

## Curriculum Information Record for a Major/Degree

### Department of Physics

#### Effective from Semester A 2020/2021

#### For Students Admitted/Changed to the Major with Catalogue Term Semester A and B 2017/18

The information provided on this form is the official record of the major/degree. It will be used for City University’s database, various City University publications (including websites) and documentation for students and others as required.

In specifying the curriculum for a major/degree, “catalogue term” is used to determine the set of curriculum requirements that a student is following. By mapping the student record and the version of curriculum rules applicable, the graduation requirements of individual students will be evaluated accordingly. The catalogue terms of curriculum requirements that students will follow are summarized below (BUS/04/A5R):

<u>Requirements</u>	<u>Catalogue Term</u>
a) Common Requirements <ul style="list-style-type: none"> <li>• Gateway Education</li> <li>• University Language</li> <li>• College/School requirement</li> </ul>	The same as student’s admission term
<hr/>	
b) Major	
<ul style="list-style-type: none"> <li>• For normative 4-year degree students who will join the majors allocation exercise</li> </ul>	Effective term of the declared major
<ul style="list-style-type: none"> <li>• For advanced standing students and 4-year degree students who already have a major at the time of admission</li> </ul>	The same as student’s admission term
<ul style="list-style-type: none"> <li>• For students who have changed major</li> </ul>	Effective term of the changed major
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c) Stream	Follow the effective term of the associated major

### Prepared / Last Updated by

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## City University of Hong Kong

## Curriculum Information Record for a Major/Degree

## Department of Physics

Effective from Semester A 2020/2021

For Students Admitted/Changed to the Major with Catalogue Term  
Semester A and B 2017/18**Part I Major/Degree Overview**

**Major** (in English) : Applied Physics  
(in Chinese) : 應用物理學

**Degree** *(For students admitted to the University in 2015/16 and thereafter)*  
(in English) : Bachelor of Science  
(in Chinese) : 理學士

*(For students admitted to the University in 2014/15 and before)*  
(in English) : Bachelor of Science (Honours)  
(in Chinese) : 榮譽理學士

**Award Title<sup>#</sup>** *(For students admitted to the University in 2015/16 and thereafter)*  
(in English) : Bachelor of Science in Applied Physics  
(in Chinese) : 理學士(應用物理學)

*(For students admitted to the University in 2014/15 and before)*  
(in English) : Bachelor of Science (Honours) in Applied Physics  
(in Chinese) : 應用物理學榮譽理學士

*# Please make reference to the "Guidelines on Award Titles" approved by the Senate when proposing new award titles or changes to existing award titles (Senate/86/A5R).*

### 1. Normal and Maximum Period of Study

	<b>Normative 4-year Degree</b>	<b>Advanced Standing I (Note 1)</b>	<b>Advanced Standing II (Senior-year Entry) (Note 2)</b>
Normal period of study	4 years	3 years	2 years
Maximum period of study	8 years	6 years	5 years

### 2. Minimum Number of Credit Units Required for the Award and Maximum Number of Credit Units Permitted

<b>Degree Requirements</b>	<b>Normative 4-year Degree</b>	<b>Advanced Standing I</b>	<b>Advanced Standing II (Senior-year Entry)</b>
Gateway Education requirement *	30 credit units	21 credit units	12 credit units
College/School requirement *	6 credit units	waived	waived
Major requirement	66/65 <sup>^</sup> credit units (Core: 45/48; 50/53 <sup>^</sup> Elective: 21/18; 15/12 <sup>^</sup> )	66 credit units (Core: 45/48 Elective: 21/18)	60 credit units (Core: 39/42 Elective: 21/18)
Free electives / Minor (if applicable)	18/19 <sup>^</sup> credit units	3 credit units	0 credit unit
<b>Minimum number of credit units required for the award</b>	<b>120 credit units</b>	<b>90 credit units</b>	<b>72 credit units</b>

<b>Maximum number of credit units permitted</b>	<b>144 credit units</b>	<b>114 credit units</b>	<b>84 credit units</b>
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\* For details, please refer to the Curriculum Information Record for Common Requirements.

<sup>^</sup> For students who plan to pursue the Joint Bachelor's Degree Program between City University of Hong Kong and Columbia University

### 3. Aims of Major

This major is to provide Bachelor-level education to students with diverse backgrounds, to prepare them to pursue a career in areas such as environmental physics, optics, materials technology, and biomedical physics in the industrial, commercial, governmental or educational sectors. On completion of the major, graduates will be able to integrate knowledge learned in the major to support in at least an original discovery or creative design relevant to applied physics.

Note 1: For students with recognised Advanced Level Examination or equivalent qualifications.

Note 2: For Associate Degree/Higher Diploma graduates admitted to the senior year.

#### 4. Intended Learning Outcomes of Major (MILOs)

(Please state what the student is expected to be able to do on completion of the major according to a given standard of performance.)

Upon successful completion of this major, students should be able to:

No.	MILOs	Discovery-enriched curriculum related learning outcomes (please tick where appropriate)		
		A1	A2	A3
1.	Apply knowledge of mathematics, physics, and engineering appropriate to the degree in Physics (with the focus on one or more of the areas in applied physics: environmental physics, optics, materials technology, and biomedical physics). This includes: (a) to design a component, a process or a system to meet desired needs within realistic constraints. (b) to identify, formulate, and solve physics and engineering problems.	✓	✓	
2.	Design and conduct experiments, as well as analyze, interpret and present results.		✓	✓
3.	Use the techniques, skills, and modern Physics and engineering tools including computer/IT tools necessary for practices appropriate to the degree in Physics along with an understanding of their processes and limitations.		✓	✓
4.	Appreciate the impact of Physics and engineering applications in a global and societal context, especially the importance of health, safety and environmental considerations to both workers and the general public.	✓	✓	
5.	Appreciate professional and ethical responsibility.			
6.	Appreciate basic laws and principles of physics and to use this knowledge to explain everyday life examples and phenomena, to explain science to people not in the science and engineering discipline, and to educate the public in physics.	✓		
7.	Work in a multidisciplinary team.		✓	
8.	Communicate effectively.		✓	
9.	Recognize the need for, and to engage in life-long learning, including the ability to stay abreast of contemporary issues.	✓	✓	
10.	Create an original discovery or design that are motivated from the major of study.	✓	✓	✓

A1: Attitude

*Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.*

A2: Ability

*Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.*

A3: Accomplishments

*Demonstrate accomplishments of discovery/innovation/creativity through producing/constructing creative works/new artefacts, effective solutions to real-life problems or new processes.*

**Part II Major Requirement**

*(The catalogue term of the major requirement that students will follow will be the effective term of the declared/allocated major.)*

*For normative 4-year degree students who will join the majors allocation exercise, the catalogue term of major requirement will be one year after admission.*

*For advanced standing students and 4-year degree students who already have a major at the time of admission, the catalogue term of major requirement will be the same as their admission term.)*

**1. Core Courses**

- Normative 4-year Degree (45 or 48 credit units; 50 or 53 credit units<sup>^</sup>)
- Advanced Standing I (45 or 48 credit units)
- Advanced Standing II (39 or 42 credits)

Course Code	Course Title	Level	Credit Units	Remarks
AP1202	General Physics II	B1	3	Advanced Standing I and II Students with acceptable qualifications may apply for exemption on a case by case basis. They are required to complete any 3 CU course to replace the exempted credits.
AP1203	General Physics III	B1	3	Advanced Standing I and II Students with acceptable qualifications may apply for exemption on a case by case basis. They are required to complete any 3 CU course to replace the exempted credits.
AP2191	Electricity and Magnetism	B2	3	
AP2212	Measurement and Instrumentation	B2	3	Advanced Standing II students are not required to take this course.
AP2213	Advanced Measurement and Instrumentation	B2	3	Advanced Standing II students are not required to take this course.
AP3114	Computational Methods for Physicists and Materials Engineers	B3	3	Normative 4-year degree students who plan to pursue the Joint Bachelor's Degree Program between CityU and ColumbiaU are required to take <b>MA3511 Ordinary Differential Equations</b> to replace this course.  *Students must get the prior approval from the Department for enrolling the Joint Bachelor's Degree Program between CityU and ColumbiaU.
AP3202	Modern Physics	B3	3	
AP3204	Waves and Optics	B3	3	
AP3205	Electromagnetism	B3	3	
AP3244	Design Laboratory	B3	3	
AP3251	Quantum Physics	B3	3	

AP3272	Introduction to Solid State Physics	B3	3	
AP3290	Thermodynamics	B3	3	
AP4216/ AP4217/ CSCI4003/  FS4003	Project/ Dissertation/ Co-operative Education Placement Project for Science Students/ CES Placement Project	B4	3/ 6/ 6/  6	<ul style="list-style-type: none"> <li>- Students taking <i>AP4216 Project</i> are required to <u>take</u> 3 more credits of elective course.</li> <li>- <i>CSCI4003 Co-operative Education Placement Project for Science Students /FS4003 CES Placement Project</i> (6 CU) can be used to replace <i>AP4217 Dissertation</i> (6 CU). Students taking <i>CSC4003/FS4003</i> are required to take <i>CSCI4001/FS4001</i> simultaneously.</li> </ul>
MA2158	Linear Algebra and Calculus	B2	3	<ul style="list-style-type: none"> <li>• Advanced Standing students may be required to complete <i>MA1200 Calculus</i> and <i>Basic Linear Algebra I</i> and <i>MA1201 Calculus</i> and <i>Basic Linear Algebra II</i> (the pre-requisite courses) before they are allowed to enroll <i>MA2158 Linear Algebra and Calculus</i>. They are advised to apply and sit for the placement test organized by MA department before the commencement of Semester A of their admitted academic year.</li> <li>• Normative 4-year degree students who plan to pursue the Joint Bachelor's Degree Program between CityU and ColumbiaU are required to take <b>MA2508 Multi-variable Calculus</b> to replace this course.</li> </ul> <p>*Students must get the prior approval from the Department for enrolling the Joint Bachelor's Degree Program between CityU and ColumbiaU.</p>

Note: Students who plan to pursue the Joint Bachelor's Degree Program between CityU and ColumbiaU are required to take **MA2503 Linear Algebra**.

<sup>^</sup> For students who plan to pursue the Joint Bachelor's Degree Program between City University of Hong Kong and Columbia University

## 2. Electives

- Normative 4-year Degree (21 or 18 credit units; 15 or 12 credit units<sup>^</sup>)

- Advanced Standing I (21 or 18 credit units)

- Advanced Standing II (21 or 18 credit units)

Course Code	Course Title	Level	Credit Units	Remarks
AP2102	Introduction to Materials Engineering	B2	3	
AP3171	Materials Characterization Techniques	B3	3	
PHY3220	Financial Engineering from a Physicist's Perspective	B3	3	The course title has been revamped as "Financial Engineering from a Scientist's Perspective" effective from Semester A 2020/21.
AP4121	Thin Film Technology and Nanocrystalline Coatings	B4	3	
AP4127	Smart Sensors: From Engineering to Applications	B4	3	
AP4172	Simulation and Modelling in Multidisciplinary Sciences	B4	3	The course title has been revamped as "Computational Physics" effective from Semester A 2019/20.
AP4230	Radiation Safety	B4	3	
AP4232	Radiotherapy Physics	B4	3	
AP4233	Imaging Physics	B4	3	
AP4254	Fundamentals of Laser Optics	B4	3	
AP4255	Optoelectronic Devices and Systems	B4	3	
AP4265	Semiconductor Physics and Devices	B4	3	
AP4273	Special Topics in Physics	B4	3	
AP4274	Radiation Biophysics	B4	3	
AP4275	Radiological Physics and Dosimetry	B4	3	
AP4283	Medical Physics I	B4	3	The course title has been revamped as "Physics in Medicine" effective from Semester A 2018/19.
AP4284	Medical Physics II	B4	3	The course is phased out in the academic year 2018/19.

<sup>^</sup> For students who plan to pursue the Joint Bachelor's Degree Program between City University of Hong Kong and Columbia University

**Part III Admission Requirements for Entry to the Major, if any**

*(Admission requirements here refers to specific requirements for students already admitted to the College/School/Department with an undeclared major. Academic units can state the prerequisites required for admission to the major.*

Nil

**Part IV Accreditation by Professional / Statutory Bodies**

Nil

**Part V Additional Information**

Nil



## Part VI Curriculum Map

(The curriculum map shows the mapping between courses and the MILOs. It should cover all courses designed specifically for the major.)

Course			MILOs										DEC		
Code	Title	Credit	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	A1	A2	A3
<b>Core Courses</b>															
AP1202	General Physics II	3	✓	✓		✓		✓		✓	✓		✓	✓	✓
AP1203	General Physics III	3	✓	✓		✓		✓		✓	✓		✓	✓	✓
AP2191	Electricity and Magnetism	3	✓		✓			✓		✓			✓	✓	
AP2212	Measurement and Instrumentation	3	✓	✓	✓				✓				✓	✓	✓
AP2213	Advanced Measurement and Instrumentation	3	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓
AP3114	Computational Methods for Physicists and Materials Engineers	3	✓		✓	✓		✓			✓		✓	✓	✓
AP3202	Modern Physics	3	✓			✓		✓					✓	✓	
AP3204	Waves and Optics	3	✓			✓		✓						✓	
AP3205	Electromagnetism	3	✓	✓		✓			✓	✓				✓	
AP3244	Design Laboratory	3	✓	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓
AP3251	Quantum Physics	3	✓			✓		✓					✓	✓	
AP3272	Introduction to Solid State Physics	3	✓			✓		✓						✓	
AP3290	Thermodynamics	3	✓			✓		✓						✓	
AP4216/ AP4217/ CSCI4003/ FS4003	Project/ Dissertation/ Co-operative Education Placement Project for Science Students/ CES Placement Project	3/ 6/ 6/ 6	✓	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓
MA2158	Linear Algebra and Calculus	3	✓	✓	✓								✓	✓	✓
MA2503	Linear Algebra*	4	✓							✓			✓	✓	✓
MA2508	Multi-variable Calculus*	4	✓							✓			✓	✓	✓
MA3511	Ordinary Differential Equations*	3	✓							✓			✓	✓	✓

Course			MILOs										DEC		
Code	Title	Credit	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	A1	A2	A3
<b>Electives</b>															
AP2102	Introduction to Materials Engineering	3	✓	✓		✓		✓		✓	✓			✓	✓
AP3171	Materials Characterization Techniques	3	✓	✓	✓				✓				✓	✓	✓
PHY3220	Financial Engineering from a Physicist's Perspective <sup>^</sup>	3	✓			✓	✓	✓	✓		✓		✓	✓	✓
AP4121	Thin Film Technology and Nanocrystalline Coatings	3	✓		✓	✓			✓		✓		✓	✓	✓
AP4127	Smart Sensors: From Engineering to Applications	3	✓	✓	✓	✓		✓			✓			✓	
AP4172	Simulation and Modelling in Multidisciplinary Sciences <sup>+</sup>	3	✓	✓	✓			✓	✓	✓			✓	✓	✓
AP4230	Radiation Safety	3	✓		✓	✓		✓					✓	✓	✓
AP4232	Radiotherapy Physics	3	✓	✓		✓	✓	✓	✓					✓	
AP4233	Imaging Physics	3	✓	✓		✓	✓	✓	✓					✓	
AP4254	Fundamentals of Laser Optics	3	✓			✓		✓					✓	✓	
AP4255	Optoelectronic Devices and Systems	3	✓			✓		✓						✓	
AP4265	Semiconductor Physics and Devices	3	✓			✓		✓					✓	✓	
AP4273	Special Topics in Physics	3	✓			✓							✓	✓	✓
AP4274	Radiation Biophysics	3	✓			✓		✓					✓	✓	
AP4275	Radiological Physics and Dosimetry	3	✓		✓	✓		✓					✓	✓	
AP4283	Medical Physics I <sup>#</sup>	3	✓	✓		✓	✓	✓	✓					✓	
AP4284 <sup>△</sup>	Medical Physics II	3	✓	✓		✓	✓	✓	✓					✓	

- A1 : Attitude  
Develop an attitude of discovery/innovation/creativity, as demonstrated by students possessing a strong sense of curiosity, asking questions actively, challenging assumptions or engaging in inquiry together with teachers.
- A2 : Ability  
Develop the ability/skill needed to discover/innovate/create, as demonstrated by students possessing critical thinking skills to assess ideas, acquiring research skills, synthesizing knowledge across disciplines or applying academic knowledge to real-life problems.
- A3 : Accomplishments  
Demonstrate accomplishments of discovery/innovation/creativity through producing /constructing creative works/new artefacts, effective solutions to real-life problems or new processes.

\* Applicable only to students who plan to pursue the Joint Bachelor's Degree Program between CityU and ColumbiaU.

<sup>^</sup> The course title has been revamped as "Financial Engineering from a Scientist's Perspective" effective from Semester A 2020/21.

<sup>+</sup> The course title has been revamped as "Computational Physics" effective from Semester A 2019/20.

<sup>#</sup> The course title has been revamped as "Physics in Medicine" effective from Semester A 2018/19.

<sup>△</sup> The course is phased out in the academic year 2018/19.