and ideas, and (3) the synthesis of these elements.</p> <p>Art majors are also required to write a research paper on a topic of their choice, which is grounded in art theory and supported by an appropriate theoretical framework.</p>	4	AR5141			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.

The 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; and to exchange ideas through oral and poster presentations at local and overseas science fairs and conferences.

**All Da Vinci Programme Courses will be awarded *Distinction, Merit, Pass or Unclassified* according to performance (no Grade Points are given).**

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<b>Level</b>	<b>Sem</b>	<b>Course Code</b>	<b>Course Type</b>	<b>Course Title</b>	<b>Description</b>	<b>Unit</b>	<b>Pre-requisites</b>	<b>Preclusions</b>	<b>Co-requisites</b>	<b>Hrs/wk</b>	<b>Remarks</b>
1	1 or 2	DV1132	Core	Design & Engineering	This semester-long course aims to give students the intermediate skills they need to turn their ideas into reality. This course will build on the skills taught in DV1131. 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	
1	1 or 2	DV1133	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 the general public. This course 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	
2	1 and 2	DV2134	Core	Junior Maker	In this course, students will learn to code and control hardware using an Arduino board. In this way, they will be introduced to the basics of using the inputs from sensors and other devices to control output devices to achieve a given objective. Students will get a rich hands-on experience and will need to complete a simple project.	0	None			3	Students will take either DV2134, DV2135 or DV2136 in Year 2
2	1 and 2	DV2135	Core	Junior Science Research	In this course, 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 project in small teams and deliver a report and presentation at the end of their project.	0	None			3	Students will take either DV2134, DV2135 or DV2136 in Year 2
2	1 and 2	DV2136	Core	Junior Math Research	In this course, 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 project in small teams and deliver a report and presentation at the end of their project.	0	None			3	Students will take either DV2134, DV2135 or DV2136 in Year 2
3	1 or 2	DV3131	Core	Research Methodology and Scientific Reading	Research is an integral component of science and mathematics. It is the vehicle for the advancement of these disciplines, both past and present. Thus, having a good understanding of various components of research and possessing good research skills will put one in a good stead for a career in math and science. In this course, we aim to introduce the basic framework which scientists and mathematicians follow to conduct their research work, i.e. the principles behind elucidating valid research findings, as well as the processes, skills and ethics needed to conduct, evaluate and communicate research well.	0	None			3	+ Students will take DV3131 either in Semester 1 or 2.
3 or 4	1	DV3231	Elective	Advanced Design and Engineering	This elective course aims to extend students' understanding of the 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 course will teach advanced skills that will enable the	0	DV2131			1.5	

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					student to design and implement customized automation and data acquisition solutions to meet research and engineering goals.						
3 or 4	2	DV3234	Elective	Overseas Technopreneurship Learning Journey	Students will join team of under-graduates from the Singapore University of Social Sciences on the Impact Start Up Challenge. They will go on an overseas trip, taking part in an entrepreneurship bootcamp. The teams will engage in brainstorming sessions, validate their business ideas, design prototypes, and present a pitch in front of a panel of judges. Students will benefit from opportunities to connect with experts from different domains by engaging with startup and local communities.	0	None			1.5	
4, 5 and 6	1 and 2	IP	Core	Research/Innovation Project	All students are required to complete and pass at least one Research or Innovation Project in the field of Math, Science or Engineering as an individual or in a team. Projects in other quantitative fields like economics may also be allowed. These projects may be linked to external programmes like the Science Mentorship Programme, Nanyang Research Programme, or the Young Defence Scientists' Programme. Students can do these projects internally or at an external research organization. Students can also do more than one project if they have the passion and aptitude.	0	DV3131			0	*Research Projects are not assigned a course code but will be reflected in the student's research transcript

## **Interdisciplinary Curriculum**

Against the backdrop of a future workforce characterised by complex, multifaceted problems, sustainability emerging as a key focal point, and increasing automation and growing prevalence of Artificial Intelligence (AI) tools, education systems worldwide are prioritising the development of 21st century competencies.

An interdisciplinary curriculum is one of the most effective ways to build 21st century competencies, because it teaches students to integrate knowledge, methods and perspectives from different disciplines to solve complex, real-world problems. This is especially relevant when the solution is designed for a practical impact on communities, which requires conflicting insights from different disciplines to be taken into account in designing the solution.

The formal interdisciplinary curriculum at NUS High School is run for Year 5 to 6 students, when they would have acquired sufficient disciplinary depth to be able to make meaningful interdisciplinary connections. The four strands of the interdisciplinary curriculum are communication skills for authentic contexts, citizenship and global citizenship, interdisciplinary skills and concepts, and interdisciplinary contexts and problems.

In Year 5, students study science communication and public discourse to hone their communication skills. These skills are further developed in Year 6 where students discover their own unique voices through self-reflection and learn how to present themselves well in rehearsed and spontaneous, social and professional settings. In Year 6 Semester 1, students also reflect on their shared heritage and broader horizons regarding global diplomacy and influence. Students concurrently have a choice of focusing on interdisciplinary skills through a course on multidimensional thinking, or on interdisciplinary concepts through a course on epistemology.

The interdisciplinary curriculum culminates in the final course in Year 6 Semester 2, where students architect change, using the skills and concepts they have acquired earlier, by prototyping solutions to socio-scientific issues with reference to the Sustainable Development Goals. Through this, the interdisciplinary curriculum, as a whole, will provide plenty of opportunities for students to develop the competencies, mindsets and skills needed to tackle real-world challenges and lead purposeful, sustainable change.

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<b>Level</b>	<b>Sem</b>	<b>Course Code</b>	<b>Course Type</b>	<b>Course Title</b>	<b>Description</b>	<b>Unit</b>	<b>Pre-requisites</b>	<b>Preclusions</b>	<b>Co-requisites</b>	<b>Hrs/wk</b>	<b>Remarks</b>
3	1 and 2	GC3332	Enrichment	Wonderment Exploration	This Junior High enrichment course focuses on fostering wonderment learning. Students collaborate and delve into topics of their choice, shaping their own learning path. Following proposal approval, they have the opportunity to fine-tune their plans. This self-directed learning takes place during Year 2's final week of each semester, with the option to extend into the school holidays. Upon completing their group project, students present their achievements for assessment. The course's core aim is to cultivate self-discipline and ignite students' enthusiasm for acquiring skills and knowledge that go beyond the school's main curriculum.	2	None				
5	1 and 2	IC5141	Core	Science Communication and Public Discourse	This course focuses on science communication to the layman and to experts, as well as on public and interpersonal communication.	2	None			1	
6	1 and 2	IC6141	Core	Your Voice	This course guides students in self-reflection and on how they can present themselves well in rehearsed and spontaneous, social and professional settings.	2	None			1	
6	1	IC6142	Core	Heritage and Horizons	This course focuses on Singapore's development into a city state, roles of residents, global diplomacy and influence.	2	None			2	
6	1	IC6143	Core	Multidimensional Thinking	This course focuses on strategies for analytical, adaptive and inventive thinking, reason and logic.	2	None		IC6142	3	Students should opt for either IC6143 or IC6144.
6	1	IC6144	Core	Epistemology	This course focuses on the nature of knowledge.	2	None		IC6142	3	
6	2	IC6145	Core	Architects of Change	This is a problem-based course integrating design thinking into prototyping solutions to socio-scientific issues using the SDGs as a foundation.	2	None			3	
5	1 and 2	IC5141	Core	Science Communication and Public Discourse	This course focuses on science communication to the layman and to experts, as well as on public and interpersonal communication.	2	None			1	

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