



Department of Physics

The University of Hong Kong

Dr Jenny H C Lee

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April 4, 2018



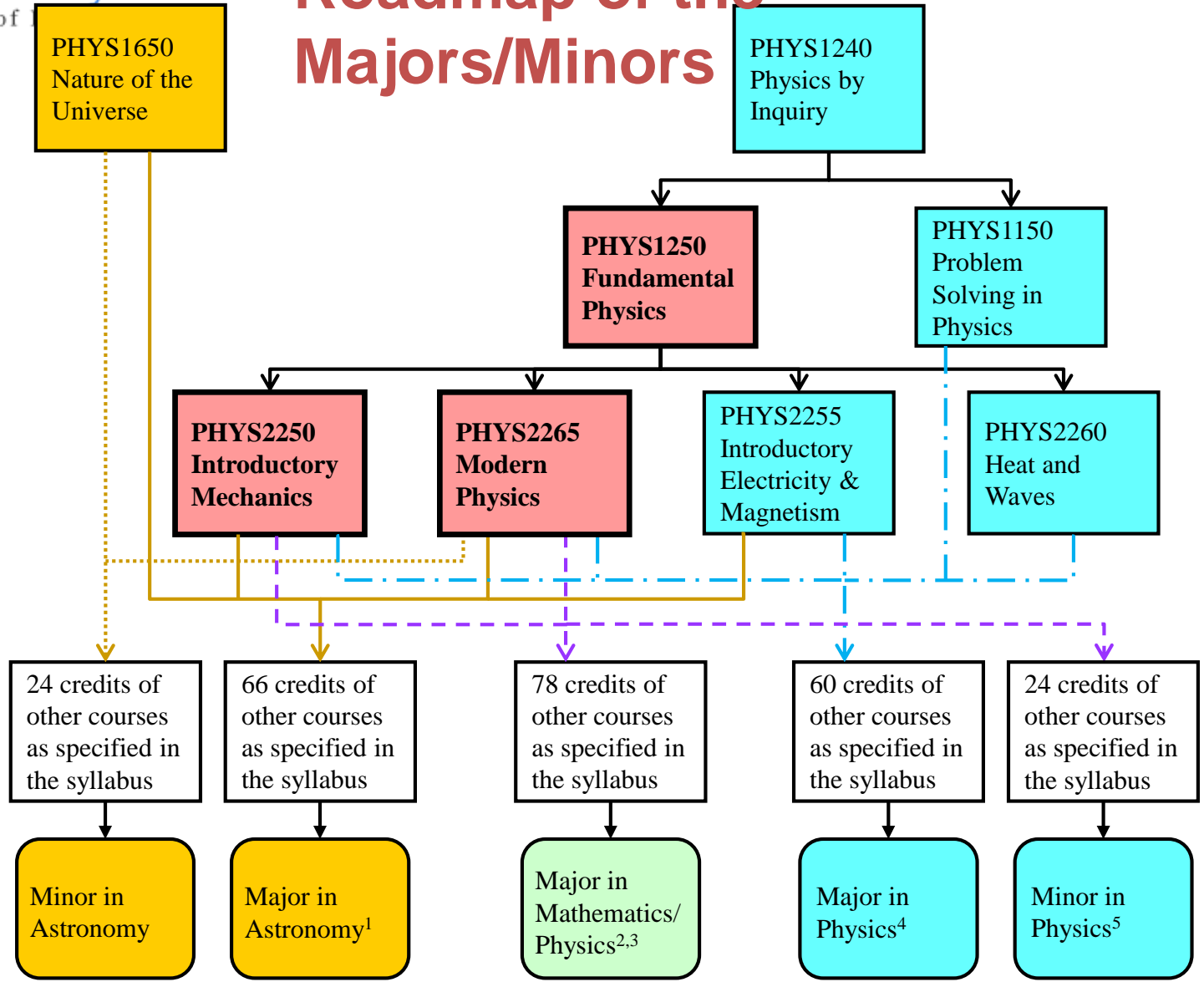
Majors and Minors

- **Physics Major (96 credits; 2+14 courses)**
 - Large flexibility in curriculum, lead to diverse career paths
- **Astronomy Major (96 credits; 2+14 courses)**
 - A comprehensive set of courses in astronomy
 - A well-rounded fundamental training
- **Math / Physics Major (96 credits; 2+14 courses)**
 - Offered jointly with the Department of Mathematics
 - Rigorous fundamental training in two subjects
- **Astronomy Minor (42 credits; 7 courses)**
- **Physics Minor (42 credits; 7 courses)**



Roadmap of the Majors/Minors

Level 3 or above in
HKDSE Physics or
equivalent

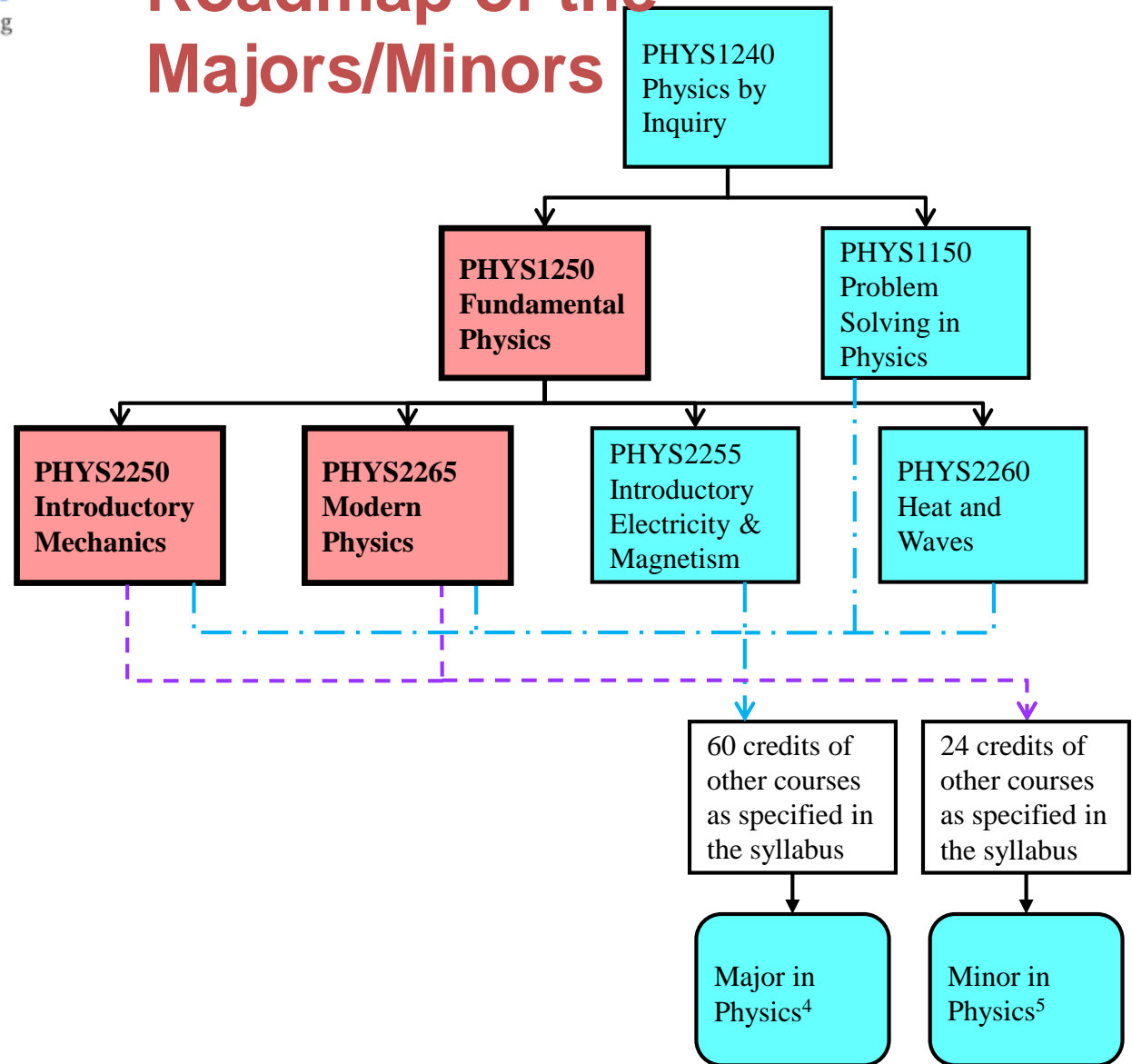


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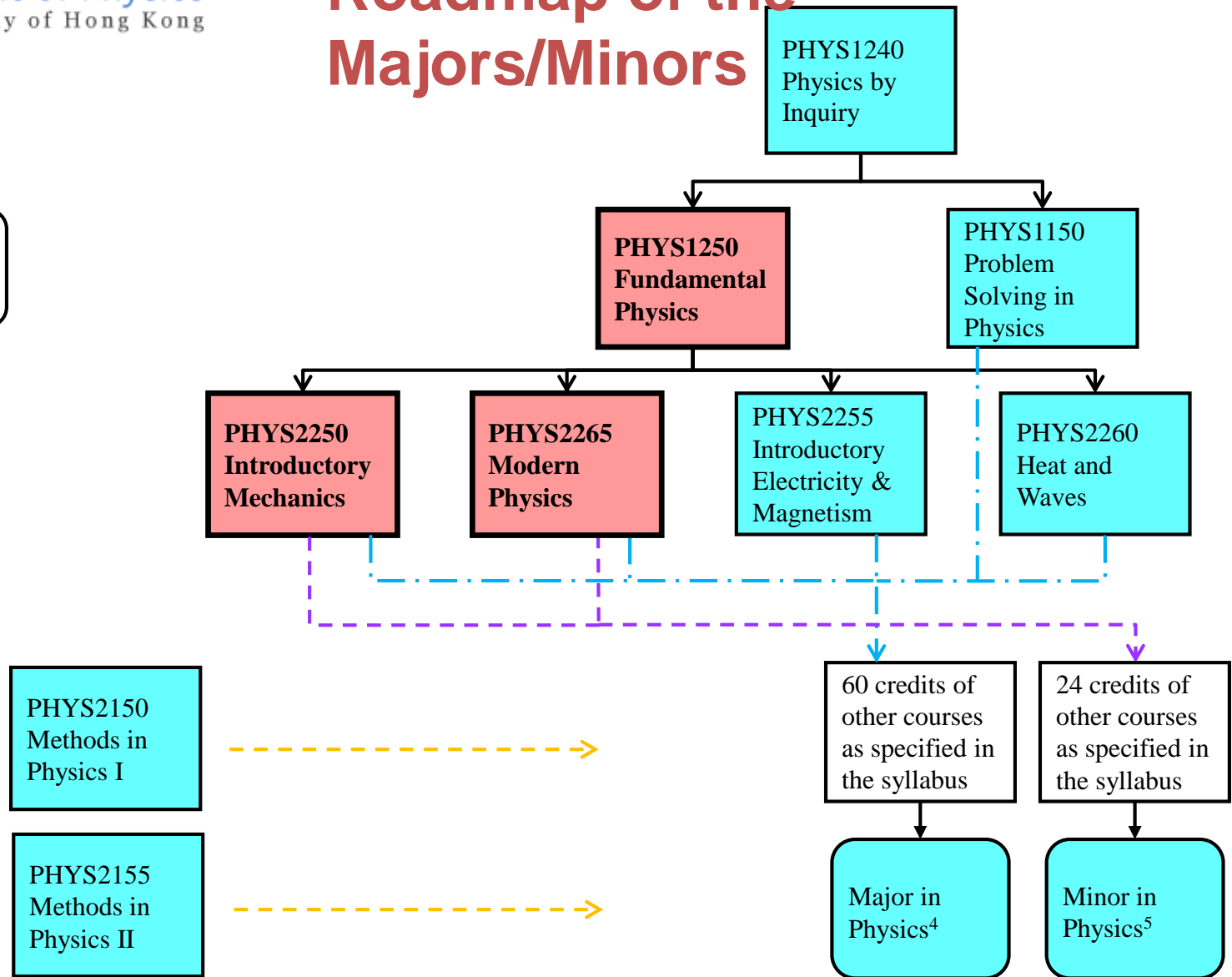


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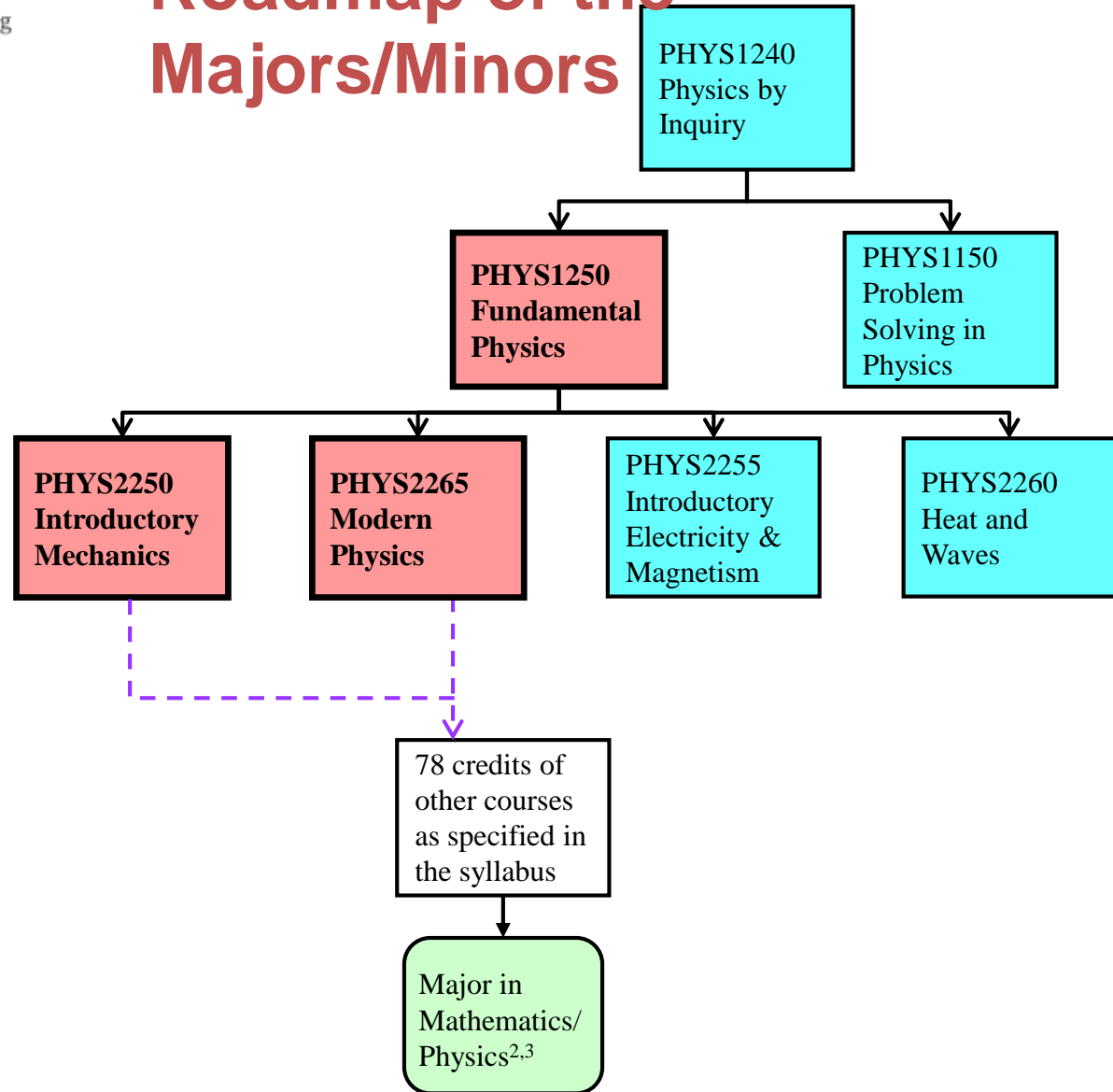


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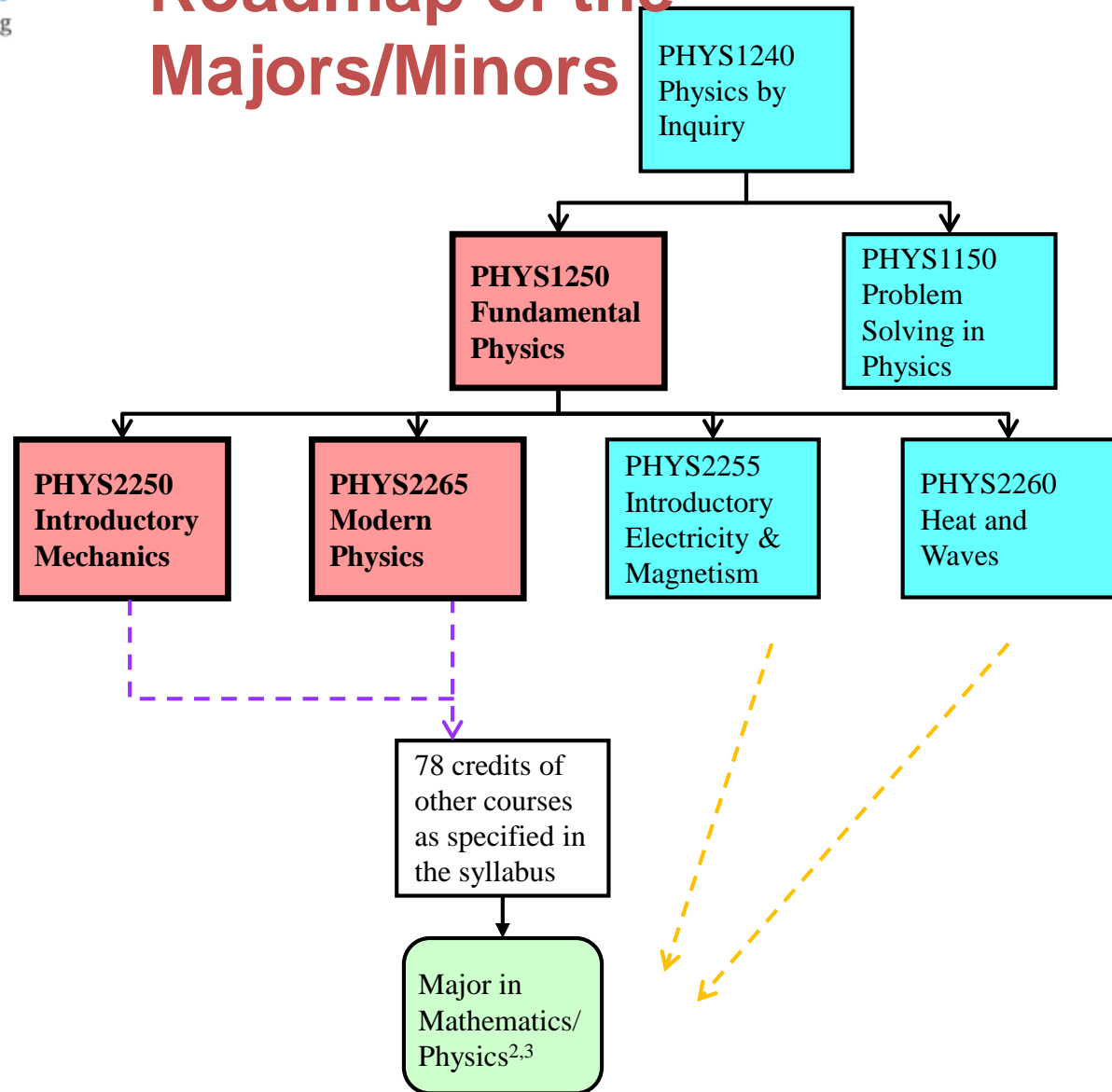


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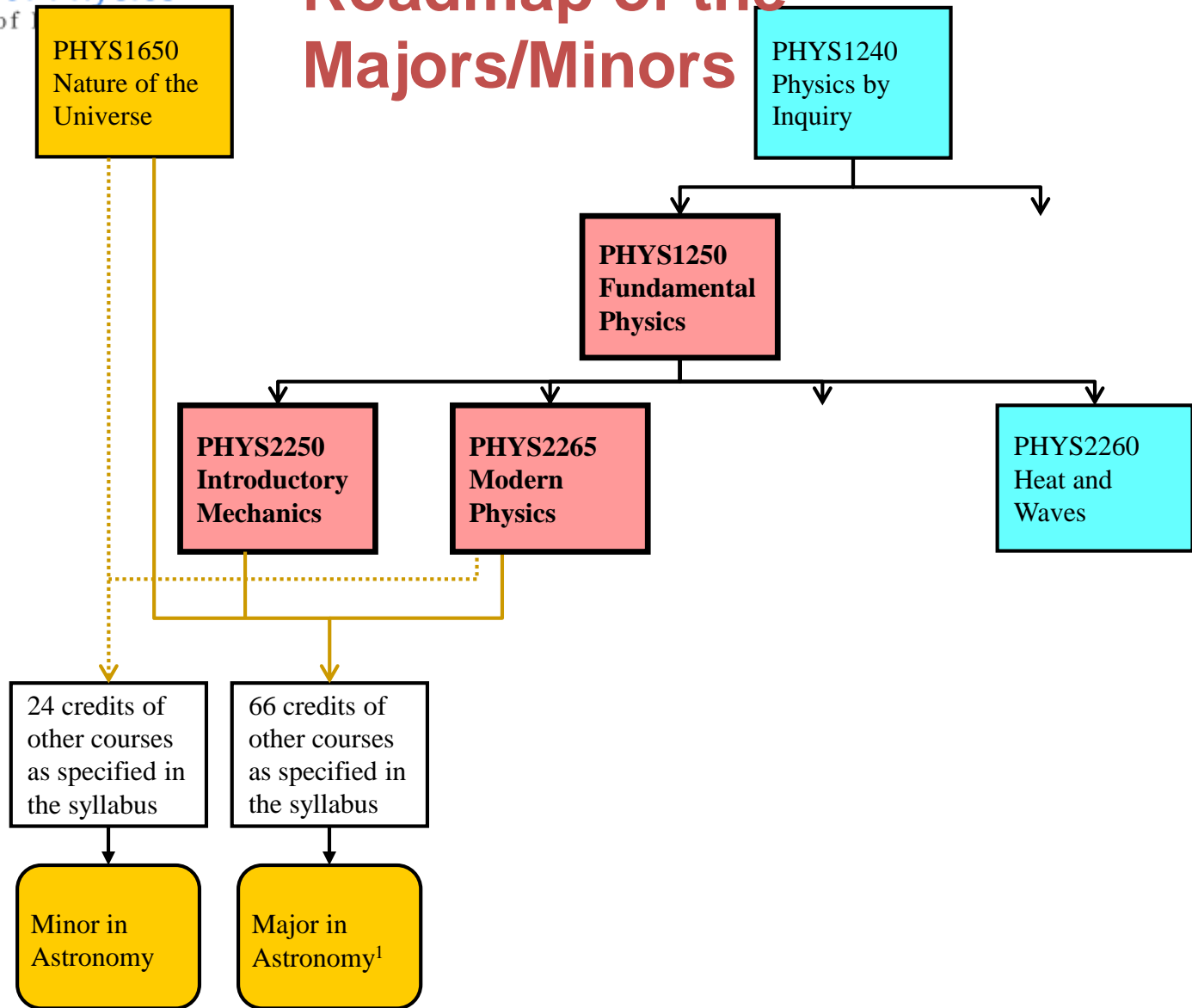


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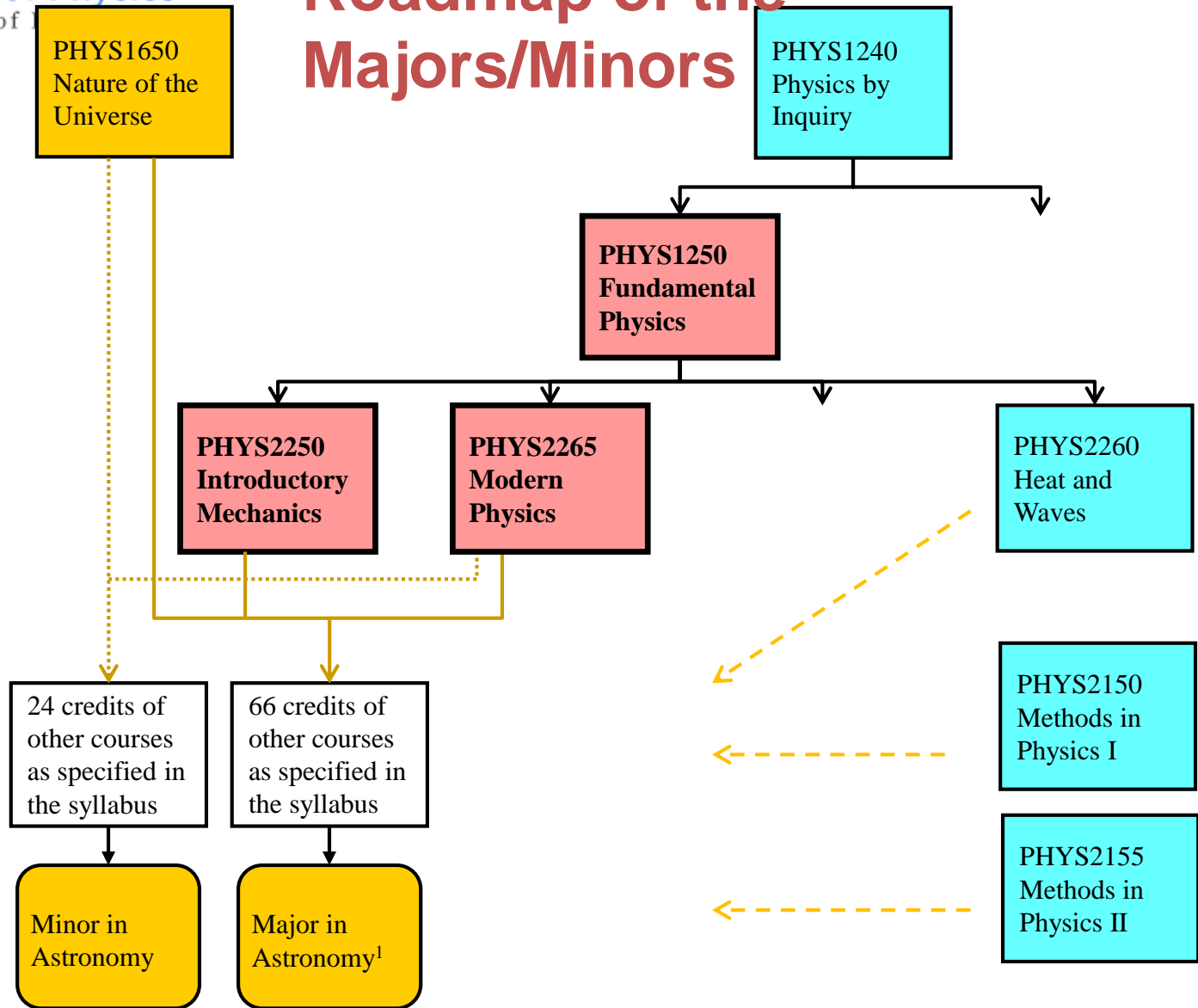


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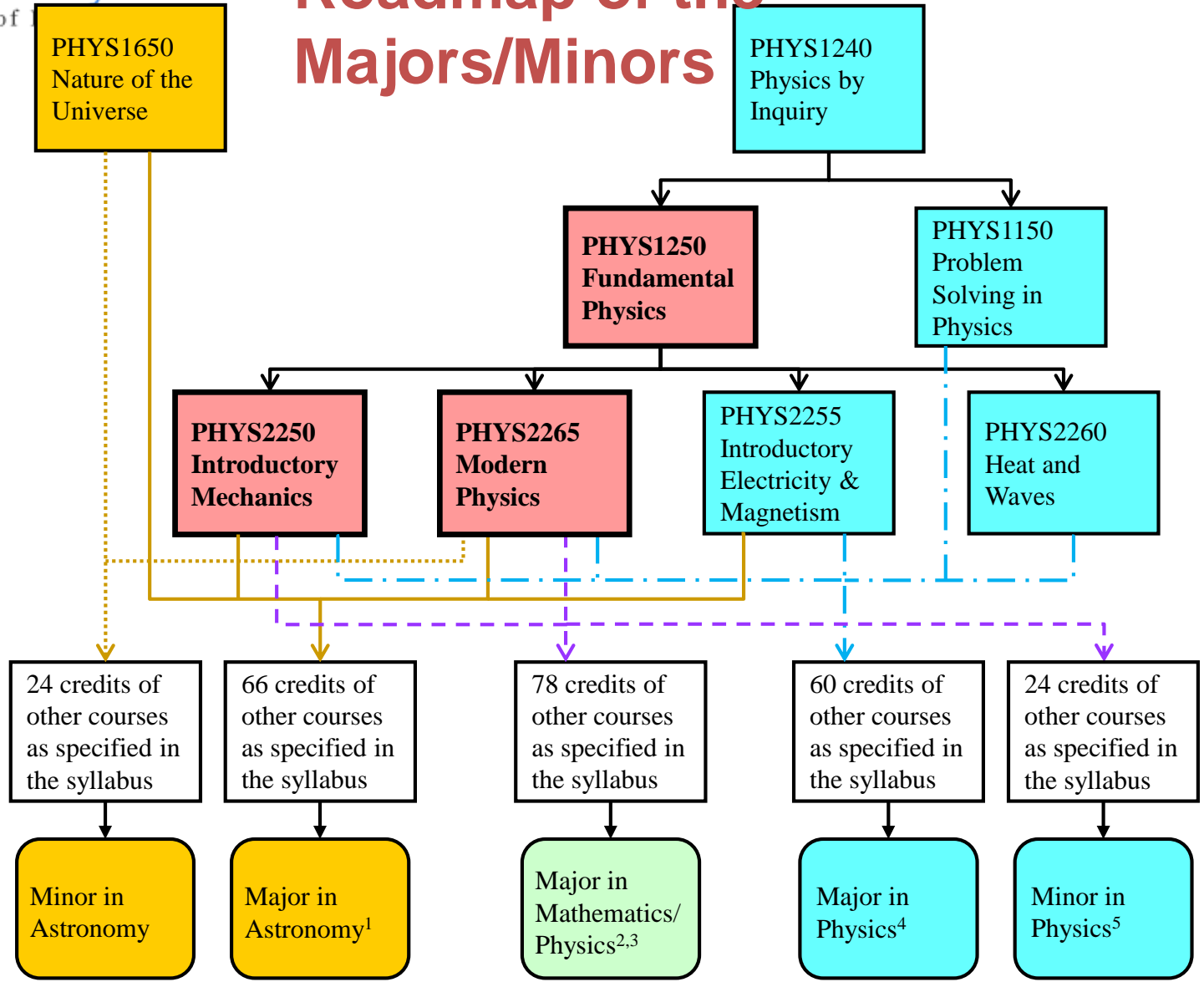


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Capstone Experience

- All HKU students need capstone to graduate
- Students **had to fulfill the 24 credits advanced level core course requirement in the major before taking the capstone course**
- The **earliest** that students are allowed to take capstone course is their **year 3** study
- Capstone offered by Physics Department:
 - PHYS4988 Physics Project (12 credits; full year)
 - PHYS3999 Directed Studies in Physics (6 credits; one semester)
 - PHYS4966 Physics Internship (6 credits; **offered in summer only; AND the 24-credit prerequisite requirement fulfilled before the start of the internship**)



Majors and Minors

- The courses required (hence, the number of credits) for the Major listed in the BSc syllabus is the **minimum**.
- Need **more** for research postgraduate studies!
Ask your department advisor for details



Advices for students who intends to do research after graduation

- **Keep your eyes wide open** – learn more about different sub-branches of physics
- **Learn about the surroundings** – find out more about the research being done in the Department (webpage, seminars, talk to teachers, ...) <http://www.physics.hku.hk/research>
- **Watch out for emails** – get on the email list of the department (if you have declared or if you incline to declare majors) because information about many learning programs are announced this way
- **Give it a try!** – the only way to find out whether you like or you are capable to do research is to try doing it



Selected research areas & facilities

- **Experimental condensed matter and material science**
 - characterizations and applications of low dimensional materials
 - novel optical properties of semiconductor nanostructures
 - optoelectronics and nanomaterials
 - wide band gap semiconductor systems: Electrical and optical properties, defects
 - thin film of novel materials and advanced microelectronic devices
 - surface science: growth and surfaces of novel quantum materials
 - **Facilities:** Material Physics Lab, Thin Film Lab, Semiconductor Lab, Optoelectronics and Nanomaterial Lab, Laser Spectroscopy Lab



Selected research areas & facilities

- **Theoretical Atomic and Condensed Matter Physics**
 - strongly interacting quantum many-body systems: correlated quantum phases and phase transitions
 - strongly correlated electron systems
 - topological quantum materials
 - quantum magnetism
 - spintronics and valleytronics
 - quantum transport
 - semiconductor optics
 - interdisciplinary study of cold atom physics and condensed matter physics



Selected research areas & facilities

- **Observational Astrophysics**

- late stage stellar evolution: SNR, planetary nebulae
- stellar formation and cooling flows in galaxy clusters
- magnetars and pulsar wind nebulae
- Cosmology: cosmic microwave background, large scale structure
- **Facility:** HKU observatory (0.4m reflector, radio telescope)
- **Facility:** [access to ground-based and space observatories](#): ALMA, EVLA, ATCA, BICEP, Chandra, XMM-Newton, Hubble, Fermi, ...

- **Theoretical Astrophysics**

- High energy emission from neutron stars and pulsars
- Dynamical evolution of planetary bodies



Selected research areas & facilities

- **Quantum Computing and Information Theory**
 - Quantum cryptology
 - Quantum key distribution, quantum error-correction codes
- **Experimental Nuclear Physics**
- **Experimental High Energy Particle Physics**



Outside classroom Learning opportunities: Physics Department Summer Internship Program

Program: ~30% of our final year students participate every year

Requirement: 6-8 weeks in academic / non-academic overseas or locally

Overseas: **Princeton Univ** (w/ Prof D.Tsui 崔琦教授), **Oxford, Cambridge, Harvard, Stanford** (w/ Profs S. Doniach, S.C. Zhang, R. W. Romani), **ETH Zurich** (w/Prof T.M. Rice), **Mullard Space Science Laboratory UCL** (w/ Prof K. Wu and G. Aeppli), **UC Berkeley** (w/ Prof. F. Wang), **UCLA, CERN, Caltech** (w/ Prof. Y.L. Yung),

Local: HK Observatory, HK Space Museum, HK Science Museum, Ho Koon Nature Education cum Astronomical Centre, Cinotech Consulting Ltd

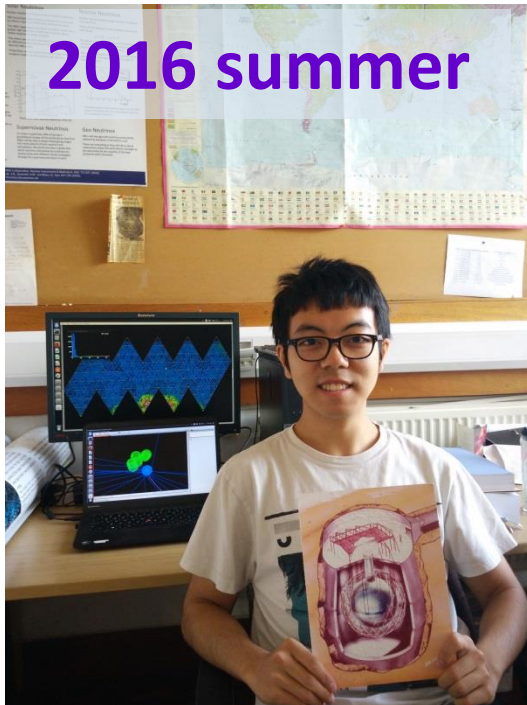
Education: Cheung Sha Wan Catholic Secondary School, St Francis of Assisi's College, Yu Chun Keung Memorial College No. 2



Outside classroom Learning opportunities:

CAPSTONE: Overseas Summer Research Fellowship (6-8 weeks)

- Participants engage in research fields of their own choosing; Physics Department **match interest with researchers**
- Reimbursement up to \$12,000 per participant



Edward Yang
(experimental
neutrino physics) with
Prof John Tseng, **Univ
of Oxford**

Jimmy Lee
(experimental particle
physics) Prof Aurelio
Juste, **ICREA, Spain
(Work @ CERN)**





Outside classroom Learning opportunities:

CAPSTONE: Summer Internship (6-8 weeks)

- Participants engage in actual work to apply their book knowledge
- Department arranged for selected candidates to be interviewed by the institution

2016 summer

Wong Wing (HK Space Museum); Chan Man Yiu, Lam Ka Fai (HK Science Museum)

Chan Yuk Ying & Tsoi Tsz Ching (Ho Koon Astronomical Centre)





Outside classroom Learning opportunities:

CAPSTONE: Summer Internship (6-8 weeks)

- Participants engage in actual work to apply their book knowledge
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Janice Cheng & Wong Yu Fung (Yu Chun Keung No 2 Memorial College)

Wong Wae Ming (Cheung Sha Wan Catholic Secondary School)

2016 summer



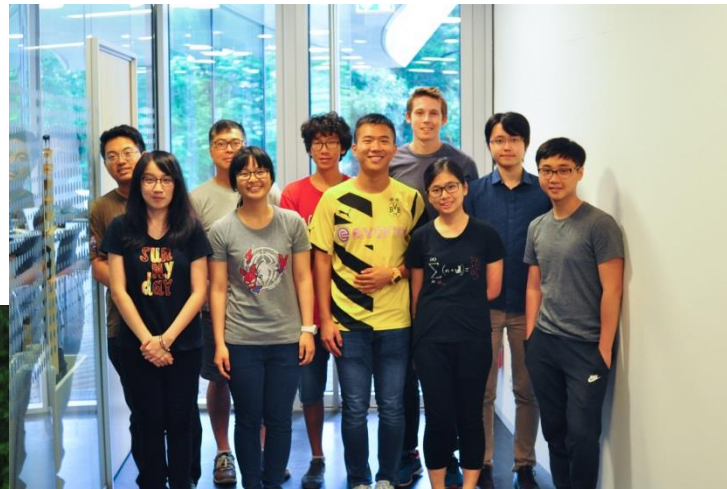


Outside classroom Learning opportunities: **NON-CAPSTONE: Undergraduate Overseas Experiential Learning Activities (~1-2 weeks)**

1. Summer School on Observational Astronomy (June 2017)

Lectures and hands-on projects (Airfare + local expenses PAID)

**Max Planck Institute for
Astronomy, (Heidelberg,
Germany); June 2017**



8 HKU students
(mostly Year 3 or 4)
who have taken
Astronomy courses





Outside classroom Learning opportunities: **NON-CAPSTONE: Undergraduate Overseas Experiential Learning Activities (~1-2 weeks)**

2. Summer School on Nuclear Physics at RIKEN, Japan (July 2017) Together with **Peking University** and **Seoul National University** (Accommodation + 80% Airfare PAID)





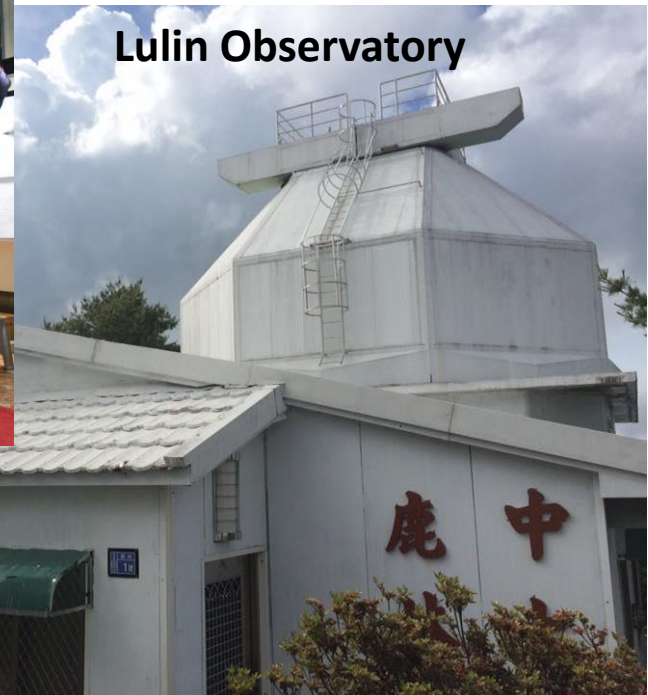
Outside Classroom Learning Opportunities:

NON-CAPSTONE: Undergraduate Overseas Experiential Learning Activities (1-2 weeks)

3. Summer School on Observational Astronomy, Taiwan (June 2016)

Mixture of classes and hands-on project (80% air-fare + local expense paid)

National Tsing
Hua University





Career Prospects

Government:

Administrative Officer

Executive Officer

Scientific Officer (HK Observatory)

Physicist (Health Department)

Industry & Commercial Firms:

Assistant Manager

Staff Accountant

Computer Programmer

Financial Consultant

Researcher

Companies include: HSBC, Standard Chartered Bank, Sino Group, others include publishing, communication, logistics companies, etc.

Education:

School Teachers

Research:

Postgraduate Studies



Where did our students go for further studies recently?



Princeton University



Stanford University



University of Oxford



University of Cambridge



University of Chicago



McGill University



Columbia University



University of Michigan



Brown University



Imperial College London



Johns Hopkins University



MIT (Massachusetts Institute of Technology)



University of Texas at Austin



California Institute of Technology



University of California, San Diego



University of California at Los Angeles (UCLA)



University of Illinois – Urbana – Champaign



Stony Brook University, State University of New York



University of Tokyo



Max Planck Institute for Radio Astronomy



Universität Hamburg



Leiden University



How did our 2016 Physics graduates do?

2016 Graduates

Educational Institutions

-Research Assistant

City University of Hong Kong

-Teaching Assistant

*Society of Boys' Centres Chak Yan
Centre School*

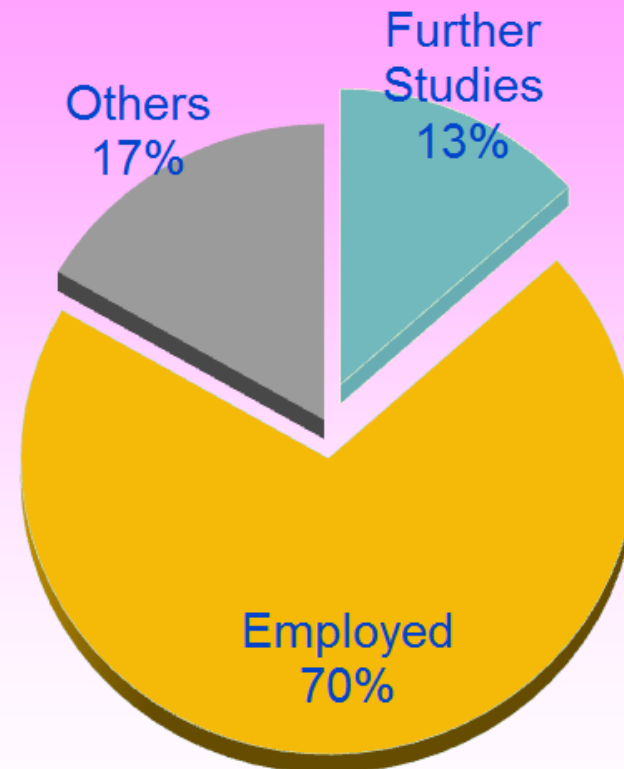
Commerce and Industry

-Lab Technician

*CMA Industrial Development
Foundation Limited*

-Database Programmer

DBP Solutions Limited





How did our 2015 Physics, Astronomy, and Math/Physics graduates do?

2015 Graduates

Civil Service

-**Enumerator**

*HKSAR - Census and Statistics
Department*

Educational Institutions

-**Research Assistant**

City University of Hong Kong

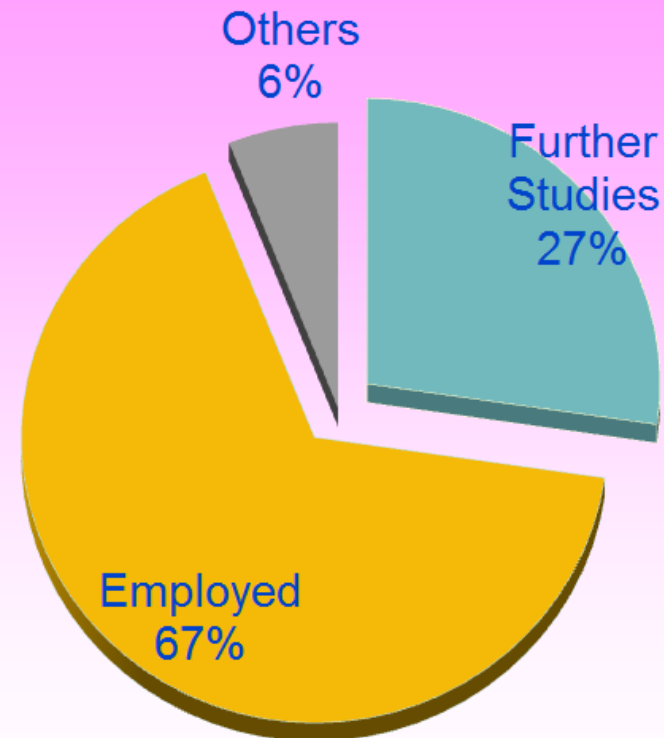
Commerce and Industry

-**Technician**

Artcom Computer Project Co Ltd

-**Associate Relationship Manager**

MetLife, Inc.





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2014 Graduates

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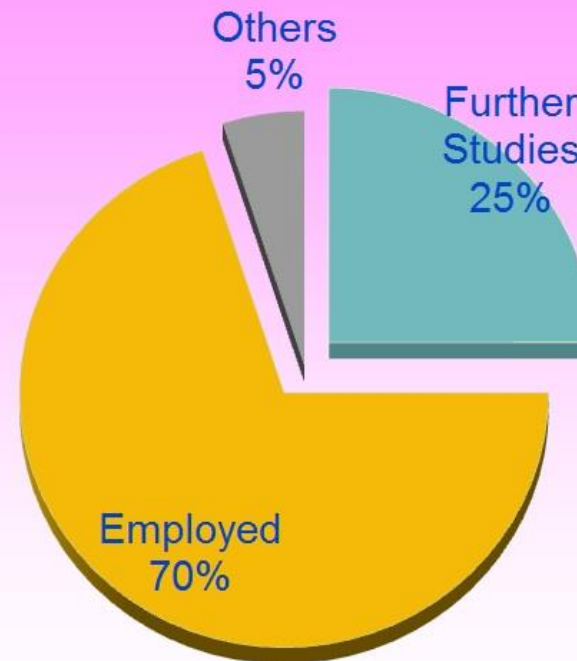
Commerce and Industry

-Project Engineer

ASM Pacific Technology Ltd.

-Engineer Trainer

Quon Hing Concrete Company Limited





Final advice on course selection

- Plan ahead beyond your current year, watch out for semester(s) the course is offered
- PHYS2150/2155 Methods in Physics I/II are essential
- Take **more credits to better equip for research**
- <http://www.physics.hku.hk/students/>
- Questions? Come talk to us
 - Course Selection Advisors
<http://www.physics.hku.hk/students/course-information/guideline1213>
 - Student Peer Advisers (Leonard Cao, Thomas Wong and others)
<http://www.scifac.hku.hk/ug/current/advising/bsc/office#peer>