

City University of Hong Kong
Department of Physics

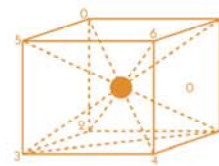
Phone [852] 3442-7831
Fax [852] 3442-0538
Email phy.go@cityu.edu.hk
Address G6702, 6/F,
Yeung Kin Man Academic Building,
City University of Hong Kong,
Tat Chee Avenue, Kowloon,
Hong Kong SAR
Website <http://www.cityu.edu.hk/phy>



$$E = mc^2$$

**DEPARTMENT
OF
PHYSICS**

$$E = mc^2$$



Department of Physics

香港城市大學
City University of Hong Kong



The Department of Physics at the City University of Hong Kong was officially launched on July 1, 2017. The Department builds on the excellent tradition of the physics faculty in the former Department of Physics and Materials Science.

A rigorous curriculum is a hallmark of the Department of Physics. The goal of our teaching is to equip students with knowledge and critical thinking skills that will enable them to tackle difficult problems throughout their career, and in their life. Our curriculum teaches not only foundational courses in physics, but also technology driven courses such as computer modeling and advanced instrumentation. Our curriculum is internationally benchmarked. It has allowed our students to enrol in joint degree programs with top universities in the world, such as Columbia University in the USA, to obtain degrees from both universities.

Faculty members at the Department of Physics are committed to excellence in research. The department's research focuses on the following themes:

- Theoretical and Computational Physics
- Spectroscopy and Imaging
- Low-dimensional System
- Soft Matter and Biophysics
- Atomic, Molecular, and Optical Physics

Our focus reflects the growing trend of physics research today. In a recent editorial, the editors of Physical Review Letters remarked, "today's physics research is much more about interwoven disciplines—physics with chemistry, biology, materials science, and others."

PHYSICS IS COOL, COME TO CITYU!



OUR VISION

The Department of Physics aspires to become a leading physics department in the Asia-Pacific region.

WHAT IS APPLIED PHYSICS?

The Applied Physics major is not an ordinary Physics major. In Applied Physics, students are taught **biomedical physics, renewable energy, quantum physics and computational physics**, paving their way to a diversified career path including medicine and health care, education, engineering, commercial and industrial sectors, nuclear radiation facilities or postgraduate study.

We provide students with comprehensive knowledge and a thorough understanding of physics principles and phenomena and their applications. Students learn how to select and use appropriate and effective instrumentation techniques, to critically examine data capture methodology and the resulting data, and to evaluate the precision and reliability of the technique in use. Students may take part in the **department-based research attachment scheme**, which provides them early exposure to discovery and innovation.

Final-year students are required to work independently on a project in a selected area. These projects are designed to help students integrate their knowledge to solve challenging problems. Projects may be carried out in conjunction with industries or government agencies, thus facilitating their job seeking upon graduation.

Professional Career Prospects

- Medical Physicists
- Biomedical Engineers
- Financial Engineers
- Technical Sales
- Education
- Product Certification and Quality Assurance
- Environmental Consultants
- Opportunities in the Public Sector (e.g. the Hong Kong Observatory, the Environmental Protection Department and the Hospital Authority)



SCHOLARSHIPS

The Department of Physics Undergraduate Entrance Scholarships

Undergraduate students who are admitted to the Bachelor of Science in Applied Physics program through the JUPAS route with an admission score (non-weighted 4+2) of 26 or above will be automatically considered for the scholarships. Each scholarship awardee will receive up to \$40,000 which is payable in Year 1 and 3.

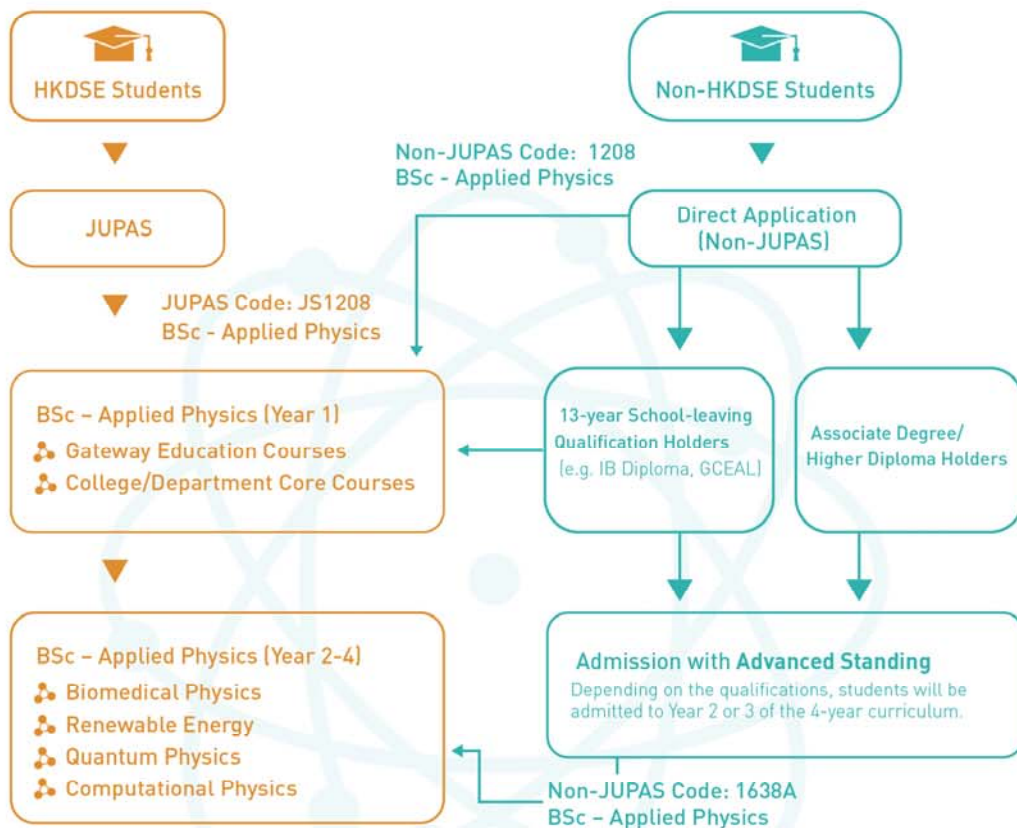
PHY Education Fund Scholarships

In addition to the institutional and external scholarships, PHY Education Fund Scholarships (department-based scholarship) are awarded to undergraduate students with outstanding academic performance and active participation in Departmental service.

For further details about our programme structure and other information, please visit our website: <http://www.cityu.edu.hk/phy>

ADMISSION ROUTE

JUPAS CODE: JS1208 / NON-JUPAS CODE: 1208 / ADVANCED STANDING ENTRIES: 1638A



ADMISSION REQUIREMENTS

- ✓ Satisfy the General Entrance Requirements of the University with a science or engineering background; OR
- ✓ Associate Degree or Higher Diploma Holder in a relevant discipline or other technical qualifications; OR
- ✓ Other 13-year school-leaving qualification holder (e.g. IB Diploma, GCEAL)

For further details about entrance requirements and application procedures, please visit the website of our Admissions Office: <http://www.admo.cityu.edu.hk/>

CORE COURSES

| Course Code | Course Title |
|--|---|
| PHY1202 | General Physics II |
| PHY1203 | General Physics III |
| PHY2191 | Electricity and Magnetism |
| PHY2212 | Measurement and Instrumentation |
| PHY2213 | Advanced Measurement and Instrumentation |
| PHY3202 | Modern Physics |
| PHY3204 | Waves and Optics |
| PHY3205 | Electromagnetism |
| PHY3231 | Advanced Instrumentation Lab |
| PHY3251 | Quantum Physics |
| PHY3272 | Introduction to Solid State Physics |
| PHY3290 | Thermodynamics |
| PHY4216/ PHY4217/ FS4003 | Project/ Dissertation/ CES Placement Project/ |
| MSE3114 & MA2158 OR ^MA2503 & ^MA2508 & ^MA3511 | Computation Methods for Physicists and Materials Engineers & Linear Algebra and Calculus Linear Algebra & Multi-variable Calculus & Ordinary Differential Equations |

^ Students have to meet the specified criteria and obtain the prior approval from the Department for taking this option.

*Course offering subject to change.



ELECTIVE COURSES

| Course Code | Course Title |
|-------------|--|
| MSE2102 | Introduction to Materials Engineering |
| MSE3171 | Materials Characterization Techniques |
| MSE4121 | Thin Film Technology and Nanocrystalline Coatings |
| MSE4127 | Smart Sensors: From Engineering to Applications |
| PHY3220 | Financial Engineering from a Physicist's Perspective (subject to approval) |
| PHY4172 | Computational Physics |
| PHY4230 | Radiation Safety |
| PHY4232 | Radiotherapy Physics |
| PHY4233 | Imaging Physics |
| PHY4254 | Fundamentals of Laser Optics |
| PHY4255 | Optoelectronic Devices and Systems |
| PHY4265 | Semiconductor Physics and Devices |
| PHY4273 | Special Topics in Physics |
| PHY4274 | Radiation Biophysics |
| PHY4275 | Radiological Physics and Dosimetry |
| PHY4283 | Physics in Medicine |



City University of Hong Kong

Columbia University

JOINT BACHELOR'S
DEGREE PROGRAM

A Brand New College Experience

The Joint Bachelor's Degree Program between City University of Hong Kong and Columbia University offers students an international undergraduate educational experience—a program spanning two continents, in cosmopolitan cities that allow students to engage directly with the world around them. The program draws upon elements both traditional and innovative, combining the academic rigor of two world-renowned universities with an attention to the roles that social and cultural traditions play in a student's intellectual formation.

Second Year applied physics major students (normative 4-year degree) with outstanding academic performance may apply for the Joint Bachelor's Degree program.



To learn more about the Joint Bachelor's Degree Program, visit gs.columbia.edu/cityu-hk

STUDENT HIGHLIGHTS

Cheng, Yuanhao ◆

BSc Applied Physics, CityU

Joint Bachelor's Degree Program between CityU and Columbia University



"Columbia University is a prestigious university. I have had the chance to interact with many brilliant professors and students. Courses at Columbia are very demanding, but also very enlightening. I have spent a great deal of time reading books, understanding materials, and doing homework. By my self-study and through my discussions with professors and students, I have been able to easily learn whatever I want.

A number of libraries are located on campus, and each of them is furnished in a distinctive style. I have greatly enjoyed the time I've spent in each one learning and meeting people."

Song, Yuan ◆

BSc Applied Physics, CityU

Joint Bachelor's Degree Program between CityU and Columbia University

"The Joint Bachelor's Degree Program has allowed me to be engaged in two elite universities in two fascinating cities. Columbia University sees the entire city as its campus. Things that I can do in New York are far beyond my imagination. I've met every actor in the play *Sleep No More* inside the 5-storey McKittrick Hotel. I've spent weeks in the Metropolitan Museum of Art to admire history. I have shaken hands with the current World Chess Champion, Magnus Carlsen. New York is a place that is full of possibilities, no matter who you are.

All the assignments that I found challenging [at Columbia] were more inclined to theoretical fields, designed to enhance my understanding of physics, which created a balance comparing to those more experimentally-focused courses at CityU. Having resources at both universities available, I became much more confident in the field of physics."

Wu, Peilin ◆

BSc Applied Physics, CityU

Joint Bachelor's Degree Program between CityU and Columbia University



"Studying in the Joint Bachelor's Degree Program was an extremely rewarding journey... both academically and personally. The biggest lesson that I've learned [was the] personal paradigm shift after the expansion of my horizon. Every conversation with a great mind around the campus turned out to be inspiring. Even though a two-year study [at Columbia] might be a bit short in time, it was well enough to peek through the cultural, social, political and religious differences, and those discrepancies really lifted me out of the normal plane of comprehension in a local perspective and granted me a glimpse of the whole picture."

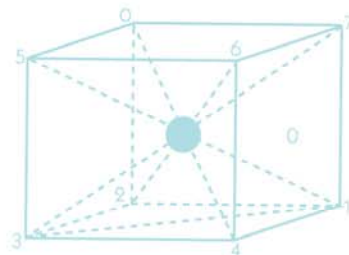
MINOR

The Department also offers two minors for students who are not majoring in Applied Physics:

Physics

Aims of Minor

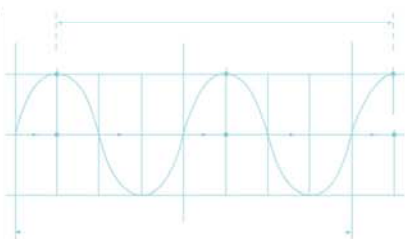
- Increase the student's understandings of physics beyond the secondary school level
- Equip students for further studies in a science or engineering discipline other than physics
- Enable students to apply key concepts and principles of the related topics about modern physics and quantum physics to open-ended situations



Photonics

Aims of Minor

- Provide students a good understanding of topics in photonics
- Assist students in their own engineering discipline when working on problems involving photonics
- Enable students to apply key concepts and principles of the related topics about photonics to open-ended scenarios



For further details about the minor structure and other information, please visit our website:
<http://www.cityu.edu.hk/phy>

INNOVATIVE LEARNING INSPIRING DISCOVERIES

STUDENT EXCHANGE



● UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN, USA



● UMEA UNIVERSITY, SWEDEN



● UNIVERSITY OF TORONTO, CANADA



● UNIVERSITY OF MARYLAND, USA

STUDY TOUR



● JAPAN



● SINGAPORE

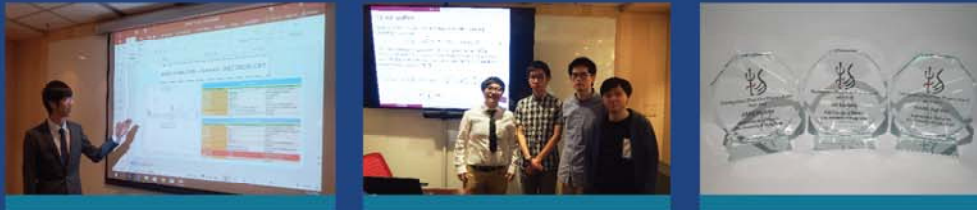


● FINAL YEAR STUDENT PROJECT EXHIBITION



INNOVATIVE LEARNING INSPIRING DISCOVERIES

DISTINGUISHED FINAL YEAR PROJECT AWARDS



- Our high performers in their final year project discoveries, report writing and presentation

UNDERGRADUATE RESEARCH ATTACHMENT SCHEME



- Early Research Exposures as Young Scientist

INTERNSHIP OPPORTUNITIES



- Besides the work placement opportunities offered by the College, PHY offers final year project attachment to medical physics departments in local hospitals.

STUDENT SUPPORT NETWORK



- Each new student will be paired with one Academic Advisor and one Student Mentor
- Career Talk



- Student Connect - Departmental Tea Gathering



PHY ANNUAL SYMPOSIUM



- Celebration of students' and faculties' achievements in the academic year
- Research Showcase by Students
- Overseas Speakers

SEMINARS BY PRESTIGIOUS SCHOLARS



- Short Course in Laser by Prof Alain Aspect, the 2010 Wolf Prize Laureate in Physics
- Departmental Seminar by Prof Serge Haroche, the 2012 Nobel Laureate in Physics

OTHER ACTIVITIES



- Visiting PCCW MCX10 Data Center



- Visiting HKT Network Operating Centre



- Mainland Enterprise Visit



- Industrial Exposures

This programme provides post-graduate level training in applied physics with highly marketable professional skills in the sub-fields of **Bio-medical Physics** and **Energy Materials Physics**. In addition to an advanced physics education, the graduates 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 as well as engineers/researchers in electronic and renewable energy industries in Hong Kong, China and other Asian countries. Graduates of this programme will have the flexibility to seek employment in the industry as well as pursuing PhD studies in a broad range of related fields (e.g. Physics, Materials Science, Electrical Engineering, and Mechanical Engineering).

Research Opportunity

Highly motivated students may be eligible to enroll in a 9 credit course “**Advanced Research in Applied Physics**” to acquire necessary skills for carrying out independent research in applied physics. Students will have the valuable opportunity to work with faculties on cutting edge research in condensed matters, quantum information, energy materials and biomedical physics.

Professional Career Prospects

- ▶ Medical Technical Specialists
- ▶ Renewable Energy Engineers
- ▶ Mechanical and Electronic Engineers
- ▶ Process and Project Engineers in the Semiconductor Industry
- ▶ Researchers in Materials Research Institutions

The programme aims to enable students to:

- ▶ Acquire an extensive and in-depth physical knowledge of and analytical skills in the various applied physics and engineering fields.
- ▶ Develop the ability to apply the knowledge of applied and engineering physics to generate creative and ethical solutions in the working environment.
- ▶ Communicate effectively with applied and engineering physics related professionals.
- ▶ Apply textbook theories to applied and engineering physics problems.
- ▶ Design and conduct experiments, as well as to critically analyze and interpret data.
- ▶ Identify, formulate, solve engineering or scientific problems and generate new ideas in the relevant subfields of applied and engineering physics.
- ▶ Develop necessary skills to present research findings in a logical manner to the scientific community.
- ▶ Be prepared for a higher degree education and future careers in forefront scientific research.

For further details about our programme structure and other information, please visit our website: <http://www.cityu.edu.hk/phy>



CORE COURSES

| Course Code | Course Title |
|-------------|---|
| PHY5501 | Modern Characterization Techniques for Materials Physics |
| PHY6501 | Advanced Instrumentation and Measurement Methods for Experimental Physics |
| PHY6502 | Advanced Computational Methods |
| PHY6503 | Mathematical Methods for Scientists and Engineers |
| PHY6504 | Physics at Nanoscale |
| PHY6505 | Modern Topics in Engineering and Applied Physics |

ELECTIVE COURSES

| Course Code | Course Title | Specialized Area |
|-------------|--|--------------------------|
| PHY6251 | Advanced Quantum Mechanics | General Advanced Physics |
| PHY6521 | Advanced Solid State Physics | General Advanced Physics |
| PHY6522 | Advanced Imaging Physics | Biomedical Physics |
| PHY6524 | Advanced Radiotherapy Physics | Biomedical Physics |
| PHY6523 | Advanced Nuclear Medicine Physics | Biomedical Physics |
| PHY6526 | Energy Materials: Physics and Applications | Energy Materials Physics |
| PHY6525 | Advanced Wave Functional Materials for Energy Applications | Energy Materials Physics |
| PHY6527 | Environmental Physics | Energy Materials Physics |
| PHY6528 | Advanced Research in Applied Physics | |

*Course offering subject to change.

ADMISSION REQUIREMENTS

- ✓ Satisfy the General Entrance Requirements of the University; AND
- ✓ Normally have an undergraduate degree in a relevant science or engineering discipline; AND
- ✓ Fulfill the English Proficiency Requirements.

For further details about entrance requirements and application procedures, please visit the website of our Chow Yei Ching School of Graduate Studies:

<https://www.cityu.edu.hk/pg/taught-postgraduate-programmes>

The Department supports both MPhil and PhD studies in the following areas:

- (1) Theoretical and Computational Physics
- (2) Spectroscopy and Imaging
- (3) Atomic, Molecular, and Optical Physics
- (4) Low-dimensional Systems
- (5) Soft Matter and Biophysics

For further details about the programme structure and other related information, please visit our website:
<http://www.cityu.edu.hk/phy>

FINANCIAL SUPPORT

Applicable to government-funded students only

- ▶ Postgraduate Studentship
- ▶ Research Tuition Scholarship
- ▶ Conference Grant
- ▶ Research Activities Fund
- ▶ Chow Yei Ching School of Graduate Studies Entrance Scholarships

Applicable to all students

- ▶ Government Grants and Loans
- ▶ External Financial Awards/Assistance



For further details about this studentship, please visit <https://www.cityu.edu.hk/pg/research-degree-programmes>

HOW TO APPLY?

Entrance Requirements

Candidates for the MPhil degree should hold a relevant bachelor's degree with first or second class honours (or equivalent qualification) from a recognized university, or hold a taught master's degree (or equivalent qualification) from a recognized university.

Candidates for the PhD degree should hold a higher degree by research (or equivalent qualification) from a recognized university, or be a current MPhil student in the University who is seeking transfer to PhD candidature.

Applicants from an institution where the language of teaching is not English should satisfy the minimum English proficiency requirements specified by both the University and College.

While priority will be given to candidates holding an MPhil degree or a taught master's degree with research component for PhD studies, candidates holding a good bachelor's degree or a taught master's degree may be considered for either MPhil or direct entry to PhD studies.

Application Procedures

Students interested in related field should contact and discuss with their potential supervisors. The applicant is advised to obtain the consent of one of the academic staff members to be his/her supervisor before submitting the application.

For further details of application procedures, please visit the website of Chow Yei Ching School of Graduate Studies:
<https://www.cityu.edu.hk/pg/research-degree-programmes>

Hong Kong PhD Fellowship

Applicants who could demonstrate outstanding qualities of academic performance, research ability / potential, communication and interpersonal skills, and leadership abilities are encouraged to apply for admission through "Hong Kong PhD Fellowship Scheme".

For further details about this scheme, please visit <https://www.cityu.edu.hk/pg/research-degree-programmes>

RESEARCH AREAS

Research focus/expertise in the Department include:

Theoretical and Computational Physics

Condensed matter theory, computational solid state physics, computational chemistry, computational biology physics, quantum computation and information, quantum simulation with cold atoms.

Spectroscopy and Imaging

Sophisticated experiments involving quantum beams such as synchrotron x-ray, neutron, electron, coherent light, and NMR, the structure and phase transition in glass and liquids, Bose peak and the dynamics of glass and liquids, quantum interactions such as spin-orbital coupling in multiferroics.

Low-dimensional Systems

Topological quantum computing and Majorana fermions, Dirac and Weyl semimetals, topological and dynamical phenomena and Bose-Einstein condensation and spin-orbit coupling, quantum Hall Effect, transport phenomena, superconductivity, frustrated magnetism, topological superconductors, 2D materials, heterostructures and interfaces.

Soft Matter and Biophysics

Dynamics of protein and subcellular processes, emergent phenomena in live cells, non-equilibrium mechanisms in active living matter, biological networks, biological and clinical experiments, novel physics-based data acquisition protocol, instrumentation in biomedical imaging, radiation biophysics, ion-track technology.

Atomic, Molecular, and Optical Physics

Mechanism of noise and decoherence, open quantum system and quantum entanglement, and non-equilibrium physics in AMO system.



To know more about our research, please visit our website: <http://www.cityu.edu.hk/phy>