



## Curriculum Information Record for a Research Degree Programme

### Department of Physics Effective from Semester B 2023/24 For Students Admitted with Catalogue Term Semester A 2012/13 to Summer Term 2019

This form is for completion by the College/School for research degree programme. The information provided on this form is the official record of the Programme. It will be used for City University's database, various City University publications (including websites) and documentation for students and others as required.

Please refer to the *Explanatory Notes* attached to this form on the various items of information required.

#### Part I

**Programme Title** (in English) : Doctor of Philosophy  
(in Chinese) : 哲學博士

**Award Title** (in English) : Doctor of Philosophy  
(in Chinese) : 哲學博士

#### Programme Aims

*This programme aims to train and produce independent researchers with state-of-the-art expertise who can create original knowledge through innovative research.*

#### Programme Intended Learning Outcomes (PILOs)

(state what the student is expected to be able to do at the end of the programme according to a given standard of performance)

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

1. achieve general intellectual proficiency and specialization in their chosen subject areas;

2. apply appropriate research methodology/tools to conduct independent research for discoveries;
3. formulate and derive effective, innovative and original solutions to fundamental problems in their chosen subject areas for discoveries;
4. communicate effectively with the learned community about the research process and findings for discoveries;
5. discover through in-depth investigation of the chosen subject areas;
6. build up ethical and social responsibilities;
7. perform multi-disciplinary research with new ideas;
8. strengthen independent learning and researching abilities to suit future versatile employment requirements;
9. enhance proficiencies in scientific language and skills in numerical and IT solutions;
10. collaborate effectively and healthily with colleagues.

## Part II Programme of Study

### 1. Research Area(s) in which research students will be admitted to:

- Theoretical and Computational Physics
- Spectroscopy and Imaging
- Atomic, Molecular and Optical Physics
- Soft Matter and Biophysics
- Quantum Materials

### 2. Programme Core Courses: (4 / 5 credits)

Course Code	Course Title	Level	Units Worth	Remarks
AP8001	Survival Skills for Research Scientists	R8	2 / 3	Effective from Semester A 2019/20, the credit units changed from 2CUs to 3CUs.
AP8004	Postgraduate Seminar	R8	2	

### 3. Programme Electives: (10 credits\*)

\*Students who completed 5 credits of core courses are only required to complete 9 credits of electives.

Code	Course Title	Credits	Remarks
AP8002	Directed Study in Advanced Research Fields	1	
AP8118	Composite Materials- with An Introduction to Nanocomposites	3	
AP8120	Microelectronic Materials and Processing	3	
AP8121	Thin Film Technology and Nanocrystalline Coatings	3	
AP8124	Failure Analysis and Case Studies	3	
AP8126	Functional Ceramics	3	
AP8171	Electronic Packaging and Materials	3	

AP8172/PHY8502	Simulation and Modelling in Multidisciplinary Sciences/Advanced Computational Methods	3	
AP8173	Biomedical Materials and Devices: From Engineering to Clinical Applications	3	
AP8174	Topics in Polymer Science	3	
AP8175	Advanced Technology in Biomedical Devices	3	
AP8176	Energy Materials Design for the Current Century	3	
AP8177	Smart and Functional Materials for Advanced Students	3	
AP8178	Nanostructures and Nanotechnology	3	
AP8179	Nanotechnology for Biological and Medical Applications	3	
AP8180	Modern Scattering Methods in Materials Science	3	
AP8181	Photonics in Nanomaterial Systems and Devices	3	
AP8182	Polymer and Composites-with an Introduction to their Nano-applications	3	
AP8265	Emerging Semiconductor Devices in 21st Century	3	
AP8301/PHY8501	Instrumental Methods of Analysis and Laboratory/Modern Characterization Techniques for Materials Physics	3	
AP8302	Nanomaterials	3	
AP8303	Corrosion and Surface Engineering	3	
AP8307	Building Materials	3	
AP8714	Special Topics in Materials Science and Engineering	3	
PHY8003	Directed Advanced Studies for Postgraduate Students	3	
PHY8251	Advanced Quantum Mechanics	3	Students taking this course should have acquired some basic knowledge of quantum physics, e.g., have taken the course <i>PHY3251 Quantum Physics</i> or equivalent courses.
PHY8252	Statistical Mechanics	3	
PHY8253	Introduction to Biophysics	3	
PHY8254	Fundamentals of Laser Optics	3	
PHY8255	Introduction to Quantum Optics	3	Students taking this course should have acquired some basic knowledge of quantum physics, e.g., have taken the course <i>PHY3251 Quantum Physics</i> and <i>PHY3205 Electrodynamics</i> or equivalent courses.
PHY8273	Special Topics in Physics	3	
PHY8401	Advanced Instrumentation and Measurement Methods for Experimental Physics	3	

PHY8503	Mathematical Methods for Scientists and Engineers	3	
PHY8504	Physics at Nanoscale	3	
PHY8505	Modern Topics in Engineering and Applied Physics	3	
PHY8506	Advanced Electrodynamics	3	
PHY8521	Advanced Solid State Physics	3	
PHY8522	Advanced Imaging Physics	3	
PHY8523	Advanced Nuclear Medicine Physics	3	
PHY8524	Advanced Radiotherapy Physics	3	
PHY8525	Advanced Wave Functional Materials for Energy Applications	3	
PHY8526	Energy Materials: Physics and Applications	3	
PHY8527	Environmental Physics	3	
PHY8603	Introduction to Quantum Information	3	Students taking this course should have acquired some basic knowledge of quantum physics, e.g., have taken the course <i>PHY3251 Quantum Physics</i> and <i>PHY3205 Electrodynamics</i> or equivalent courses.

#### 4. **Qualifying Examination (if any):**

The Qualifying Panel will assess the student's suitability to continue his or her studies on the basis of the qualifying report, coursework results and any other assessment as considered appropriate by the Panel. The Panel's recommendations will be forwarded to the Department/School for approval.

#### 5. **Qualifying/Annual Report Submission:**

Students are required to submit qualifying report and annual report in compliance with the University regulations or guidelines. Such regulations and guidelines are accessible via the Guidebook for Research Degree Studies located at School of Graduate Studies (SGS) website.

#### 6. **Thesis:**

The thesis at the core of the PhD study enables a student to demonstrate his/her independent research work, design and conduct experiments, analyze and formulate physical and engineering problems, correlate and verify data, explain problems lucidly and reach sound conclusions. The data obtained and conclusions reached are placed in logical context substantiated by physics and mathematics. The output of the PhD thesis results from the student's creativity and original ideas. It represents a tangible contribution to science and engineering. The PhD thesis is unique and represents evident contribution to science and /or engineering in the field of study. It contains experimental and/or theoretical output supported by theoretical physics and practical implications.

Students are required to submit their thesis in compliance with the University regulations or guidelines. Such regulations and guidelines are accessible via the Guidebook for Research Degree Studies located at School of Graduate Studies (SGS) website.

#### 7. **Additional Notes:**

Other regulations and guidelines can be found in the Guidebook for Research Degree Studies located at School of Graduate Studies (SGS) website.

#### **Prepared / Last Updated by**

Name: Prof. S B Wang

College/School: PHY

Phone/Email: 9143/shubwang

Date: 5 September 2023

## Explanatory Notes for Completing CIR-RPG

### 1. Research Area

This refers to the research area(s) in which the University offers MPhil and PhD studies.

### 2. Programme Title

This is the full title of the programme in both English and Chinese. One copy of CIR-RPG should be filled in for each research degree programme (i.e. MPhil or PhD) in each research area.

### 3. Award Title

This is the title in both English and Chinese granted by the University upon successful completion of the programme.

### 4. Number of Credit Units Required for the Award

This specifies the number of credit units required to obtain an award. Students will need to accumulate credit units at or more than this level in order to gain an award.

### 5. Programme Aims

This is a brief description of what the programme is about and what it intends to achieve.

### 6. Programme Intended Learning Outcomes (PILOs)

PILOs state what the student is expected to be able to do at the end of a programme according to a given standard of performance. The outcomes statements should be written in a manner which is clearly understood both by students and staff. The outcomes should be achievable and assessable. PILOs should address a number of areas, e.g. subject area, requirements of professional bodies, if any, graduate outcomes of CityU's research degree graduates provided below, etc.

#### Graduate Outcomes of CityU's Research Degree Graduates:

*On graduation, City University research degree graduates will be able to:*

- *Apply a thorough understanding of the fundamental concepts of their research areas;*
- *Adopt excellent methodological, and relevant ethical principles in the generation of independent and innovative research;*
- *Generate strategies to develop internationally competitive research in their fields of expertise;*
- *Apply effective communication skills in relation to research.*

### 7. Programme of Study

This consists of three main parts – Programme Core Courses, Programme Electives and Thesis. Students are required to fulfil the criteria stipulated in each part so as to obtain an award.

Please refer to the following programme structure for research degree programmes for filling in this section:

#### **MPhil**

	<b><i>Existing Coursework Structure</i></b>	<b><i>Proposed Coursework Structure</i></b>
Core Courses	0 CU	At least 2 CUs (# research methodology or foundation course)
Elective Courses	7 CUs	Other courses so as to satisfy the minimum coursework requirement of 7 CUs
<b>Total</b>	<b>7 CUs</b>	<b>7 CUs</b>
Other Requirement <i>(not counted towards the University's coursework requirement)</i>	Teaching Students: First Steps (SG8001) (1 CU)	Teaching Students: First Steps (SG8001) (1 CU)

*CU = credit unit*

**PhD**

	<i>Existing Coursework Structure</i>	<i>Proposed Coursework Structure</i>
Core Courses	0 CU	At least 4 CUs (including # research methodology or foundation course (at least 2CUs))
Elective Courses	14 CUs	Other courses so as to satisfy the minimum coursework requirement of 14 CUs
<b>Total</b>	<b>14 CUs</b>	<b>14 CUs</b>
Other Requirement <i>(not counted towards the University's coursework requirement)</i>	Teaching Students: First Steps (SG8001) (1 CU)	Teaching Students: First Steps (SG8001) (1 CU)

*CU = credit unit*

- # College, school or departmental seminars related to research methodology are not considered as equivalent to the Research Methodology course if they consist of student presentations only, without a teaching component.
- 8. Programme Core Courses**  
These are the compulsory courses as required by the relevant faculty or school.
- 9. Programme Electives**  
These are courses from which students select courses based on their interests.
- 10. Additional Notes**  
This may consist of information on any special features of the programme.
- 11. Amendments/Revisions to CIR-RPG**  
Amendment or revisions to the information provided in CIR-RPG are subject to the procedures outlined in the University's guidelines on approval authorities for academic and research matters. College and School Boards should consider delegation of authority to C/SGSC as necessary to facilitate innovation and change as appropriate.