Physics
Applicable to students admitted in 2020-21

Students admitted to the Physics Major Programme through the Broad-based admission scheme may apply to specialize in the *Enrichment Stream in Theoretical Physics* no sooner than their third year of attendance if they have obtained a GPA of 3.3 or above in all PHYS courses (excluding PHYS courses at 1000 level). Students admitted to the Theoretical Physics Programme are placed in the *Enrichment Stream in Theoretical Physics* automatically, declaration is not required. The minimum units required for the *Enrichment Stream in Theoretical Physics* is 72.

Major Programme Requirement

Students are required to complete a minimum of 71 units (72 units for Enrichment Stream in Theoretical Physics) of courses as follows:

		Units
1.	Faculty Package: Group D: PHYS1111 or 1113 Group C: MATH1010 or 1018 A course from the following Group B: CHEM1070 or 1072 or 1280 Group E: STAT1011 or 1012 Group A: LSCI1000 or 1001 or 1002	9
2.	Required Courses[a]:	
(a)	Physics courses PHYS1122, 1712, 2041, 2051[b], 2510, 2520, 2711, 2722, 3011, 3021, 3022, 3031 (or 4031)[c][d], 3041, 3710, 4610 (capstone course) [e], 4801[f]	35
(b)	Mathematics and Chemistry courses (i) One course from MATH2010, 2530 (ii) One course from CHEM1070, 1072[g]	3 or 6[g1]
3.	Elective Courses: 24 or 21 units[g2] of the following courses: CSCI3320, ESSC4010, 4520, MATH3290, 4030, PHYS2061[b][h] or equivalent, PHYS2401, 2610, 3023, 3031[c], 3051, 3061, 3403, 3410[h], 3420, 3610, 3630, 3730, 3810, 4011, 4021, 4031[c], 4041, 4050, 4051, 4061, 4420, 4430, 4440, 4450, 4460, 4470, 4480, 4490, 4491, 4492, 4620[e], 4630, 4710, 4711, 4712, 4802[f], 4811, 4812, and all PHYS and MSEG courses at 5000 level[i]. Students may seek approval from the Department to substitute up to 6 units of elective courses with relevant courses at the appropriate (typically 3000 or 4000) level offered by other programmes.	24 or 21[g2]
	Total:	**71**

<u>Streams</u>:
Students may declare at most two of the following streams by taking the stream-specific courses.

Enrichment Stream in Theoretical Physics

(a)	Required Courses: PHYS2061[b][h], 3051, 4620[e], 4802	10
(b)	Elective Courses (of which at least two courses from MATH4030, PHYS4011, 4021[j], 4041[j], 4460): MATH3290, 4030, PHYS3031[c], 4011, 4021[j], 4031[c], 4041[j], 4050[j], 4051, 4061, 4420, 4430, 4460, 4470	15 or 12[g3]

Astrophysics and Particle Physics Stream

(a)	Required Courses: PHYS2401, 4430, 4460, 4470	12

Computational and Data Physics Stream

(a)	Required Courses: PHYS2061[b][h], 3061, 4061	9
(b)	Elective Courses: One course from CSCI3320, ELEG5491, PHYS5061, 5520, 5610	3

Quantum Science and Technology Stream

(a)	Required Courses: PHYS4021[j], 4031[c], 4050[j]	9
(b)	Elective Courses: Two courses from PHYS3023, 4440, 4450 (or 5320), 5510 (or 5430), 5550 (or 5590).	6

In addition to fulfilling the above Major Programme Requirement, students meeting the criteria as specified by the Faculty can take the following stream offered by the Faculty:

Science, Technology And Research Stream

Students are required to complete a minimum of 12 units of courses as follows:

		Units
1.	Required Courses:	
(a)	One Faculty Package Course: Choose from the two remaining groups of the Faculty Package that have not been used to fulfill the Major Programme Requirement	3
(b)	Research Courses: STAR2000, 3000, 4000[k]	6
(c)	Seminar Courses: STAR2050, 3050, 4050	3
2.	Experiential Learning: At least 4 consecutive weeks of outside Hong Kong exposure[l]	---
	Total:	**12**

Explanatory Notes:

1. PHYS and MSEG courses at 2000 and above level will be included in the calculation of Major GPA for honours classification.
2. Students may choose to declare one, or up to two streams, including the Science, Technology And Research Stream.

[a] Upon written approval of the Department, students who have failed a required course

in the final year of attendance may be allowed to take a substitute course at the same level as prescribed by the Department.

[b] Students can be exempted from taking PHYS courses by taking its closely related course, as listed below to fulfill the requirement. Units earned can be counted towards the Major Programme.

PHYS courses		Closely related courses	
PHYS2051	Quantitative Methods for Basic Physics	MATH2020 / MATH2028	Advanced Calculus II / Honours Advanced Calculus II
PHYS2061	Basic Computational Physics	MATH3230	Numerical Analysis

[c] Students who have taken both PHYS3031 and 4031 can use only one of the courses to fulfill the Elective Courses requirement.

[d] Students who are under the Quantum Science and Technology Stream should take PHYS4031.

[e] Upon approval of the Department, students who declare second major in Earth System Science may be allowed to use ESSC4810 and/or ESSC4820 to fulfill the requirement of PHYS4610 and/or PHYS4620.

[f] Students, who are not under the Enrichment Stream in Theoretical Physics, have not taken PHYS4801 may seek approval from the Department to substitute PHYS4801 with PHYS4802. Students may also take both courses. In this case, PHYS4802 will be used to fulfill the Elective Courses requirement.

[g] Students should note that CHEM1070/1072 is a required course. Students who do not take CHEM1070/1072 to fulfill the Faculty Package should include one of these courses here. For these students, the applicable units for [g1], [g2] and [g3] are 6, 21 and 12, respectively.

[h] Students may seek approval from the Department to substitute PHYS2061 with CSCI2800/1510/1520/1110/1120 and to substitute PHYS3410 with ELEG2202.

[i] PHYS and MSEG courses at 5000 level are offered by the Division of Physics and Division of Materials Science and Engineering respectively for postgraduate programmes.

[j] Students may seek approval from the Department to substitute PHYS4021 with PHYS5410, PHYS4041 with PHYS5420, and PHYS4050 with PHYS5430.

[k] Students may select research-oriented course(s), as approved by the Major Programme, to substitute up to four units for fulfillment of Research Courses requirement.

[l] Students must complete any exchange/research/internship programme(s) offered by the University, Colleges, the Faculty of Science or Major Programme, as approved by the Major Programme, to fulfill the Experiential Learning requirement. Students are responsible for the extra costs incurred in the exchange/research/internship programme(s).

In view of the fact that students admitted through the Broad-based admission scheme have more diverse academic backgrounds under the new senior secondary education system, two course patterns are recommended for students with different HKDSE preparations. Course pattern A is suitable for students who have a better physics and mathematics preparation, e.g. those taken Physics as a single elective subject or done well in Combined Science with a physics component and an elective module in mathematics in HKDSE, whereas course pattern B is for students who prefer to take preparatory courses in physics and/or mathematics in the first semester of studies so as to be better prepared before taking the physics major courses.

Physics		
	Recommended Course Pattern A	Units
First Year of Attendance	1st term Faculty Package: PHYS1111 or 1113, MATH1010 or 1018, CHEM1070 or 1072 or 3rd Faculty Package course Major Required: Major Elective(s):	9
	2nd term Faculty Package: 3rd Faculty Package course (if not taken CHEM1070 or 1072 in the 1st term) Major Required: MATH2010 or 2530, PHYS1122, 1712 Major Elective(s):	0-3 7
Second Year of Attendance	1st term Major Required: PHYS2041, 2051, 2510, 2711 Major Elective(s):	9
	2nd term Major Required: PHYS2520, 2722, 3011 Major Elective(s): Elective(s)	5 3-6
Third Year of Attendance	1st term Major Required: PHYS3021, 3041, 3710 (if not taking in the 2nd term) Major Elective(s): Elective(s)	6-7 3-6
	2nd term Major Required: PHYS3022, 3031 (if not taking PHYS4031 in the Fourth Year), 3710 (if not taken in the 1st term), 4802 (if not taking either PHYS4801 or 4802 in the Fourth Year) Major Elective(s): Elective(s)	3-8 0-3
Fourth Year of Attendance	1st term Major Required: PHYS4031 (if not taken PHYS3031 in the Third Year), 4610, 4801 (if not taken PHYS4802 and not taking PHYS4802 in the 2nd term) Major Elective(s): Elective(s)	3-7 6-9
	2nd term Major Required: PHYS4802 (if not taken either PHYS4801 or 4802) Major Elective(s): Electives	0-1 9-12
	Total (including Faculty Package):	**71**

Physics		
	Recommended Course Pattern B	Units
First Year of Attendance	1st term Faculty Package: CHEM1070 or 1072 or 3rd Faculty Package course Major Required: Major Elective(s): Others: Remedial physics and/or mathematics courses (e.g. PHYS1002 as a preparatory course in physics); such remedial courses are not counted towards the physics major requirement	0-3 0-3
	2nd term Faculty Package: PHYS1111 or 1113, MATH1010 or 1018, CHEM1070 or 1072 (if not taken in the 1st term) or 3rd Faculty Package course Major Required: PHYS1712 Major Elective(s):	6-9 1
Second Year of Attendance	1st term Major Required: PHYS2041, 2051, 2510, 2711 Major Elective(s):	9

	2nd term Major Required: MATH2010 or 2530, PHYS1122, 2520, 2722, 3011 (or one elective course) Major Elective(s):	8-11
Third Year of Attendance	1st term Major Required: PHYS3021, 3041, 3710 (if not taking in the 2nd term) Major Elective(s): Elective(s)	6-7 3-6
	2nd term Major Required: PHYS3011 (if not taken), 3022, 3031 (if not taking PHYS4031 in the Fourth Year), 3710 (if not taken in the 1st term), 4802 (if not taking either PHYS4801 or 4802 in the Fourth Year) Major Elective(s): Elective(s)	3-11 2-6
Fourth Year of Attendance	1st term Major Required: PHYS4031 (if not taken PHYS3031 in the Third Year), 4610, 4801 (if not taken PHYS4802 and not taking PHYS4802 in the 2nd term) Major Elective(s): Electives	3-7 9
	2nd term Major Required: PHYS4802 (if not taken either PHYS4801 or 4802) Major Elective(s): Electives	0-1 10
	Total (including Faculty Package):	**71**

Physics (Enrichment Stream in Theoretical Physics)		
	Recommended Course Pattern	Units
First Year of Attendance	1st term Faculty Package: PHYS1111 or 1113, MATH1010 or 1018, CHEM1070 or 1072 or 3rd Faculty Package course Major Required: PHYS2520 Major Elective(s):	9 1
	2nd term Faculty Package: 3rd Faculty Package course (if not taken CHEM1070 or 1072 in the 1st term) Major Required: MATH2010 or 2530, PHYS1122, 1712 Major Elective(s):	0-3 7
Second Year of Attendance	1st term Major Required: PHYS2041, 2051, 2061, 2510, 2711 Major Elective(s):	12
	2nd term Major Required: PHYS2722, 3011, 3051 Major Elective(s):	7
Third Year of Attendance	1st term Major Required: PHYS3021, 3041, 3710 (if not taking in the 2nd term) Major Elective(s): Elective(s)	6-7 3-6
	2nd term Major Required: PHYS3022, 3031 (if not taking PHYS4031 in the Fourth Year), 3710 (if not taken in the 1st term) Major Elective(s): Elective(s)	3-7 3-6
Fourth Year of Attendance	1st term Major Required: PHYS4031 (if not taken PHYS3031 in the Third Year), 4610, 4801 Major Elective(s): Elective(s)	4-7 6-9

	2nd term Major Required: PHYS4620, 4802 Major Elective(s): Electives	 4 3-9
	Total (including Faculty Package):	**72**

Physics (Astrophysics and Particle Physics Stream)		
	Recommended Course Pattern	Units
First Year of Attendance	1st term Faculty Package: PHYS1111 or 1113, MATH1010 or 1018, CHEM1070 or 1072 or 3rd Faculty Package course Major Required: Major Elective(s):	9
	2nd term Faculty Package: 3rd Faculty Package course (if not taken CHEM1070 or 1072 in the 1st term) Major Required: MATH2010 or 2530, PHYS1122, 1712 Major Elective(s):	0-3 7
Second Year of Attendance	1st term Major Required: PHYS2041, 2051, 2510, 2711 Major Elective(s):	9
	2nd term Major Required: PHYS2401, 2520, 2722, 3011 Major Elective(s):	8
Third Year of Attendance	1st term Major Required: PHYS3021, 3041, 3710 (if not taking in the 2nd term) Major Elective(s): Elective(s)	 6-7 3-6
	2nd term Major Required: PHYS3022, 3031 (if not taking PHYS4031 in the Fourth Year), 3710 (if not taken in the 1st term), 4802 (if not taking either PHYS4801 or 4802 in the Fourth Year) Major Elective(s): Elective(s)	3-8 6
Fourth Year of Attendance	1st term Major Required: PHYS4031 (if not taken PHYS3031 in the Third Year), 4610, 4801 (if not taken PHYS4802 and not taking PHYS4802 in the 2nd term) Major Elective(s): Elective(s)	3-7 3-6
	2nd term Major Required: PHYS4430, 4460, 4470, 4802 (if not taken either PHYS4801 or 4802) Major Elective(s):	9-10
	Total (including Faculty Package):	**71**

Physics (Computational and Data Physics Stream)		
	Recommended Course Pattern	Units
First Year of Attendance	1st term Faculty Package: PHYS1111 or 1113, MATH1010 or 1018, CHEM1070 or 1072 or 3rd Faculty Package course Major Required: Major Elective(s):	9

	2nd term Faculty Package: 3rd Faculty Package course (if not taken CHEM1070 or 1072 in the 1st term) Major Required: MATH2010 or 2530, PHYS1122, 1712 Major Elective(s):	0-3 7
Second Year of Attendance	1st term Major Required: PHYS2041, 2051, 2061, 2510, 2711 Major Elective(s):	12
	2nd term Major Required: PHYS2520, 2722, 3011 Major Elective(s):	5
Third Year of Attendance	1st term Major Required: PHYS3021, 3041, 3710 (if not taking in the 2nd term) Major Elective(s): Elective(s)	6-7 3-6
	2nd term Major Required: PHYS3022, 3031 (if not taking PHYS4031 in the Fourth Year), 3061, 3710 (if not taken in the 1st term), 4802 (if not taking either PHYS4801 or 4802 in the Fourth Year) Major Elective(s):	6-11
Fourth Year of Attendance	1st term Major Required: PHYS4031 (if not taken PHYS3031 in the Third Year), 4061, 4610, 4801 (if not taken PHYS4802 and not taking PHYS4802 in the 2nd term) Major Elective(s): Elective(s)	6-10 3
	2nd term Major Required: PHYS4802 (if not taken either PHYS4801 or 4802) Major Elective(s): Electives	0-1 9
	Total (including Faculty Package):	**71**

Physics (Quantum Science and Technology Stream)		
	Recommended Course Pattern	Units
First Year of Attendance	1st term Faculty Package: PHYS1111 or 1113, MATH1010 or 1018, CHEM1070 or 1072 or 3rd Faculty Package course Major Required: Major Elective(s):	9
	2nd term Faculty Package: 3rd Faculty Package course (if not taken CHEM1070 or 1072 in the 1st term) Major Required: MATH2010 or 2530, PHYS1122, 1712 Major Elective(s):	0-3 7
Second Year of Attendance	1st term Major Required: PHYS2041, 2051, 2510, 2711 Major Elective(s):	9
	2nd term Major Required: PHYS2520, 2722, 3011 Major Elective(s):	5
Third Year of Attendance	1st term Major Required: PHYS3021, 3041, 3710 (if not taking in the 2nd term), 4031 Major Elective(s): Elective(s)	9-10 3-6

	2nd term Major Required: PHYS3022, 3710 (if not taken in the 1st term), 4802 (if not taking either PHYS4801 or 4802 in the Fourth Year) Major Elective(s): Elective(s)	3-5 6
Fourth Year of Attendance	1st term Major Required: PHYS4021, 4050, 4610, 4801 (if not taken PHYS4802 and not taking PHYS4802 in the 2nd term) Major Elective(s): Elective(s)	9-10 3-6
	2nd term Major Required: PHYS4802 (if not taken either PHYS4801 or 4802) Major Elective(s): Electives	0-1 6
	Total (including Faculty Package):	**71**

Physics — Science, Technology And Research Stream		
	Recommended Course Pattern	Units
First Year of Attendance	1st term Faculty Package: PHYS1111 or 1113, MATH1010 or 1018, CHEM1070 or 1072 or 3rd Faculty Package course Major Required: Major Elective(s):	9
	2nd term Faculty Package: 3rd Faculty Package course (if not taken CHEM1070 or 1072 in the 1st term) 4th Faculty Package course Major Required: MATH2010 or 2530, PHYS1122, 1712 Major Elective(s):	0-3 3 7
	Summer session STARS: STAR2050	1
Second Year of Attendance	1st term Major Required: PHYS2041, 2051, 2510, 2711 Major Elective(s): STARS: STAR2000	9 1
	2nd term Major Required: PHYS2520, 2722, 3011 Major Elective(s): Elective(s) STARS: STAR3050	5 3-6 1
Third Year of Attendance	1st term Major Required: PHYS3021, 3041, 3710 (if not taking in the 2nd term) Major Elective(s): Elective(s) STARS: STAR3000	6-7 3-6 2
	2nd term Major Required: PHYS3022, 3031 (if not taking PHYS4031 in the Fourth Year), 3710 (if not taken in the 1st term), 4802 (if not taking either PHYS4801 or 4802 in the Fourth Year) Major Elective(s): Elective(s) STARS: STAR4050	3-8 6 1
Fourth Year of Attendance	1st term Major Required: PHYS4031 (if not taken PHYS3031 in the Third Year), 4610, 4801 (if not taken PHYS4802 and not taking PHYS4802 in the 2nd term) Major Elective(s): Elective(s)	3-7 6-9

	2nd term Major Required: PHYS4802 (if not taken either PHYS4801 or 4802) Major Elective(s): PHYS4620@ and other Electives	 0-1 6-9
	Total (including Faculty Package):	**80**

@ Students may take PHYS4620 as a substitute for STAR4000.

Minor Programme Title
Physics

Minor Programme Requirement

Students are required to complete a minimum of 18 units of courses as follows:

		Units
1.	Elective Courses (at least 6 units of PHYS courses at 3000 or above level)[a] : PHYS1001[b] or 1002[b][c], 1111[b][c] or 1113[b][c], 1122, 2041[c], 2051[c], 2401, 3011, 3021, 3022, 3023, 3031, 3041, 3051, 3061, 3403, 3420, 3730, 4011, 4021, 4031, 4041, 4050, 4051, 4420, 4430, 4440, 4450, 4460, 4470	18
	Total:	**18**

Explanatory Notes:

[a] Certain prerequisite/co-requisite conditions for PHYS courses may be waived for Minor students. Intending Minor students should consult the Department of Physics.

[b] Students can only use PHYS1001 or 1002, PHYS1111 or 1113, but not both in the respective pair, to fulfill the requirements of this Minor Programme.

[c] Students can take either the PHYS course, or its corresponding equivalent or closely related course (with a maximum of 6 units), as listed below to fulfill the requirement, but not both:

PHYS courses		Equivalent/closely related courses	
PHYS1002	General Physics	PHYS1003	General Physics for Engineers
PHYS1111/ 1113	Introduction to Mechanics, Fluids, and Waves (University Physics I)/ Mechanics, Fluids and Waves (University Physics I)	PHYS1110	Engineering Physics: Mechanics and Thermodynamics
PHYS2041	University Physics III	ENGG1310 or ENGG2520 or ESTR1003 or ESTR2006	Engineering Physics: Electromagnetics, Optics and Modern Physics/ Engineering Physics II
PHYS2051	Quantitative Methods for Basic Physics	MATH2020 / MATH2028	Advanced Calculus II / Honours Advanced Calculus II

Course List

Course Code	*Course Title*	*Unit(s)*
PHYS1001	Essential Physics	3
PHYS1002	General Physics	3
PHYS1003	General Physics for Engineers	3
PHYS1110	Engineering Physics: Mechanics and Thermodynamics	3
PHYS1111	Introduction to Mechanics, Fluids, and Waves (University Physics I)	3
PHYS1113	Mechanics, Fluids and Waves (University Physics I)	3
PHYS1122	University Physics II – Introduction to Optics and Modern Physics	3
PHYS1712	Physics Laboratory I	1
PHYS2041	University Physics III – Introduction to Heat and Electromagnetism	3
PHYS2051	Quantitative Methods for Basic Physics	3
PHYS2061	Basic Computational Physics	3
PHYS2401	Introduction to Astronomy and Astrophysics	3
PHYS2510	Student Centred Learning I	1
PHYS2520	Student Centred Learning II	1
PHYS2610	Short Project I	2
PHYS2711	Physics Laboratory II	2
PHYS2722	Physics Laboratory III	1
PHYS3011	Classical Mechanics I	3
PHYS3021	Quantum Mechanics I	3
PHYS3022	Applied Quantum Mechanics	3
PHYS3023	Introduction to Quantum Information Physics	3
PHYS3031	Thermodynamics and Statistical Physics	3
PHYS3041	Electromagnetic Theory I	3
PHYS3051	Methods in Theoretical Physics I	3
PHYS3061	Introduction to Computer Simulation of Physical Systems	3
PHYS3403	Introduction to Soft and Living Matter Physics	3
PHYS3410	Practical Electronics	3
PHYS3420	Topics in Contemporary Physics	3
PHYS3610	Short Project II	2
PHYS3630	Other Physics Learning Experience I	1
PHYS3710	Short Experimental Project I	1
PHYS3730	Basic Instrumentation	3
PHYS3810	Short Theoretical Project I	1
PHYS4011	Classical Mechanics II	3
PHYS4021	Quantum Mechanics II	3
PHYS4031	Statistical Mechanics	3
PHYS4041	Electromagnetic Theory II	3
PHYS4050	Solid State Physics	3
PHYS4051	Methods in Theoretical Physics II	3
PHYS4061	Computational Physics	3
PHYS4420	Physics in Meteorology	3
PHYS4430	Astrophysics	3
PHYS4440	Topics in Nanoscience and Technology	3

PHYS4450	Optical Physics	3
PHYS4460	Relativity	3
PHYS4470	Nuclear and Particle Physics	3
PHYS4480	Special Topics I	3
PHYS4490	Special Topics II	3
PHYS4491	Special Topics III	3
PHYS4492	Special Topics IV	3
PHYS4610	Senior Project I	3
PHYS4620	Senior Project II	3
PHYS4630	Other Physics Learning Experience	2
PHYS4710	Short Experimental Project II	1
PHYS4711	Short Experimental Project III	1
PHYS4712	Short Experimental Project IV	1
PHYS4801	Seminar I	1
PHYS4802	Seminar II	1
PHYS4811	Short Theoretical Project II	1
PHYS4812	Short Theoretical Project III	1
STAR2000	Undergraduate Research in Science I	1
STAR2050	Seminar I	1
STAR3000	Undergraduate Research in Science II	2
STAR3050	Seminar II	1
STAR4000	Undergraduate Research in Science III	3
STAR4050	Seminar III	1