CIR-TPG

香港城市大學
City University of Hong Kong

Curriculum Information Record for a Taught Postgraduate Programme

Department of Physics
Effective from Semester B 2023/24
For Students Admitted with Catalogue Term
Semester A 2020/21 and thereafter

This form is for completion by the *Programme Leader*. 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.

In specifying the curriculum for a Programme, "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.

Prepared / Last Updated by

Name:	Prof. Dai Liang	Academic Unit:	PHY
Phone/email:	6025/liangdai	Date:	5 September 2023

City University of Hong Kong

Curriculum Information Record for a Taught Postgraduate Programme

School/Department of Physics
Effective from Semester B 2023/24
For Students Admitted to the Programme with Catalogue Term
Semester A 2020/21 and thereafter

Part I Programme Overview

Programme Title (in English) : Master of Science in Applied Physics
(in Chinese) : 理學碩士(應用物理學)

Award Title[#] (in English) : Master of Science in Applied Physics
(in Chinese) : 理學碩士(應用物理學)

 # 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

	Years (full-time)	**Years (part-time/combined mode)**
Normal period of study	1	2
Maximum period of study	2.5	5

2. Number of Credit Units Required for the Award: 30

3. Programme Aims

The programme aims to provide an opportunity for university graduates in physical science or engineering disciplines to obtain post-graduate level training in applied physics with highly marketable professional skills specialized in the sub-fields of Bio-medical Physics, Energy Materials Physics and General Advanced Physics. It also provides an opportunity for scientists and engineers in industry to upgrade their knowledge or skills through pursuing graduate level studies of various topics of applied physics. The graduates of this programme will gain knowledge of physical principles and how these principles can be applied to practical problems in specific related professions. The training and knowledge provided are suitable for employment as medical technical specialists and engineers in electronic and renewable energy industries in Hong Kong, China and other South Eastern countries. It is also expected that this programme will serve as a bridge providing a good base for students to pursue Ph.D. studies in related fields (Physics, Materials Science, Electrical Engineering, Mechanical Engineering).

4. Programme Intended Learning Outcomes (PILOs)

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

Upon successful completion of this Programme, students should:

No.	*PILOs*	*Discovery-enriched curriculum related learning outcomes (please tick where appropriate)*		
		A1	*A2*	*A3*
1.	Have acquired an extensive and in-depth physical knowledge of and analytical skills in various fields in applied and engineering physics.		✓	
2.	Have developed the ability to apply the knowledge of applied and engineering physics to generate creative and ethical solutions in the working environment.		✓	
3.	Be able to communicate effectively with applied and engineering physics related professions.		✓	
4.	Be able to apply textbook theories to applied and engineering physics problems.	✓	✓	
5.	Be able to design and conduct experiments, as well as to critically analyze and interpret data.	✓		✓
6.	Be able to identify, formulate, solve engineering or scientific problems and generate new ideas in the relevant subfields of applied and engineering physics.	✓		✓
7.	Have developed necessary skills to present research findings in a logical manner to the scientific community.	✓	✓	✓
8.	Recognize the need for, and an ability to engage in life-long learning.	✓		

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 Programme Requirement

1. Core Courses (18 credit units)

Course Code	Course Title	Level	Credit Units	Remarks (e.g. College Accreditation, or Exemption Requirements, etc.)
PHY5501	Modern Characterization Techniques for Materials Physics	P5	3	
PHY6501	Advanced Instrumentation and Measurement Methods for Experimental Physics	P6	3	
PHY6502	Advanced Computational Methods	P6	3	
PHY6503	Mathematical Methods for Scientists and Engineers	P6	3	
PHY6504	Physics at Nanoscale	P6	3	
PHY6505	Modern Topics in Engineering and Applied Physics	P6	3	

2. Electives (12 credit units)

Course Code	Course Title	Level	Credit Units	Remarks (e.g. College Accreditation, or Exemption Requirements, etc.)
PHY5502	Frontiers in Physics	P5	3	All areas
PHY6180	Modern Scattering Methods in Materials Science	P6	3	All areas
PHY6251	Advanced Quantum Mechanics	P6	3	• General graduate level physics • Students taking this course should have acquired some basic knowledge of quantum physics, e.g., have taken the course *PHY3251 Quantum Physics* or equivalent courses.
PHY6252	Statistical Mechanics	P6	3	General graduate level physics
PHY6253	Introduction to Biophysics	P6	3	Biomedical physics
PHY6254	Fundamentals of Laser Optics	P6	3	General graduate level physics
PHY6255	Introduction to Quantum Optics	P6	3	• General graduate level physics • Students taking this course should have acquired some basic knowledge of quantum physics, e.g., have taken

				the courses PHY3205 Electrodynamics or equivalent and *PHY3251 Quantum Physics* or equivalent courses.
PHY6506	Advanced Electrodynamics	P6	3	General graduate level physics
PHY6521	Advanced Solid State Physics	P6	3	General graduate level physics
PHY6522	Advanced Imaging Physics	P6	3	Biomedical physics
PHY6523	Advanced Nuclear Medicine Physics	P6	3	Biomedical physics
PHY6524	Advanced Radiotherapy Physics	P6	3	Biomedical physics
PHY6525	Advanced Wave Functional Materials for Energy Applications	P6	3	Energy materials physics
PHY6526	Energy Materials: Physics and Applications	P6	3	Energy materials physics
PHY6527	Environmental Physics	P6	3	Energy materials physics
PHY6528	Advanced Research in Applied Physics	P6	9	
PHY6603	Introduction to Quantum Information	P6	3	• General graduate level physics • Students taking this course should have acquired some basic knowledge of quantum physics, e.g., have taken the courses PHY3205 Electrodynamics or equivalent and PHY3251 Quantum Physics or equivalent courses.

Part III Accreditation by Professional / Statutory Bodies

N/A

Part IV Additional Information

N/A

Part V Curriculum Map

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

Course			PILOs									DEC		
Code	**Title**	**Credit**	**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**		**A1**	**A2**	**A3**
Core Courses														
PHY5501	Modern Characterization Techniques for Materials Physics	3	✓	✓	✓	✓			✓	✓		✓	✓	✓
PHY6501	Advanced Instrumentation and Measurement Methods for Experimental Physics	3	✓	✓	✓	✓	✓		✓	✓		✓	✓	
PHY6502	Advanced Computational Methods	3	✓	✓	✓	✓			✓	✓		✓	✓	✓
PHY6503	Mathematical Methods for Scientists and Engineers	3	✓	✓	✓	✓			✓	✓		✓	✓	
PHY6504	Physics at Nanoscale	3	✓	✓	✓	✓				✓		✓	✓	
PHY6505	Modern Topics in Engineering and Applied Physics	3	✓	✓	✓	✓			✓			✓	✓	✓
Electives														
PHY5502	Frontiers in PHysics	3	✓	✓	✓	✓	✓	✓				✓	✓	
PHY6180	Modern Scattering Methods in Materials Science	3	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	
PHY6251	Advanced Quantum Mechanics	3	✓	✓	✓	✓				✓		✓	✓	
PHY6252	Statistical Mechanics	3	✓	✓	✓	✓				✓		✓	✓	
PHY6253	Introduction to Biophysics	3	✓	✓	✓	✓			✓	✓		✓	✓	✓
PHY6254	Fundamentals of Laser Optics	3	✓	✓	✓	✓		✓	✓			✓	✓	
PHY6255	Introduction to Quantum Optics	3	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
PHY6506	Advanced Electrodynamics	3	✓	✓	✓	✓				✓		✓	✓	
PHY6521	Advanced Solid State Physics	3	✓	✓	✓	✓				✓		✓	✓	
PHY6522	Advanced Imaging Physics	3	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
PHY6523	Advanced Nuclear Medicine Physics	3	✓	✓	✓	✓	✓			✓		✓	✓	✓
PHY6524	Advanced Radiotherapy Physics	3	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	
PHY6525	Advanced Wave Functional Materials for Energy Applications	3	✓	✓	✓	✓				✓		✓	✓	
PHY6526	Energy Materials: Physics and Applications	3	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓
PHY6527	Environmental Physics	3	✓	✓	✓	✓				✓		✓	✓	
PHY6528	Advanced Research in Applied Physics	9	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
PHY6603	Introduction to Quantum Information	3	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	

Attitude

A1: 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 VI Research Elements in Programme Design

(A description on how research elements are embedded in the proposed programme design for ALL students as guided by the 2016-19 Academic Development Proposal (ADP) should be included. Research elements need to be incorporated into core or compulsory course(s) in order that all students can be benefited from the learning experience.)

Description on how research elements are embedded in the programme design:

Most of the core and elective courses are designed so that students will have a solid foundation to understand current research in engineering and applied physics. For example, the Materials Characterization and Advanced Instrumentation courses will allow students to acquire the necessary knowledge to understand and pursue advanced research in experimental applied physics. The core course on Computational Methods prepare students for research in both experimental and theoretical physics, while the course on Mathematical methods provide students with the necessary knowledge to analyze and present experimental results in their prospective research work. The core course on Modern Topics in Engineering and Applied Physics will emphasize on recent research in relevant areas in Engineering and Applied Physics.

Some of the core and elective courses (e.g. Modern Characterization Techniques for Materials Physics, Advanced Instrumentation and Measurement Methods for Experimental Physics Advanced Instrumentation, Advanced Nuclear Medicine Physics, and Energy Materials) have laboratory sessions and/or student projects providing students with some hand-on research experience in the particular area. The 9 CU advanced research elective is designed for students to carry out original research under the direct supervision of a faculty member on problems relevant to current applied physics. This research elective is particularly suitable for motivated students who want to pursue a career in research and development.

Core/Compulsory Courses

Course Code	Course Title	Level	Credit Units	Information on research elements in the course design*
PHY5501	Modern Characterization Techniques for Materials Physics	P5	3	Provides the necessary knowledge in general experimental methods in physics research. Students will have hand-on experience on certain techniques in the lab session.
PHY6501	Advanced Instrumentation and Measurement Methods for Experimental Physics	P6	3	Provides the necessary knowledge in advanced instrumentation in physics research.

PHY6502	Advanced Computational Methods	P6	3	Prepares students for research in both experimental and theoretical physics.
PHY6503	Mathematical Methods for Scientists and Engineers	P6	3	Provides students with the necessary knowledge to analyze and present experimental results in their prospective research work.
PHY6504	Physics at Nanoscale	P6	3	Provides the quantum theory, solid state physics computational methods for nano science research with an emphasis on the recent experiments in nanoscale devices and low dimensional systems.
PHY6505	Modern Topics in Engineering and Applied Physics	P6	3	Various current research topics in Engineering Physics will be introduced to the students.

**indicative of planned teaching and learning activities / assessment tasks incorporating research elements*