The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2025
Course Outline

SAYT1001 Bonding in Organic Compounds, and Reactivity and Selectivity of Organic Reactions
有機化合物的鍵合，與有機反應的活性及選擇性

Introduction:

This course is designed to allow students to have a basic understanding of the bonding and structures of organic molecules and ions, their influences on the molecular properties of organic compounds, and the reactivity and selectivity of some organic reactions. This course will focus on the stability of reaction intermediates, and the reactivity and selectivity of addition reactions, nucleophilic substitutions, and eliminations.

本課程設計旨在讓同學對有機分子及離子的鍵合及結構，及它們在有機分子的特性和有機反應的活性及選擇性的影響上有基礎的理解。本課程將會集中討論各類反應中間體的穩定性，及加成反應、親核取代反應和消除反應的活性及選擇性。

Medium of Instruction:

Cantonese supplemented with English
粵語主講及輔以英語

Organising Unit:

Department of Chemistry, Faculty of Science, CUHK

Teachers:

Dr. MAK Kin Wah Kendrew (麥建華博士)
Principal Lecturer
Department of Chemistry, CUHK
Rm. 355, Science Centre South, CUHK
Tel: 3943 8136, Email: kendrewmak@cuhk.edu.hk

Course Content:

28 July 2025 (Monday) 9:30 am – 12:30 pm	**<u>Lecture (1):</u> Electronic Structure of Atoms** • The atomic line spectrum of hydrogen • The energy states of the hydrogen atom and the Bohr's atomic model • Wave behaviour of electrons • Atomic orbitals (*s*, *p*, and *d*-orbitals) • Energies of orbitals in multi-electron atoms • Electron configurations of atoms and ions **<u>Assessment:</u>** Multiple-choice and short-answer questions assignment
30 July 2025 (Wednesday) 9:30 am – 12:30 pm	**<u>Lecture (2):</u> Shapes of Molecules, Orbital Hybridization, and Chemical Bonding** • Shapes of molecules (the Valence Shell Electron Pair Repulsion Theory) • Sigma (s) and pi (p) bonds • Hybridization of atomic orbitals • Orbital hybridization and bonding • Orbital hybridization and shapes of molecules **<u>Assessment:</u>** Multiple-choice and short-answer questions assignment
1 August 2025 (Friday) 9:30 am – 12:30 pm	**<u>Lecture (3):</u> Properties of Organic Acids and Bases, Electron Delocalization, and Resonance Stabilization** • Basic concepts about acids and bases • Definitions of the acid dissociation constant (K_a) and pK_a • How the structure of an acid affects its pK_a value • Electron flow in a reaction (reaction mechanism) • Electron delocalization and resonance structures • Resonance stabilization **<u>Assessment:</u>** Multiple-choice and short-answer questions assignment
4 August 2025 (Monday) 9:30 am – 12:30 pm	**<u>Lecture (4):</u> Reactions of Alkanes and Alkenes: Addition and Substitution Reactions** • Radical substitution of alkanes • Reaction mechanism of radical substitution reactions • Stability of radicals and reaction selectivity • Nucleophiles and Electrophiles • Addition reactions of alkenes – Markovnikov's rule • Reaction mechanism of addition reactions • Reaction selectivity, carbocation stability, and carbocation rearrangement • Nucleophilic substitutions: S_N1 and S_N2 mechanisms **<u>Assessment:</u>** Multiple-choice and short-answer questions assignment
6 August 2025 (Wednesday) 9:30 am – 12:30 pm	**<u>Lecture (5):</u> Nucleophilic Substitution and Elimination Reactions: Reactivity and Selectivity** • Reactivity and selectivity of S_N1 and S_N2 reactions • Elimination reactions: E1 and E2 mechanisms • Reactivity and selectivity of E1 and E2 reactions • Competitions between S_N1, S_N2, E1, and E2 **<u>Assessment:</u>** Short-answer test

Date	28, 30 July, 1, 4, 6 August 2025 (15 hours) *(8 August 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	9:30 am – 12:30 pm
Venue	The Chinese University of Hong Kong
Enrollment	30 – 60
Expected Applicants	Students who are promoting to or studying S4 – S6
Tuition Fee	HKD 3,200.00
Credit	1 University Unit(s) *Students who complete the course and meet its requirement can opt for credit exemption when studying at CUHK.*
Grading Methods	

	Certificate	***Assessment***	***Attendance***	***Credit(s)***
A to A-	*Certificate of Distinction*	*Excellent*	*>75%*	*1*
B+ to D	*Certificate of Merit*	*Pass*	*>75%*	*1*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
F	*N/A*	*Fail*	*N/A*	*0*

The Chinese University of Hong Kong
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Summer Courses 2025
Course Outline

CUSA1021 Analysis in Modern Chemistry
現代化學分析

Introduction:

This course aims at introducing the basic concepts and techniques in carrying out chemical analysis by using various modern spectroscopic and chromatographic instruments. Students will learn how to use modern instruments to determine the amounts of substances present in a mixture down to part per million levels (ppm), and identify the structure of a compound. Techniques such as UV-visible spectroscopy, infrared spectroscopy, mass spectrometry, nuclear magnetic resonance spectroscopy, gas chromatography and high performance liquid chromatography will be covered. This course will also discuss some common standard practices of collecting and preparing samples for laboratory testing, the accreditation system in testing laboratories. This course is conducted in the format of lecture.

本課程旨在介紹化學分析中所用到的現代光譜和色譜儀器的基本概念和技術。學生將學習使用該等儀器來分析濃度水平低至百萬分之一的物質，並確定化合物的結構。課程內容包括紫外−可見光譜法、紅外線光譜法、質譜分析法、核磁共振、氣相色譜法及高效能液相色譜法的操作技巧，以及化驗工作中的收集及製備樣本的常用標準技巧和香港化驗室所實行的認可系統。課程以講課形式進行。

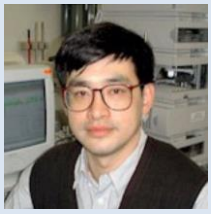
Medium of Instruction:

Cantonese supplemented with English (and written materials in English)
粵語主講及輔以英語 (講義為英文)

Organising Unit:

Department of Chemistry, Faculty of Science, CUHK

Teachers:



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Principal Lecturer
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Rm. 355, Science Centre South, CUHK
Tel: 3943 8136, Email: kendrewmak@cuhk.edu.hk

Course Content:

21 July 2025 (Monday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm **(Dr. YS Cheung)**	**Lecture:** • UV-visible Spectroscopy • Infrared Spectroscopy • Mass Spectrometry **Assessment:** • Short-answer exercise
23 July 2025 (Wednesday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm **(Dr. Kendrew Mak)**	**Lecture:** • Nuclear Magnetic Resonance Spectroscopy **Assessment:** • Short-answer exercise
25 July 2025 (Friday) 9:30 am – 12:30 pm **(Dr. WF Chan)**	**Lecture:** • GC and HPLC (Analysing the chemical composition of a sample using advanced chromatographic techniques) • Chemical Testing (Sampling techniques and the accreditation system) **Assessment:** • Essay

Date	21, 23, 25 July 2025 (15 hours) *(29 July 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	9:30 am – 12:30 pm &/or 2:00 pm – 5:00 pm
Venue	The Chinese University of Hong Kong
Enrollment	30
Expected Applicants	Students who are studying in S5-S6 (in the academic year 2024-2025)
Tuition Fee	HKD 3,200.00
Credit	1 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*
Grading Methods	

	Certificate	***Assessment***	***Attendance***	***Credit(s)***
Distinction	*Certificate of Distinction*	*Excellent*	*>75%*	*1*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*1*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

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Summer Courses 2025
Course Outline

CUSA1041 Essentials of Organic Chemistry
有機化學精華

Introduction:

This course aims at introducing the essential concepts of organic chemistry and how it is closely related to our daily life. Students will learn the fundamental knowledge of organic chemistry with a particular emphasis on stereochemistry. Through laboratory demonstration and participation, students will be introduced to basic experimental techniques and scientific methods in organic chemistry. Students can therefore gain appreciation of the daily practice of a synthetic organic chemist in a university research environment.

本課程旨在介紹有機化學的精華和這一學科與我們日常生活的緊密聯繫。學生將學習有機化學的基本知識及立體化學的專題討論。通過參加實驗，學生將學到有機實驗的基本技術和科學方法，從而接觸到有機合成化學家在大學研究環境裏的日常工作及操作。

Medium of Instruction:

English and Cantonese
英語，粵語

Organising Unit:

Department of Chemistry, Faculty of Science, CUHK

Teachers:

Prof. Gavin Chit TSUI (徐哲教授)
Associate Professor
Department of Chemistry, CUHK
Office: Room 162, Science Centre South, CUHK
Telephone: 3943 6293 E-Mail: gctsui@cuhk.edu.hk

Course Content:

CUSA1041A (Group A students)

18 August 2025 (Monday)	9:30 am – 12:30 pm	**Lecture I:** Introduction to Organic Chemistry ***(All students)***
	2:00 pm – 5:00 pm	**Lab 1:** Separation of Mixtures by Column Chromatography ***(Group A)***
19 August 2025 (Tuesday)	9:30 am – 12:30 pm	**Lecture II:** Alkanes and Stereochemistry ***(All students)***
20 August 2025 (Wednesday)	9:30 am – 12:30 pm	**Lecture III:** Chemistry of Life and Basic Organic Reactions ***(All students)***
	2:00 pm – 5:00 pm	**Lab 2:** Resolution of *trans*-1,2-diaminocyclohexane ***(Group A)***
21 August 2025 (Thursday)	9:30 am – 12:30 pm	**Lecture IV:** Natural Products and Molecules that Changed the World ***(All students)***

CUSA1041B (Group B students)

18 August 2025 (Monday)	9:30 am – 12:30 pm	**Lecture I:** Introduction to Organic Chemistry ***(All students)***
19 August 2025 (Tuesday)	9:30 am – 12:30 pm	**Lecture II:** Alkanes and Stereochemistry ***(All students)***
	2:00 pm – 5:00 pm	**Lab 1:** Separation of Mixtures by Column Chromatography ***(Group B)***
20 August 2025 (Wednesday)	9:30 am – 12:30 pm	**Lecture III:** Chemistry of Life and Basic Organic Reactions ***(All students)***
21 August 2025 (Thursday)	9:30 am – 12:30 pm	**Lecture IV:** Natural Products and Molecules that Changed the World ***(All students)***
	2:00 pm – 5:00 pm	**Lab 2:** Resolution of *trans*-1,2-diaminocyclohexane ***(Group B)***

- *For the lecture sessions in the morning, all students will attend the same class.*
- *For the lab sessions in the afternoon, students will be divided into two groups (A or B) by the instructor. Students will join the lab sessions in **EITHER Group A or Group B** according to the schedule.*

Date	18, 19, 20, 21 August 2025 (18 hours) *(22 August 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	9:30 am – 12:30 pm and/or 2:00 pm – 5:00 pm
Venue	The Chinese University of Hong Kong
Enrollment	CUSA1041A (Group A): 15 – 20 CUSA1041B (Group B): 15 – 20 ***Please indicate your preference (A or B) in your online application form for the instructor's consideration. If any ONE group is full, we will try to assign you to the other group.***
Expected Applicants	Students who are promoting to or studying S4 – S6
Tuition Fee	HKD 3,600.00
Credit	1.25 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*
Grading Methods	

	Certificate	***Assessment***	***Attendance***	***Credit(s)***
Distinction	*Certificate of Distinction*	*Excellent*	*>75%*	*1.25*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*1.25*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

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Summer Courses 2025
Course Outline

CUSA1071 How Chemistry Works
化學的真相

Introduction:

This course is designed for students to learn about some fundamental chemical principles. Students will learn the basic principles of chemistry including atoms and molecules, structure and chemical bonding, molecular geometry, and properties. This course is conducted in the format of a lecture.

本課程的設計旨在讓同學學到一些基礎化學原理。同學會在課程中學到基礎化學原理如原子與分子、結構與化學鍵合、分子幾何及特性。課程以講課形式進行。

Medium of Instruction:

Cantonese supplemented with English
粵語輔以英語

Organising Unit:

Department of Chemistry, Faculty of Science, CUHK

Teachers:

Dr. MAK Kin Wah Kendrew (麥建華博士)
Principal Lecturer
Department of Chemistry, CUHK
Rm. 355, Science Centre South, CUHK
Tel: 3943 8136, Email: kendrewmak@cuhk.edu.hk

Course Content:

14 July 2025 (Monday) 9:30 am – 12:30 pm	**Lecture:** **Atoms and Molecules, Structure and Chemical Bonding (1)** - The simple atomic models and atomic structure - The organization of the modern periodic table - The electron arrangement of an atom **Assessment:** Short-answer exercises and quizzes
17 July 2025 (Thursday) 9:30 am – 12:30 pm	**Lecture:** **Atoms and Molecules, Structure and Chemical Bonding (2)** - The atomic line spectrum of hydrogen - The energy states of a hydrogen atom and the Bohr's atomic model - Wave behaviour of electrons - Atomic orbitals (*s*, *p*, and *d*-orbitals) - Electron configurations of atoms and ions **Assessment:** Short-answer exercises and quizzes
21 July 2025 (Monday) 9:30 am – 12:30 pm	**Lecture:** **Atoms and Molecules, Structure and Chemical Bonding (3)** - Electronegativity and bond polarity - Predicting the shape of a molecule (the Valence Shell Electron Pair Repulsion Theory) - Predicting the polarity of a molecule using VSEPR Theory **Assessment:** Short-answer exercises and quizzes
24 July 2025 (Thursday) 9:30 am – 12:30 pm	**Lecture:** Atoms and Molecules, Structure and Chemical Bonding (4) - Hybridization of atomic orbitals - Two types of covalent bonds (sigma (σ) and pi (π) bonds) - Orbital hybridization and nature of bonding **Assessment:** Short-answer exercises and quizzes

Date	14, 17, 21, 24 July 2025 (12 hours) *(25 July 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	9:30 am – 12:30 pm
Venue	The Chinese University of Hong Kong
Enrollment	20 – 40
Expected Applicants	Students who are studying S1 – S3
Tuition Fee	HKD 2,700.00
Credit	0.75 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*
Grading Methods	

	Certificate	***Assessment***	***Attendance***	***Credit(s)***
Distinction	*Certificate of Distinction*	*Excellent*	*>75%*	*0.75*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*0.75*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

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Summer Courses 2025
Course Outline

CUSA1081 Some Amazing Discoveries in Science: Principles behind, their Importance, and their Applications
科學中的一些精彩發現：其背後的原理、重要性及應用

Introduction:

This course covers the stories of some discoveries in science. Students will learn the principle behind, the importance of the discoveries, their applications and the science of a lot of related topics. Topics included: atomic and molecular structure, chemical bonding, fake gold, X-ray, radioactive decay, fluorescence and phosphorescence, noble gases, the father of organic chemistry, polymers, chemical analysis (physical methods, elemental analysis, and chromatography), etc. This course is conducted in the format of lecture, supplemented with demonstrations as well as in-class and at-home activities. Snapshots and PowerPoint sample can be downloaded from:

CUHK CUSA1081 YSCheung Snapshots and PowerPoint sample

https://gocuhk-my.sharepoint.com/:f:/g/personal/yscheung_cuhk_edu_hk/EmVcKWj0hk9Hsfat5sbcgvMBpehkuxFD6VhORyFEc4YYKA?e=sJtiMu

or https://bit.ly/419QkGX or QR-code below

本課程涵蓋了一些科學發現的故事。學生將學習其背後的原理、重要性、應用及許多相關主題的科學。主題包括：原子和分子結構、化學鍵、假金、X 射線、放射性衰變、熒光和磷光、貴族氣體、有機化學之父、聚合物、化學分析（物理方法、元素分析及色譜）等。本課程以講課形式進行，輔以示範以及課堂和居家活動。相片和 PowerPoint 樣本可從以下網址下載：

CUHK CUSA1081 YSCheung Snapshots and PowerPoint sample

https://gocuhk-my.sharepoint.com/:f:/g/personal/yscheung_cuhk_edu_hk/EmVcKWj0hk9Hsfat5sbcgvMBpehkuxFD6VhORyFEc4YYKA?e=sJtiMu

或 https://bit.ly/419QkGX 或以上二維碼

Medium of Instruction:

Cantonese supplemented with English (and written materials in English)
粵語主講及輔以英語 (講義為英文)

Organising Unit:

Department of Chemistry, Faculty of Science, CUHK

Teachers:

Dr. CHEUNG Yu San (張羽伸博士)
Senior Lecturer
Department of Chemistry, CUHK
Rm. 234, Science Centre North, CUHK
Tel: 3943 6265, Email: yscheung@cuhk.edu.hk

Course Content:

28 July 2025 (Monday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture:** • Basic concepts in chemistry • King's crown: Archimedes vs Goldsmith • The discovery of X-ray • The discovery of radioactivity **Assessment:** • Short-answer exercise
30 July 2025 (Wednesday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture:** • Noble gases • The father of organic chemistry **Assessment:** • Short-answer exercise
1 August 2025 (Friday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture:** • Polymers **Assessment:** • Short-answer exercise

Date	28, 30 July, 1 August 2025 (18 hours) *(5 August 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	9:30 am – 12:30 pm & 2:00 pm – 5:00 pm
Venue	The Chinese University of Hong Kong
Enrollment	30
Expected Applicants	Students who are studying in S2 – S3 (in the academic year 2024-2025)
Tuition Fee	HKD 3,400.00
Credit	1.25 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*
Grading Methods	

	Certificate	***Assessment***	***Attendance***	***Credit(s)***
Distinction	*Certificate of Distinction*	*Excellent*	*>75%*	*1.25*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*1.25*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

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Summer Courses 2025
Course Outline

CUSA1091 Artistic and Colourful Chemistry
色彩斑斕的化學世界

Introduction:

This course combines the disciplines of science and culture and aims to provide students with fundamental understanding on the nature of science and their influences on our culture and daily life.

This course aims to provide students, who have a knowledge of the principles of chemistry, an overview on the mechanism of perceiving colors, the production of various classes of dyes and pigments, including their corresponding applications. Graphics, demonstrations, and project presentations are the major elements of interactive learning environment in this course.

本課程將結合科學與文化的內容，目的讓學生對基礎自然科學有更深入認識和了解，以至科學對日常生活和文化的影響。

本課程冀讓對化學有基拙理解的學生們明白顏色接收的基理，不同類型染料和顏料的製作以及其相應的應用。本課程會以不同的圖片，示範，小組專題研習及報告的形式以達至互動的學習環境和氣氛。

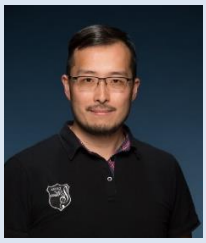
Medium of Instruction:

Cantonese supplemented with English
粵語輔以英語

Organising Unit:

Department of Chemistry, Faculty of Science, CUHK

Teachers:



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Lecturer
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Rm. G1564, Science Centre South, CUHK,
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Course Content:

16 July 2025 (Wednesday) 9:00 am – 12:00 nn 2:00 pm – 5:00 pm	**Lecture:** • A Brief Historical Introduction on Color • The Physical and Chemical Basis of Color **Lab:** • *Colour Composition in dyes and ink; 'Magic' Writing* **Assessment:** • In Class Worksheet or Online Google Form
17 July 2025 (Thursday) 9:00 am – 12:00 nn 2:00 pm – 5:00 pm	**Lecture:** • Azo Dyes and Pigments • Carbonyl Dyes and Pigments **Lab:** • *Synthesis of Azo Dyes* **Assessment:** • In Class Worksheet or Online Google Form
18 July 2025 (Friday) 9:00 am – 12:00 nn 2:00 pm – 5:00 pm	**Lecture:** • Textile Dyes • Inorganic Pigments • Applications of Dyes and Pigments **Lab:** • *Dyeing Method with DIY Dyes* **Assessment:** • In Class Worksheet or Online Google Form

Date	16, 17, 18 July 2025 (18 hours) *(21 July 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	9:00 am – 12:00 nn & 2:00 pm – 5:00 pm
Venue	The Chinese University of Hong Kong
Enrollment	30 – 40
Expected Applicants	Students who are promoting or studying S3 – S6
Tuition Fee	HKD 3,600.00
Credit	1.25 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*
Grading Methods	

	Certificate	***Assessment***	***Attendance***	***Credit(s)***
Distinction	*Certificate of Distinction*	*Excellent*	*>75%*	*1.25*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*1.25*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

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Summer Courses 2025
Course Outline

CUSA1111 Chemistry in Food and Health
食物與健康的化學

Introduction:

Nowadays, people have increasing awareness of healthy lifestyle. They care about what they eat and whether it is good for health. They would like to develop a balanced diet to enhance health and beauty. This course aims to introduce students to basic concepts with the relationship of nutrition and food to chemistry, as well as to develop students' abilities in presentation skills through group project of case study.

This course emphases on the scientific principles in chemistry related to food, diet and health. It provides the introduction of the chemical substances that can be found in food systems (including nutrients), such as protein, lipid, carbohydrate and phytochemicals. Moreover, working principles in food additives that related to chemistry will be further illustrated. In addition, different cooking methods will be introduced. Further applications with selected food in experiments will be performed in laboratory.

Face-to-face teaching in lectures with the aid of interactive discussions in class will be adopted. Experimental sessions in laboratory will also be included. A group presentation of case study will be applied for final assessment in this course.

今時今日，人們對健康生活方式的意識日益增強。他們關心自己吃什麼以及是否對健康有益。他們希望制定均衡飲食以增強健康和保持美麗。本課程旨在向學生介紹營養、食品與化學關係的基本概念，並透過案例研究小組計畫培養學生的表達能力。

本課程強調與食物、飲食和健康相關的化學科學原理。它介紹了食品系統中存在的化學物質（包括營養素），例如蛋白質、脂質、碳水化合物和植物化學物質。此外，本課程也進一步闡述與化學相關的食品添加劑的工作原理，並且會介紹不同的烹調方法。另外將會在實驗室對選定食品進行實驗，作為進一步應用。

本課程採取面對面授課及課堂互動討論的方式進行教學，也包括實驗課。本課程的最終評估將採用案例研究的小組展示。

Medium of Instruction:

Cantonese supplemented with English
粵語輔以英語

Organising Unit:

Department of Chemistry, Faculty of Science, CUHK

Teachers:

Dr. LO Chui Man Cat (盧翠雯博士)
Lecturer
Department of Chemistry, CUHK
Rm. 333C, Science Centre South, CUHK
Tel: 3943 0623, Email: cmlo@cuhk.edu.hk

Course Content:

4 August 2025 (Monday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture:** • Nutrition for human health • Major nutrients and their chemical properties in food **Case Study:** • Discussion of the major nutrients and their functions in a selected food
6 August 2025 (Wednesday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture:** • Phytochemicals in food **Case Study:** • Discussion of the major nutrients and their functions in a selected food **Experiment:** • Anthocyanin in red cabbage – Application in pH indicator
11 August 2025 (Monday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture:** • Food for health and beauty • Food safety and food additives **Experiment:** • Preparation of sunscreen lotion and test for its effectiveness with UV-test card
13 August 2025 (Wednesday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture:** • Healthy diet and cooking methods **Case Study:** • Discussion of the major nutrients and their functions in a selected food **Assessment:** • Group presentation of case study

Date	4, 6, 11, 13 August 2025 (24 hours) *(14 August 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	9:30 am – 12:30 pm & 2:00 pm – 5:00 pm
Venue	The Chinese University of Hong Kong
Enrollment	30 – 40
Expected Applicants	Students who are studying S1– S3
Tuition Fee	HKD 4,000.00
Credit	1.75 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*
Grading Methods	

	Certificate	***Assessment***	***Attendance***	***Credit(s)***
Distinction	*Certificate of Distinction*	*Excellent*	*>75%*	*1.75*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*1.75*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2025
Course Outline

CUSA1121 Chemistry Basis in Cooking Process
烹飪過程的化學基礎

Introduction:

Many people perform cooking at home and try to explore new cooking methods. Some people may be curious about what happened to cooking and the chemical reactions that involved in cooking process. For examples, change in texture of cooking eggs, colour changes in cooking beef, shrimp and crab, color change of vegetables in acidic and alkaline medium, browning of apples in prolong storage in air, etc. Actually, they are all related to chemical reactions.

This course is designed to illustrate the chemistry basis related to cooking process. Emphasis is given to the observable changes in color and texture of the food. Selected techniques in various cooking methods will be discussed in lectures. Due to safety reasons, cooking will not be performed in the laboratory, and some related experiments were chosen instead. For examples, we need to wash the cooking utensils and dishes after cooking. One experiment is the application of recycled cooking oil to make soap that can be used for washing. Another experiment is the study of color changes of phytochemicals in vegetables in acidic and alkaline medium with their possible application as a pH indicator.

Face-to-face teaching in lectures with the aid of interactive discussions in class will be adopted. Video demonstration for selected cooking methods will also be provided. Experimental sessions in laboratory will also be included. A group presentation of case study will be applied for final assessment in this course.

許多人都會在家做飯，並嘗試探索新的烹飪方法，有些人可能會好奇在烹飪過程中發生了什麼事，以及在烹飪過程中涉及的化學反應。例如，煮蛋時質地的變化，烹調牛肉、蝦、蟹時顏色的變化，蔬菜在酸性和鹼性介質中的顏色變化，以及蘋果在空氣中長期存放的褐變等。事實上，它們都與化學反應有關。

本課程旨在闡釋與烹飪過程相關的化學基礎原理，強調在於食物顏色和質地的可觀察變化，以及在上課時討論一些不同的烹飪方法和技術。基於安全考慮，我們不會在實驗室進行煮食，取而代之，我們選取了一些相關的實驗。例如，我們煮食後需要清洗廚具和碗碟，其中一項實驗是利用回收的食用油來製造可用於洗滌的肥皂，另一項實驗是研究蔬菜中植化素在酸性和鹼性介質中的顏色變化及其作為 pH 指示劑的應用。

本課程採取面對面授課及課堂互動討論的方式進行教學，並將提供所選烹飪方法的影片示範，也包括相關的實驗課。本課程的最終評估將採用案例研究的小組展示。

Medium of Instruction:

Cantonese supplemented with English
粵語輔以英語

Organising Unit:

Department of Chemistry, Faculty of Science, CUHK

Teachers:

Dr. LO Chui Man Cat (盧翠雯博士)
Lecturer
Department of Chemistry, CUHK
Rm. 333C, Science Centre South, CUHK
Tel: 3943 0623, Email: cmlo@cuhk.edu.hk

Course Content:

18 August 2025 (Monday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture:** • Structure of an egg and its various cooking methods • Tricks in cooking meat and the reasons of color changes in beef, shrimp and crab **Case Study:** • Sharing of a recipe and discussion on the chemistry basis involved in the cooking method
20 August 2025 (Wednesday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture:** • Introduction of cooking oil and the chemical reactions during frying • Color change of vegetables in acidic and alkaline medium **Case Study:** • Sharing of a recipe and discussion on the chemistry basis involved in the cooking method
25 August 2025 (Monday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture:** • Chemical reactions of apples browning • Biological and chemical leavening in baking bread and tarts **Experiment:** • Possible recycling of cooking oil: Making cold process handmade soap for washing dishes
27 August 2025 (Wednesday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Case Study and Group Presentation:** • Sharing of a recipe and discussion on the chemistry basis involved in the cooking method **Experiment:** • Extraction and practical use of phytochemicals in vegetables **Assessment:** • Group presentation of case study

Date	18, 20, 25, 27 August 2025 (24 hours) *(28 August 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	9:30 am – 12:30 pm & 2:00 pm – 5:00 pm
Venue	The Chinese University of Hong Kong
Enrollment	30 – 40
Expected Applicants	Students who are studying S3– S5 (in the academic year 2024-2025)
Tuition Fee	HKD 4,000.00
Credit	1.75 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*
Grading Methods	

	Certificate	***Assessment***	***Attendance***	***Credit(s)***
Distinction	*Certificate of Distinction*	*Excellent*	*>75%*	*1.75*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*1.75*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2025
Course Outline

CUSA1023 Great Discoveries in Biomedical Sciences Practical One
生物醫學大發現 實習一

Introduction:

This practical course aims at supplementing the lecture courses **CUSA2013 Great Discovery in Biomedical Sciences (Senior Class)** or **CUSA3003 Biological Science Student Knowledge Enhancement Course** with some practical skills of literature research and scientific presentation.

本實習科旨在為修讀 **CUSA2013 生物醫學大發現(高級班)** 或 **CUSA3003 生命科學學生知識增進課程** 之同學提供有關文獻研究和科學報告的實習。

Learning Outcomes:

After taking this course, students are expected to

1. demonstrate the basic skills to search for scientific journals online;
2. differentiate research and review articles;
3. define and solve an academic problem by literature research;
4. name at least one reference style in the field of biomedical science;
5. demonstrate proper citation in scientific presentation;
6. speak and write for scientific presentation;
7. evaluate the importance of academic honesty.

Medium of Instruction:

Cantonese supplemented with English
粵語輔以英語

Organising Unit:

Biochemistry Programme, School of Life Sciences, Faculty of Science, CUHK

Teachers:

Dr. LO Fai Hang (羅輝恒博士)
Lecturer
School of Life Sciences, CUHK
Rm. G83, Science Centre, CUHK
Tel: 3943 5019, E-mail: lofaihang@cuhk.edu.hk

Demonstrators:

Students from Programme of Biochemistry, School of Life Sciences, CUHK

Course Content:

CUSA1023A (Class A):

13 September 2025 (Saturday) 10:00 am – 1:00 pm 2:30 pm – 4:30 pm	**<u>In-class activities & Assessment:</u>** • Introduction to literature research 文獻研究基本技巧簡介 • Introduction to scientific presentation 科學報告基本技巧簡介 • Group work and case study 小組練習及個案討論

CUSA1023B (Class B):

20 September 2025 (Saturday) 10:00 am – 1:00 pm 2:30 am – 4:30 pm	**<u>In-class activities & Assessment:</u>** • Introduction to literature research 文獻研究基本技巧簡介 • Introduction to scientific presentation 科學報告基本技巧簡介 • Group work and case study 小組練習及個案討論

Date	CUSA1023A: 13 September 2025 (5 hours) CUSA1023B: 20 September 2025 (5 hours) *(29 November 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	10:00 am – 1:00 pm & 2:30 pm – 4:30 pm
Venue	The Chinese University of Hong Kong
Expected Applicants	Students who are promoting or studying S5 – S6 who are interested in biomedical sciences
Tuition Fee	HKD 1,400.00
Credit	0.25 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*
Grading Methods	

	Certificate	***Assessment***	***Attendance***	***Credit(s)***
Distinction	*Certificate of Distinction*	*Excellent*	*>75%*	*0.25*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*0.25*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

Remarks:	**Students need to bring along a laptop or tablet for the course**

The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2025
Course Outline

CUSA1033 Great Discoveries in Biomedical Sciences Practical One
生物醫學大發現 實習二

Introduction:

This practical course aims at supplementing the lecture courses **CUSA2013 Great Discovery in Biomedical Sciences (Senior Class)** or **CUSA3003 Biological Science Student Knowledge Enhancement Course** with some practical skills of scientific method and data presentation.

本實習科旨在為修讀 **CUSA2013 生物醫學大發現(高級班)** 或 **CUSA3003 生命科學學生知識增進課程** 之同學提供有關科學方法和數據表達的實習。

Learning Outcomes:

After taking this course, students are expected to

1. evaluate the importance of laboratory safety and bioethics;
2. explain what is scientific method;
3. list the basic steps of scientific method;
4. design a relevant experiment based on a hypothesis;
5. analyze and present the raw data of an experiment;
6. recognize the general practice of data presentation in the field of biomedical science;
7. criticize the effectiveness of data presentation.

Medium of Instruction:

Cantonese supplemented with English
粵語輔以英語

Organising Unit:

Biochemistry Programme, School of Life Sciences, Faculty of Science, CUHK

Teachers:

Dr. LO Fai Hang (羅輝恒博士)
Lecturer
School of Life Sciences, CUHK
Rm. G83, Science Centre, CUHK
Tel: 3943 5019, E-mail: lofaihang@cuhk.edu.hk

Demonstrators:

Students from Programme of Biochemistry, School of Life Sciences, CUHK

Course Content:

6 September 2025 (Saturday) 10:00 am – 2:00 pm	**<u>In-class activities & Assessment:</u>** • Introduction to laboratory safety and bioethics 實驗室安全簡介及生物倫理 • Discussion of scientific method 科學方法討論 • Data analysis and presentation 數據分析及表達 • Discussion and exercise 小組討論 / 習作

Date	6 September 2025 (4 hours) *(29 November 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	10:00 am – 2:00 pm
Venue	The Chinese University of Hong Kong
Enrollment	25 – 40
Expected Applicants	Students who are promoting or studying S5 – S6 who are interested in biomedical sciences
Tuition Fee	HKD 1,300.00
Credit	0.25 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*
Grading Methods	
Remarks:	**Students need to bring along a laptop or tablet for the course**

	Certificate	***Assessment***	***Attendance***	***Credit(s)***
Distinction	*Certificate of Distinction*	*Excellent*	*>75%*	*0.25*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*0.25*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2025
Course Outline

CUSA1043 Life Science in Daily Life
日常生活中的生命科學

Introduction:

Life science is the study of all living organisms and life processes at all levels from ecological to molecular. While many people refer life science as biology, it is an enormous field of study that also covers genetics, molecular biology, cell biology, biochemistry, food science, biotechnology, ecology, and more. The knowledge of life science teaches us to respect and love the nature and all life forms. It also plays a substantial role in human welfare and helps to create many of our daily needs ranging from food to medicine.

生命科學以科學方式對所有生物體和生命過程由生態到分子各個層面進行研究。雖然許多人將生命科學稱為生物學，但其實它是一個巨大的研究領域，其中還包括遺傳學、分子生物學、細胞生物學、生物化學、食品科學、生物技術、生態學等。生命科學的知識教會我們尊重和熱愛自然和所有生命體。它還在人類福利方面發揮著重要作用，並有助於創造我們從食物到藥品的許多日常需求。

Medium of Instruction:

Cantonese supplemented with English
粵語輔以英語

Organising Unit:

School of Life Sciences, Faculty of Science, CUHK

Teachers:

Professor NGO Chi Ki Jacky (敖志祺教授)
Associate Professor
School of Life Sciences, Faculty of Science, CUHK
Rm E403, Science Centre East Block, CUHK
E-mail: jackyngo@cuhk.edu.hk

Course Content:

5 August 2025 (Tuesday) 9:00 am – 12:30 pm 2:00 pm – 5:30 pm	**Lecture 1** • What are Life Sciences? • Importance of Life Sciences in Our Daily Lives. • Thinking and Acting like a Life Scientist. **Laboratory 1 #** • Effectiveness of antiseptics and disinfectants on bacteria around us
7 August 2025 (Thursday) 9:00 am – 12:30 pm 2:00 pm – 5:30 pm	**Lecture 2** • The Building Blocks of Our Bodies. • DNA – the Blueprint of Life. **Laboratory 2 #** • Extraction of DNA from fruits • Making plastic from milk and analysis of milk proteins
12 August 2025 (Tuesday) 9:00 am – 12:30 pm 2:00 pm – 5:30 pm	**Lecture 3** • The Central Dogma: From DNA to Proteins. • The 20 Letters of Protein that Make Life Possible. **Laboratory 3 #** • Micropipetting and Gel Electrophoresis for DNA Analysis
14 August 2025 (Thursday) 9:00 am – 12:30 pm 2:00 pm – 5:30 pm	**Lecture 4** • Unleashing the Potentials of Life Sciences. **Laboratory 4 #** • Expression of Green Fluorescent Protein (GFP) in Bacteria and Computer-Aided Drug Discovery *(please bring your own computer)*

 # Students are required to wear lab coats when attending the laboratory sessions.

Date	5, 7, 12, 14 August 2025 (28 hours) *(15 August 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	9:00 am – 12:30 pm & 2:00 pm – 5:30 pm
Venue	The Chinese University of Hong Kong
Enrollment	20 – 36
Expected Applicants	Students who are promoting to or studying S2 – S5
Tuition Fee	HKD 4,200.00
Credit	2 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*
Grading Methods	

	Certificate	***Assessment***	***Attendance***	***Credit(s)***
Distinction	*Certificate of Distinction*	*Excellent*	*>75%*	*2*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*2*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2025
Course Outline

CUSA1053 Nutrition Across the Lifespan
生命各階段的營養需求

Introduction:

This course aims to explore the fundamental nutritional needs at various stages of life, including adolescence and adulthood. At the same time, students will learn how to apply nutritional knowledge in real life. The course includes lectures and workshops, where students will design nutritious recipes and evaluate the nutritional values of common packaged foods. This course aims to guide students to make informed dietary choices and understand the vital role of nutrition in a healthy life.

本課程旨在探討人體各階段，包括青少年與成年時期的基本營養需求。同時，學生將學習如何把營養知識應用於現實生活中。本課程包括講課與工作坊，學生需設計營養食譜，以及評估常見包裝食品的營養價值。本課程旨在啟發學生作出有根據的飲食選擇，並理解營養在健康生活中的關鍵角色。

Medium of Instruction:

English supplemented by Cantonese
英語輔以粵語

Organising Unit:

School of Life Sciences, Faculty of Science, CUHK

Teachers:

Miss SIN Man Ching Daisy
Assistant Lecturer
School of Life Sciences, Faculty of Science, CUHK
Rm 525, Mong Man Wai Building, CUHK
E-mail: daisymcsin@cuhk.edu.hk

Course Content:

15 July 2025 (Tuesday) 9:30 am – 12:00 nn 2:00 pm – 4:30 pm	**Lecture 1** • Explore the nutritional needs of pregnant women and children **Group Discussion Workshops 1** • Learn about how to analyse food labels on packaged foods • Plan and discuss about how to design a healthy recipe
22 July 2025 (Tuesday) 9:30 am – 12:00 nn 2:00 pm – 4:30 pm	**Lecture 2** • Explore the nutritional needs of adolescents and adults **Group Discussion Workshops 2** • Discuss the healthy packaged foods available in the market • Finalise the healthy recipe design
29 July 2025 (Tuesday) 9:30 am – 12:00 nn 2:00 pm – 4:30 pm	**Lecture 3** • Explore the nutritional needs of older adults **Workshop 3 - Projects/Assignment** • Short quiz (open book) • Presentation of healthy recipes and healthy packaged food choices • Short essay - reflective journal

Date	15, 22, 29 July 2025 (15 hours) *(31 July 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	9:30 am – 12:00 nn & 2:00 pm – 4:30 pm
Venue	The Chinese University of Hong Kong
Enrollment	25 – 30
Expected Applicants	Students who are promoting to or studying S5 – S6
Tuition Fee	HKD 3,200.00
Credit	1 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*
Grading Methods	

	Certificate	***Assessment***	***Attendance***	***Credit(s)***
Distinction	*Certificate of Distinction*	*Excellent*	*>75%*	*1*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*1*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2025
Course Outline

CUSA1073 Understanding Global Environmental Pollution
認識全球環境污染

Introduction:

This course aims to give students a scientific overview of different environmental pollution issues in the planet Earth, and will look into the scientific basis and find out potential solution to different environmental pollution problems. The class will cover topics related to different ecosystem types on the planet, global climate change, water shortage, nutrient enrichment, toxic chemical pollution and their impacts, and other emerging environmental topics. The course will cover the basic concepts of ecology, environmental sciences, microbiology, plant and animal sciences, ecotoxicology, and environmental sustainability. Case studies will be provided to help the students better grasp the underlying principles.

本課程旨在讓學生對地球上的不同環境污染問題有一個科學基本的認識，並探討其科學依據並找出不同環境污染問題的潛在解決方案。本課程將涵蓋與地球上不同生態系統類型、全球氣候變遷、水資源短缺、營養過剩、有毒化學物質污染及其影響，以及其他新興環境相關的主題。本課程將涵蓋生態學、環境科學、微生物學、植物和動物科學、生態毒理學和環境永續性的基本概念。本課程將提供案例研究，以幫助學生更好地掌握基本原則。

Learning outcomes

After completing this course, students are expected to:

- understand the fundamental processes in environmental pollution around the world;
- understand the basic concepts and the potential pathways leading to reduction in pollution status;
- know how to design and conduct an environmental project in studying and solving some environmental problems.

Medium of Instruction:

Cantonese supplemented with English
粵語輔以英語

Organising Unit:

School of Life Sciences, Faculty of Science, CUHK

Teachers:

Professor TSUI Tsz Ki Martin
Associate Professor
School of Life Sciences, Department of Earth and Environmental Sciences
Faculty of Science, CUHK
Rm 288, Science Centre South Block, CUHK
E-mail: mtktsui@cuhk.edu.hk

Course Content:

18 August 2025 (Monday)
 	
9:00 am – 12:30 pm
	Lecture 1
	• Course Introduction and Major Global Environmental Issues
	  • Four spheres and their interactions
	  • Water, global warming, land use changes, nutrients and toxic chemicals
	• Ecosystem Types, Services, and their Stressors
	  • Ecosystem services
	  • Stressors in different ecosystem types
	Case Discussion 1: Emerging environmental problems in Hong Kong

19 August 2025 (Tuesday)
 	
9:00 am – 12:30 pm
	Lecture 2
	• Global Climate Change
	  • Greenhouse gases and consequences of climate change
	  • Experiments and modelling in climate change
	• Wetland and Water
	  • Wetland types
	  • Global water problems and solution
	Assessment 1: End-of lecture quiz

21August 2025 (Thursday)
 	
9:00 am – 12:30 pm
	Lecture 3
	• Urbanization and Environmental Consequences
	  • Pollution problems in cities
	  • Urban ecosystem services
	• Global Carbon Cycle
	  • Forest ecosystems
	  • Aquatic ecosystems
	Case Discussion 2: Common environmental problems in big cities

22 August 2025 (Friday)
 	
9:00 am – 12:30 pm
	Lecture 4
	• Nutrient Cycle and Eutrophication
	  • Essential nature of nutrients
	  • Consequences of excessive nutrients
	• Anions and Heavy Metals in the Environment
	  • Chloride, perchlorate, and sulphate
	  • Metals, metalloids, and mercury
	Assessment 2: End-of lecture quiz

25 August 2025 (Monday)
 	
9:00 am – 12:30 pm
	Lecture 5
	• Organic Pollutants and Emerging Micropollutants
	  • Key persistent environmental organics
	  • Microplastics, antibiotics, nanoparticles
	• Environmental Monitoring
	  • Abiotic monitoring
	  • Biotic monitoring
	Case Discussion 3: How can we know the environmental quality changes in Hong Kong?

26 August 2025 (Tuesday) 9:00 am – 12:30 pm	**Group Project and Presentation:** Each team (3-4 students) work together to propose a topic of their interests about an environmental issue and its potential solution. The team will present to the class and all students will have a chance to interact with the presenting team. **Final Assessment:** A test will be conducted to test the overall understanding of the students on the class materials.

Date	18, 19, 21, 22, 25, 26 August 2025 (21 hours) *(27 August 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	9:00 am – 12:30 pm
Venue	The Chinese University of Hong Kong
Enrolment	30
Expected Applicants	Students who are advancing to or studying S4 – S6
Tuition Fee	HKD 3,600.00
Credit	1.5 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*
Grading Methods	

	Certificate	*Assessment*	*Attendance*	*Credit(s)*
Distinction	*Certificate of Distinction*	*Pass*	*>75%*	*1.5*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*1.5*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

Remarks:	**Students are requested to bring laptops/notebooks or tablets with them for this course.**

The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2025
Course Outline

CUSA2023 Introduction to Bionics
仿生學淺談

Introduction:

Bionics is the branch of science dedicated to the studying of the characteristics, structure or functions of bio-systems for innovations in developing new technology, it is also known as "Biomimicry" or "Biomimetics". Since the 1960s, bionics has developed quickly and applied widely in various fields of science and technology. With an emphasis on the scientific basis of various processes or phenomena in nature, this course aims to introduce to the students the various inspirations which human beings acquired from nature, the methodology, the major applications, and the advancements of bionics. Students will learn in form of lectures, videos, demonstrations, quizzes, discussions, and also gain hands-on experience through participating in worksheets and self-exploratory activities.

仿生學又稱為「模擬生物學」或「生物模仿學」，是一門研究生物系統的特質、結構及功能原理的科學，主要用以研發各種創新科技。自上世紀六十年代開始，仿生學的迅速發展使其在各個科學及技術範疇中漸漸普及。本課程旨在以各種科學現象或過程的原理為基礎，通過講解、視頻、示範、測驗、及討論等內容介紹仿生學的原理及仿生學在各方面的應用。學生亦可通過工作紙及在家實驗等活動，親身了解仿生學的基本原理。

Medium of Instruction:

Cantonese supplemented with English
粵語輔以英語

Organising Unit:

Centre for Promoting Science Education, Faculty of Science, CUHK

Teachers:

Dr. CHUNG, Kwok Cheong (鍾國昌博士)
School of Life Sciences, CUHK
Email: kcchung@cuhk.edu.hk

Course content:

28 July 2025 (Monday) 2:00 pm – 5:00 pm	**Lecture:** • Introduction: history, methodology and scope of Bionics **Demonstration:** • Relationship between the number of setae in Gecko foot & its holding force
30 July 2025 (Wednesday) 2:00 pm – 5:00 pm	**Lecture:** • Application of Bionics: structures / materials / architecture **Demonstration:** • Superhydrophobicity, the lotus effect and water striders **Homework:** • How to build stronger bones?
4 August 2025 (Monday) 2:00 pm – 5:00 pm	**Lecture:** • The secrets of flying: Principle of animal flight & aerodynamics **Homework:** • Practice flying with a Glider/Pterosaur model
6 August 2025 (Wednesday) 2:00 pm – 5:00 pm	**Lecture:** • Use of sound by animals • Application of Bionics: art / energy / management **Homework:** • The folding leaves exercise
11 August 2025 (Monday) 2:00 pm – 5:00 pm	**Lecture:** • Application of Bionics: health / medicine
15 August 2025 (Friday) 2:00 pm – 5:00 pm	**Lecture:** • Application of Bionics: environmental and sustainability **Homework:** • Find out the golden ratio: Constructing the "Golden Section Gauge"

Date	28, 30 July, 4, 6, 11, 15 August 2025 (18 hours) *(18 August 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	2:00 pm – 5:00 pm
Venue	The Chinese University of Hong Kong
Enrollment	20 – 40
Expected applicants	Students who are promoting to or studying S2 – S3
Tuition Fee	HKD 3,400.00
Credit	1.25 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*
Grading Methods	

	Certificate	***Assessment***	***Attendance***	***Credit(s)***
Distinction	*Certificate of Distinction*	*Pass*	*>75%*	*1.25*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*1.25*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2025
Course Outline

CUSA2043 An Ocean of Inspiration and Beauty
海洋啟示錄

Introduction:

The oceans cover 70% of the Earth's surface and is the biggest biome on Earth as well as the most important component of the biosphere. In addition to the crater of life on Earth, the ocean is also one of the crucial factors for maintaining life on Earth. In the history of mankind, the oceans have been admired and greatly respected for its significance in the human exploration of nature, as well as in the development of human civilization. This course intends to offer an overview of the oceans from perspectives such as culture, history, science, philosophy and arts; as well as to acknowledge the importance of the oceans to mankind and other life forms on Earth. The core concepts include the roles played by the oceans in the development of human civilization, the impact and reliance of human beings on the oceans, ocean processes and the physical, chemical and biological properties of the oceans, diversity of marine ecosystems and marine organisms, how marine organisms solve their specific problems and provide inspirations for solving human problems, the importance of the oceans in maintaining global climatic and ecological balances, as well as how we should protect, conserve and sustainably exploit the oceans for our future generations and all life forms on Earth.

海洋覆蓋了地球七成的表面，是地球最大的生物群系和生物圈最重要的部份。海洋既是地球上生命產生的搖籃，又是維持生命的必要關鍵因素之一。 自古以來人類對神祕莫測的海洋既敬畏又嚮往；海洋是人類對自然的探索，以至文明的產生和發展過程中極重要部份。 本課程旨在讓學員從文化、歷史、科學、哲學、及藝術等角度去認識海洋；及了解海洋對人類以至其他生物的重要性。主要課程內容包括海洋在人類文明發展的角色、人類對海洋的影響和依賴、各種海洋過程及海洋的物理，化學，生物等方面的特性、海洋生態系和海洋生物的多樣性、海洋生物如何適應獨海洋環境並為人類提供解決問題的靈感、海洋在調節全球氣候和生態平衡的功能、及我們應如何維護、保育及永續地開發海洋等。

Medium of Instruction:

Cantonese supplemented with English
粵語輔以英語

Organising Unit:

Centre for Promoting Science Education, Faculty of Science, CUHK

Teachers:

Dr. CHUNG, Kwok Cheong (鍾國昌博士)
School of Life Sciences, CUHK
Email: kcchung@cuhk.edu.hk

Course Content:

14 July 2025 (Monday) 2:00 pm – 5:30 pm	**Theme 1. Ocean and Man:** 1. The oceans and the marine environment; 2. Importance of the oceans; 3. A history of maritime development; 4. The rise and fall of maritime power.
16 July 2025 (Wednesday) 2:00 pm – 5:30 pm	**Theme 1. Ocean and Man:** 1. Marine resources and their exploitation; 2. Deterioration & conservation of the marine environment.
18 July 2025 (Friday) 2:00 pm – 5:30 pm	**Theme 2. Marine Ecosystems:** 1. The marine environment, zonation of the oceans, physical and chemical properties; 2. Plate tectonics & associated phenomena; 3. Ocean processes.
21 July 2025 (Monday) 2:00 pm – 5:30 pm	**Theme 2. Marine Ecosystems:** 1. Coastal marine ecosystems: rocky shores, mangrove forests, estuary / soft-bottom intertidal ecosystems, coral reefs, kelp forests etc. 2. Oceanic marine ecosystems: open oceans and deep oceans, hydrothermal vents and cold seeps etc.
23 July 2025 (Wednesday) 2:00 pm – 5:30 pm	**Theme 3. Marine Organisms:** 1. Classification of living organisms; 2. Major types of marine organisms.
25 July 2025 (Friday) 2:00 pm – 5:30 pm	**Theme 3. Marine Organisms:** 1. Survival, adaptation & evolution of marine organisms; 2. Inspirations from marine organisms.

Date	14, 16, 18, 21, 23, 25 July 2025 (21 hours) *(1 August 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	2:00 pm – 5:30 pm
Venue	The Chinese University of Hong Kong
Enrollment	20 – 40
Expected applicants	Students who are promoting to or studying S4 – S6
Tuition Fee	HKD 3,600.00
Credit	1.5 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*
Grading Methods	

	Certificate	***Assessment***	***Attendance***	***Credit(s)***
Distinction	*Certificate of Distinction*	*Pass*	*>75%*	*1.5*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*1.5*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2025
Course Outline

CUSA1035 Mysteries in the Atomic World
原子世界的奧秘

Introduction:

This course will bring students to retrace the thinking paths of physicists in the early 20th century to unravel the mysteries of atoms. The course includes lectures, experiments, and a visit. Students will glimpse through the basic concepts of quantum physics, such as wave-particle duality, quantization, wave function and its probabilistic interpretation, spin, and their applications to understand some atomic and nuclear phenomena, including energy levels in atoms, atomic spectra, formation of molecules, as well as a more advanced topic on magnetic resonance imaging (MRI), which is now widely applied to medical imaging.

Students will gain hands-on experience in using modern laboratory equipment to measure atomic spectra, and determine the charge mass ratio of electrons. **A visit to a company in Hong Kong Science and Technology Park will also be included to let students gain hands-on experience in the operation of a medical MRI machine.**

本課程帶領學生重溫二十世紀初物理學家探索原子奧秘的過程。課程包括講座、實驗，和參觀三部分。學生將瞥見量子物理的基本概念，包括波粒二象性、量子化、波函數及其或然率詮釋，自旋；這些概念如何應用於了解原子和核子的現象，包括原子的能階、光譜、分子的形成，以及一個較深入、目前廣泛應用於醫療造影的現象：磁力共振。

學生也會學習如何利用現代科學儀器測量原子的光譜，以及電子的電荷質量比。**課程也包括到香港科學技術園參觀一間儀器公司，實際操作醫學磁力共振儀器**。

Medium of Instruction:

Cantonese supplemented with English
粵語輔以英語

Organising Unit:

Department of Physics, Faculty of Science, CUHK

Teachers:

Dr. TONG Shiu Sing (湯兆昇博士)
Senior Lecturer
Department of Physics, Faculty of Science, CUHK
Rm. 223, 2/F, Science Centre North Block, CUHK
Tel: 3943 6400, E-mail: sstong@phy.cuhk.edu.hk

Course Content:

28 August 2025 (Thursday) 9:00 am – 12:30 pm 2:00 pm – 5:30 pm	**Lecture and demos:** Discovery of subatomic particles, atomic spectra, wave particle duality, relationship between classical wave phenomena and quantization, atomic models and quantization of atomic energy, and the emergence of quantum physics **Laboratory Activities:** • Study of atomic spectra, and charge to mass ratio of electron
29 August 2025 (Friday) 9:00 am – 12:30 pm 2:00 pm – 5:30 pm	**Lecture and demos:** Basic concepts of quantum physics, conceptual understanding of Schrodinger equation, wave function and probabilistic interpretation. Electron microscope, quantum phenomena such as quantum tunnelling and our existence. **Laboratory Activities:** • Visiting the modern physics laboratory at the Department of Physics, CUHK. Experiments with a scanning electron microscope and a transmission electron microscope, seeing microscopic objects, atoms, and electron diffraction patterns
30 August 2025 (Saturday) 9:00 am – 12:30 pm 2:00 pm – 5:30 pm	**Visit:** Visiting a Magnetic Resonance Imaging (MRI) company at Hong Kong Science Park. Experience the operation of an MRI machine and acquisition of MRI images. **Lecture and demos:** Introduction to the concepts of spin, Pauli Exclusion Principle and atomic orbitals, and their applications to understand some atomic and nuclear phenomena including MRI. **Discussion:** • Summary of essential ideas and findings, assessment

Date	28, 29, 30 August 2025 (21 hours) *(6 September 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	9:00 am – 12:30 pm & 2:00 pm – 5:30 pm
Venue	The Chinese University of Hong Kong
Enrollment	20 – 30
Expected Applicants	Students who are promoting to or studying S4 – S6
Tuition Fee	HKD 3,800.00 (including materials for experiments)
Credit	1.5 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*
Grading Methods	

	Certificate	***Assessment***	***Attendance***	***Credit(s)***
Distinction	*Certificate of Distinction*	*Excellent*	*>75%*	*1.5*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*1.5*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2024
Course Outline

CUSA1045 Discovering the Universe
探索宇宙

Introduction:

Humans want to explore the universe by looking up into the sky since ancient times. This course offers the outline about the selected phenomena which were observable with the naked eye. Upon finishing the course, students will acquire the development of modern astronomy, knowledge of the basic observational features of the sky, and the application of physical principles to astronomy.

The course includes lectures, experiments, and observation sessions. The experiments session is aimed to provide students with hand-on experience in basic physical principles and ideas in Astronomy. Student will have indoor observation of simulated night in class. Outdoor solar observation will be held if weather permits.

人類自古以來已希望通過觀察天文現象來探索身處的宇宙。本課程的設計正旨在概述這些肉眼能見的天象。完成課程的學生會了解當代天文的發展、有關天象的基本知識，以及物理定律在天文學上的應用。

本課程分為講座、實驗，和天文觀察三部份。實驗部份的目的是讓學生有機會親身驗證認識基本科學原理和天文概念。學生在天文觀察部份，可以參與模擬星空觀察。若天氣許可，學生會於室外作太陽的觀察。

Medium of Instruction:

Cantonese supplemented with English
粵語輔以英語

Organising Unit:

Department of Physics, Faculty of Science, CUHK

Teachers:

Dr. LEUNG Po Kin (梁寶建博士)
Senior Lecturer
Department of Physics, CUHK
Rm. 220, Science Centre North Block, CUHK
Tel: 3943 4078, E-mail: pkleung@cuhk.edu.hk

Demonstrators:

Students from Department of Physics, CUHK

Course Content:

18 August 2025 (Monday) 9:00 am – 12:30 pm 2:00 pm – 5:30 pm	**Lecture 講課: (3.5 hrs)** • Introduction to Astronomy 天文學簡介 • Ancient Greek Astronomy (Plato, Aristotle) 古希臘天文（柏拉圖、阿里士多德） • Modern Astronomy (Copernicus, Kepler, Galileo, Newton) 現代天文(哥白尼、開普勒、伽利略、牛頓) • Newton's laws of motion and law of gravitation 牛頓運動定律和重力定律 • Basics concepts of celestial sphere 天球介紹 **Assessment 評核:** MC, short questions, etc 選擇題、短題目…… **Lab 實驗: (3.5 hrs)** • Newtonian mechanics (Measuring gravitational acceleration; If time permits, also verifying Newton's second law.) 牛頓力學 (例如：量度地心引力加速、確認牛頓運動定律)
20 August 2025 (Wednesday) 9:00 am – 12:30 pm 2:00 pm – 5:30 pm	**Lecture 講課: (3.5 hrs)** • Constellations 星座、Seasons 季節、The Moon (phase, tides, eclipses) 月球 (月相、潮汐、掩蝕) **Lecture 講課: (1.5 hrs)** • Overview of the Solar System 太陽系概覽 • Planets 行星、Dwarf planets and asteroids 矮行星和小行星、Comets 彗星、Meteors 流星 **Assessment 評核:** MC, short questions, etc 選擇題、短題目…… **Observation 天文觀察: (2 hrs)** (note: this session would be moved to the 1st or 3rd day in case of bad weather 若天氣欠佳，此部份將改到第一天或第三天) • Basics related to observation 有關天文觀察的基本知識 • Physical principles behind telescope 望遠鏡的原理 • Outdoor solar observation (if weather permits) (如天氣許可) 室外太陽觀察 • Indoor simulated night sky observation 室內模擬星空觀察
22 August 2025 (Friday) 9:00 am – 12:30 pm 2:00 pm – 5:30 pm	**Lecture 講課: (3.5 hrs)** • The Sun – the nearest star 太陽 – 最接近的恆星、Stars 恆星、Star light 星光 • Conclusion 總結、Brief introduction to other fields in Astronomy 其他天文學範疇概覽 **Assessment 評核:** MC, short questions, etc 選擇題、短題目…… **Lab 實驗: (3.5 hrs)** • Light (e.g. information in starlight, observing the spectra of elements.) 光 (例如：星光裏的訊息、觀察原素光譜) **Assessment 評核:** Lab report 實驗報告

Date	18, 20, 22 August 2025 (21 hours) *(23 August 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	9:00 am – 12:30 pm & 2:00 pm – 5:30 pm
Venue	The Chinese University of Hong Kong
Enrollment	20 – 30
Expected Applicants	Students who are promoting to or studying S4 – S6
Tuition Fee	HKD 3,800.00
Credit	1.5 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*
Grading Methods	

	Certificate	*Assessment*	*Attendance*	*Credit(s)*
Distinction	*Certificate of Distinction*	*Excellent*	*>75%*	*1.5*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*1.5*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2025
Course Outline

CUSA1095 Relativity and Particle Physics
相對論與粒子物理學

Introduction:

This course is tailored for students who are curious about the fundamental workings of the universe. Embarking on a captivating exploration of special relativity, we will uncover the mind-bending concepts of time dilation and length contraction. We will then dive into the realm of particle physics, unravelling the mysteries of elementary particles and fundamental interactions. Students will be able to learn about the cutting-edge technologies used in particle accelerators and detectors in frontier scientific research, and gain some hands-on experience with apparatus. Come join us on this exhilarating journey as we unlock the secrets of the cosmos and inspire a lifelong passion for scientific discovery!

本課程特別為對宇宙基本運作感到好奇的學生度身打造。我們將踏上一段引人入勝的探索之旅，揭示狹義相對論中如時間膨脹和長度收縮等概念。我們更會深入粒子物理學的領域，解開基本粒子、基本相互作用的神秘面紗。此外，同學們將會學習到粒子加速器和探測器等用於前沿研究的尖端技術，並有機會親自動手操作儀器。讓我們一同展開這趟令人振奮的科學探索之旅程，解開宇宙的奧秘！

Medium of Instruction:

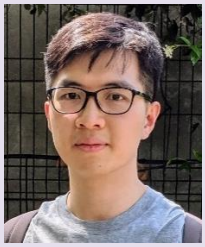
Cantonese supplemented with English
粵語輔以英語

Organising Unit:

Department of Physics, Faculty of Science, CUHK

Teachers:

Dr. CHENG Hok Chuen Tom (鄭學全博士)
Lecturer
Department of Physics, CUHK
Room 217, 2/F, Science Centre North Block
Tel: 3943 3397, E-mail: hccheng@phy.cuhk.edu.hk



Dr. YIP Long Sang Kenny (葉朗生博士)
Lecturer
Department of Physics, CUHK
Room 222, 2/F, Science Centre North Block
Tel: 3 943 6278, E-mail: lskyip@phy.cuhk.edu.hk

Course Content:

14 August 2025 (Thursday) 9:00 am – 12:30 pm 2:00 pm – 5:30 pm	**Special Relativity (Dr. YIP Long Sang Kenny):** **Lecture:** • Michelson-Morley experiment, postulates of special relativity and constancy of the speed of light in vacuum, time dilation, and length contraction.
15 August 2025 (Friday) 9:00 am – 12:30 pm 2:00 pm – 5:30 pm	**Special Relativity (Dr. YIP Long Sang Kenny):** **Lecture:** • Lorentz transformation, twin paradox, cosmic muon lifetime, and assessment. **Laboratory Activities:** • Measurement of muon lifetime at the Department of Physics, CUHK. **Particle Physics (Dr. CHENG Hok Chuen Tom):** **Lecture:** • Historical overview and discoveries, and elementary particle dynamics.
16 August 2025 (Saturday) 9:00 am – 12:30 pm 2:00 pm – 5:30 pm	**Particle Physics (Dr. CHENG Hok Chuen Tom):** **Lecture:** • Particle decays and conservation laws, relativistic kinematics, selected contemporary topics, particle detectors (at lab visit), and assessment. **Laboratory Activities:** • Experiments with particle detection devices such as cloud chambers and modern particle detectors at the Department of Physics, CUHK.

Date	14, 15, 16 August 2024 (21 hours) *(23 August 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	9:00 am – 12:30 pm and 2:00 pm – 5:30 pm
Venue	The Chinese University of Hong Kong
Enrollment	20 – 30
Expected Applicants	Students who are promoting to or studying S4-S6 with good knowledge in mathematics and physics
Tuition Fee	HKD 3,800.00
Credit	1.5 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*
Grading Methods	

	Certificate	***Assessment***	***Attendance***	***Credit(s)***
Distinction	*Certificate of Distinction*	*Excellent*	*>75%*	*1.5*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*1.5*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2025
Course Outline

CUSA1105 Sidewalk Physicists' Lab
「明辨是非」物理實驗室

Introduction:

The course aims to introduce essential concepts in physics through vivid demonstrations and hands-on STEM activities. Using the style of a famous popular science TV programme, the instructor will present students with stunning science magic and tricks, leading them to enjoy an exciting journey of discovering the principles of physics in mechanics, waves, sound, optics, radiations, solar energy, electromagnetism, gases, aerodynamics, and low-temperature material properties. Hands-on activities will be arranged for students to construct their own STEM toys (e.g., electromagnetic guns), and conduct experiments. The course is suitable for students enthusiastic about learning science, technology and natural phenomena through STEM but without a physics background.

本課程旨在透過生動的演示和實踐 STEM 活動來介紹物理學的基本概念。導師以著名科普電視節目的風格，為學生呈現令人驚嘆的科學魔術和技巧，帶領學生享受一段激動人心的旅程，以探索力學、波動、聲音、光學、輻射、電磁學、氣體、空氣動力學和低溫物料等物理原理。我們將安排學生動手製作自己的 STEM 玩具（例如電磁炮），並進行物理實驗。本課程適合熱衷於透過 STEM 學習科學、技術和自然現象、但沒有物理背景的學生。

Medium of Instruction:

Cantonese supplemented with English
粵語輔以英語

Organising Unit:

Department of Physics, Faculty of Science, CUHK

Teachers:

Dr. TONG Shiu Sing (湯兆昇博士)
Senior Lecturer
Department of Physics, Faculty of Science, CUHK
Rm. 223, 2/F, Science Centre North Block, CUHK
Tel: 3943 6400, E-mail: sstong@phy.cuhk.edu.hk

Course Content:

7 August 2025 (Thursday) 10:00 am – 01:00 pm 02:00 pm – 05:00 pm	**Lecture and demos:** **Motion and the Visible Sound:** Introduce the concepts and applications of motion, waves, sound, and resonance using plastic slinky, sound tubes, signal generators and vibrators, vibrating structures, Chladni plates, and videos of ultra-fast motions. **The Hammer of Thor:** Introduce stunning phenomena of electromagnetism and their applications, such as triboelectricity, testing conductivity, Van der Graaf generator, discharge tubes, lightning, Tesla coils, magnetic field visualizations, electromagnets, and EM induction. **Hands-on Activity:** Make a model of an electromagnetic gun and test it! Crush a can with electromagnetic force!
8 August 2025 (Friday) 10:00 am – 01:00 pm 02:00 pm – 05:00 pm	**Lecture and demos:** **Colourful Lights:** Introduce the basic properties of light, including colour (frequency and wavelength), reflection, retroreflection, refraction, lenses, optical illusions, mirages, visible spectrum, and other optical phenomena. **Beyond the Rainbow:** Visualizing the properties and applications of EM waves, and the energy of invisible radiations such as infrared and ultraviolet, using colourful LEDs, ultraviolet lamps, diffraction grating, fluorescent materials, and thermographic camera. **Hands-on Activity:** Observe the spectra of different light sources using a portable spectrometer **Visit:** **Electron microscopes:** Visit the central laboratory of the Physics Department and learn how electron microscopes enable us to see very small objects and explore the microscopic world
9 August 2025 (Saturday) 10:00 am – 01:00 pm 02:00 pm – 05:00 pm	**Lecture and demos:** **Gone with the Wind:** Introduce the concepts and applications of air pressure, experiments with the vacuum, Bernoulli's principle, the aerodynamics of flying machines and model aeroplanes, fluid pressure, buoyant force, and surface tension. **Ultracool World:** Introduce the properties of gases and materials under cooling, properties of liquid nitrogen, superconductor levitation and their applications. **Discussion and Assessment** Summary of essential ideas and findings, assessment

Date	7, 8, 9 August 2025 (18 hours) *(16 August 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	10:00 am – 1:00 pm & 2:00 pm – 5:00 pm
Venue	The Chinese University of Hong Kong
Enrollment	20 – 30
Expected Applicants	Students who are studying S1 – S3
Tuition Fee	HKD 3,600.00 (including materials for experiments)
Credit	1.25 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*

Grading Methods

	Certificate	*Assessment*	*Attendance*	*Credit(s)*
Distinction	*Certificate of Distinction*	*Excellent*	*>75%*	*1.25*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*1.25*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2025
Course Outline

CUSA1115 Light in Science: From Past to Present
光在過去與現在的科學事跡

Introduction:

This course aims to introduce students to the story of light in human history, both past and present. First, we will start from a historical perspective to understand how humans have explored the properties and nature of light. Then, we will learn about some of the fascinating phenomena of light that opened the doors to relativity and quantum theory. Finally, we will introduce modern technologies related to light, especially lasers and their related applications.

本課程旨在讓同學認識光在人類歷史過去和現在的故事。首先，我們由歷史的角度出發，認識人類如何探索光的特性與本質，然後，我們將認識光的一些奇妙現象如何使人類打開相對論與量子理論的大門。最後，我們將介紹與光有關的現代科技，尤其是激光以及與其相關的應用。

Learning outcomes

1. Gain a foundational understanding of the science and history of light.
2. Acknowledge the significance of light in scientific advancements.
3. Appreciate humanity's efforts to explore the nature of light and develop light-based technologies.
4. Cultivate curiosity and interest in physics.

Medium of Instruction:

Cantonese supplemented with English
粵語輔以英語

Organising Unit:

Department of Physics, Faculty of Science, CUHK

Teachers:

Dr. Yu Hang Marco LAI (賴裕衡博士)
Lecturer
Department of Physics, CUHK
Rm. 216A, Science Centre North Block, CUHK
Tel: 3943 4076, E-mail: yhmlai@phy.cuhk.edu.hk

Course Content:

22 July 2025
(Tuesday)
 	
9:30 am – 12:00 nn
1:30 pm – 4:00 pm
	Lecture 1:
	• Early history on the development on the theories on the nature of light.
	  • particle theory vs wave theory
	  • Young's double slit experiment
	• Early history on the measurement of speed of light.
	Short answer test or exam

24 July 2025
(Thursday)
 	
9:30 am – 12:00 nn
1:30 pm – 4:30 pm
	Lecture 2:
	• Electromagnetism and light
	  • Faraday's electromagnetic induction
	  • Qualitative description of Maxwell's equations and wave equation
	  • Experimental verification of the EM wave nature of light (Hertz's experiment).
	• Light and special relativity
	  • Ether; Michelson-Morley experiment
	  • Constancy of the speed of light in vacuum
	Short answer test or exam

26 July 2025
(Saturday)
 	
9:30 am – 12:00 nn
1:30 pm – 4:30 pm
	Lecture 3:
	• Light and quantum theory
	  • Photoelectric effect
	  • Emission spectra of atoms
	  • (Optional) Basic concepts of photon
	• Light in modern science and technology
	  • Principle of Laser: Qualitative description on absorption, spontaneous emission and stimulated emission. Laser cavity.
	  • Different type of lasers
	  • (Optional) Frontier laser technologies: ultra-short pulses; ultra-intense pulses.
	Short answer test or exam

Date	22, 24, 26 July 2025 (16 hours) *(2 August 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	9:30 am – 12:00 nn & 1:30 pm – 4:00 pm / 4:30 pm
Venue	The Chinese University of Hong Kong
Enrollment	15 – 30
Expected Applicants	Students who are promoting to or studying S3-S5 with good knowledge in mathematics and physics
Tuition Fee	HKD 3,300.00
Credit	1.25 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*
Grading Methods	

	Certificate	***Assessment***	***Attendance***	***Credit(s)***
Distinction	*Certificate of Distinction*	*Excellent*	*>75%*	*1.25*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*1.25*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2025
Course Outline

CUSA1125 Introduction to Cosmology
宇宙學概論

Introduction:

This course is designed for high school students and aims to introduce the fundamental concepts and latest advancements in cosmology. We will explore the origin, composition, and history of the universe, starting with the theory of the Big Bang, allowing students to gain a deeper understanding of the expansion of the universe and its underlying mechanisms.

We will examine the components of the universe, including the intriguing concepts of dark matter and dark energy, and investigate how these mysterious elements shape the structure and evolution of the cosmos. We will also discuss the process of Big Bang nucleosynthesis (BBN) to understand how it explains the formation of light elements. Additionally, the course will cover the discovery of cosmic microwave background radiation (CMB) and its significance, as well as the process of large-scale structure formation, exploring the formation and distribution of galaxies and galaxy clusters in the universe.

We will also introduce important observations in current cosmological research, including how modern telescopes and detectors are used to observe distant galaxies and their characteristics. Ultimately, this course aims not only to equip students with essential knowledge in cosmology but also to ignite their passion for science and cultivate a curiosity for exploring the unknown.

本課程專為高中學生量身打造，旨在介紹宇宙學的基本概念與最新進展。我們將探討宇宙的起源、構成及演化歷史，從宇宙大爆炸理論開始，讓學生深入了解宇宙的膨脹及其背後的機制。

我們將探討宇宙的組成部分，包括引人入勝的暗物質與暗能量概念，並研究這些神秘元素如何塑造宇宙的結構與演變。我們還將討論大爆炸核合成（BBN）的過程，以了解其如何解釋輕元素的形成。此外，課程中將涵蓋宇宙微波背景輻射（CMB）的發現及其重要意義，以及大型結構形成的過程，探討星系和星系團的形成及其在宇宙中的分佈。

我們亦將介紹當前宇宙學研究中的重要觀察，包括如何使用現代望遠鏡和探測器來觀測遙遠的星系及其特性。這門課程不僅希望學生們能夠掌握宇宙學的基本知識，還能激發他們對科學的熱情，培養探索未知的好奇心。

Medium of Instruction:

Cantonese supplemented with English
粵語輔以英語

Organising Unit:

Department of Physics, Faculty of Science, CUHK

Teachers:

Dr. LEUNG Po Kin (梁寶建博士)
Senior Lecturer
Department of Physics, CUHK
Rm. 220, Science Centre North Block, CUHK
Tel: 3943 4078, E-mail: pkleung@cuhk.edu.hk

Demonstrators:

Students from Department of Physics, CUHK

Course Content:

14 July 2025 (Monday) 2:00 pm – 5:30 pm	**Lecture 講課: (3.5 hrs)** • Telescope and astronomical observation 望遠鏡和天文觀測 • Hubble's observation in 1920s 哈勃在 1920 年代的觀測 • Hubble's law 哈勃定理 • The formation of cosmic microwave background 宇宙微波背景輻射的生成 **Assessment 評核:** MC, short questions, etc 選擇題、短題目……
15 July 2025 (Tuesday) 2:00 pm – 5:30 pm	**Lecture 講課: (3.5 hrs)** • Einstein's Theory 愛因斯坦的理論 • The Cosmological Principle 宇宙學原理 • The Cosmological Redshift 宇宙學紅移 • The Geometry of the Universe 宇宙的幾何結構 **Assessment 評核:** MC, short questions, etc 選擇題、短題目……
16 July 2025 (Wednesday) 2:00 pm – 5:30 pm	**Lecture 講課: (3.5 hrs)** • Contents of the universe 宇宙的組成 • Dark matter 暗物質 • Dark energy 暗能量 **Assessment 評核:** MC, short questions, etc 選擇題、短題目……
17 July 2025 (Thursday) 2:00 pm – 5:30 pm	**Lecture 講課: (3.5 hrs)** • Freeze-out of particles 粒子形成 • Big Bang nucleosynthesis 大爆炸核合成 • Cosmic microwave background anisotropies 宇宙微波背景輻射的各向不均勻性 **Assessment 評核:** MC, short questions, etc 選擇題、短題目……
18 July 2025 (Friday) 2:00 pm – 6:00 pm	**Lecture 講課: (4 hrs)** • Large-scale structure formation 大尺度結構生成 • Other development in cosmology 宇宙學的其他發展 **Assessment 評核:** MC, short questions, etc 選擇題、短題目……

Date	14, 15, 16, 17, 18 July 2025 (18 hours) *(19 July 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	2:00 pm – 5:30 pm / 6:00 pm
Venue	The Chinese University of Hong Kong
Enrollment	20 – 30
Expected Applicants	Students who are promoting to or studying S5 – S6
Tuition Fee	HKD 3,600.00
Credit	1.25 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*
Grading Methods	

	Certificate	***Assessment***	***Attendance***	***Credit(s)***
Distinction	*Certificate of Distinction*	*Excellent*	*>75%*	*1.25*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*1.25*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2025
Course Outline

SAYT1006 Risk Management and Actuarial Science
風險管理與精算學

Introduction:

The uncertainty in an event or an activity is known as risk. Risks are encountered in trivial events such as travelling and in professional activities such as business partnership. We take risk every day. This course provides a broad perspective on both current practices and mathematical theories of risk management. Topics include qualitative and quantitative classifications of risks, mathematical modelling of financial markets and derivatives, current financial issues and crises, and statistical analysis of financial data, mathematics of insurance and Actuarial Science. This course is designed for the students who are interested in the scientific and mathematical aspects of risk management, financial market and actuarial science.

任何事件或活動的不確定性皆可視為風險。我們於日常中會遭遇到各項大大小小的風險。小如平日生活之衣食住行、大如商業之投機活動，風險總是伴隨左右。本課程為風險管理的實際應用和數學理論提供廣泛概要。本課程涵蓋範圍包括：風險的質化與量化分類，金融市場與衍生產品的數學建模，現今金融的課題與危機，金融數據的統計分析，保險數學與精算。本課程為有興趣於風險管理，金融市場或精算學之數理概念的同學而設。

Medium of Instruction:

Cantonese supplemented with English
粵語輔以英語

Organising Unit:

Department of Statistics, Faculty of Science, CUHK

Teachers:

Dr. LEUNG Sze Him, Isaac (梁思謙博士)
Lecturer
Department of Statistics, CUHK
Room 120, Lady Shaw Building, CUHK
E-mail: shleung@cuhk.edu.hk

Course Content:

29 July 2025 (Tuesday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture 1: Overview of Risk Management** • Risk and management • Qualitative and quantitative aspects of risks • Random variables • Probability distributions **Computer-lab Session 1: Introduction to R language and data acquisition**
1 August 2025 (Friday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture 2: Measures of risk** • Distribution function and quantile • Value at risk (VaR) • Conditional value at risk (cVaR) **Computer-lab Session 2: Computing various risk measures**
5 August 2025 (Tuesday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture 3: Modelling of Market and Financial Products – Part I** • Stock prices and limit order market • Futures and options as financial derivatives for hedging and leverage • One-step binomial tree • No-arbitrage principle and risk-neutral probability **Computer-lab Session 3: Simulation techniques for pricing derivatives**
8 August 2025 (Friday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture 4: Modelling of Market and Financial Products – Part II** • Vector and matrix operations • Portfolio allocation • Markowitz portfolio theory **Computer-lab Session 4: Hedge fund manager case Study**
12 August 2025 (Tuesday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture 5: Actuarial Science** • Life contingency table • Survival modelling and actuarial theories • Pricing insurance products **Computer-lab Session 5: Evaluation of insurance contracts**

Date	29 July, 1, 5, 8, 12 August 2025 (30 hours) *(15 August 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	9:30 am – 12:30 pm & 2:00 pm – 5:00 pm
Venue	The Chinese University of Hong Kong
Enrollment	30 – 40
Expected Applicants	Students who are promoting to or studying S4 – S6 with good knowledge in mathematics, knowledge in economic is preferable but not necessarily
Tuition Fee	HKD 4,200.00 (Students who have attended all sessions will be granted a HKD 500 scholarship)
Credit	1 University Unit(s) *Students who complete the course and meet its requirement can opt for credit exemption when studying at CUHK.* *This credit can only be used to apply exemption from the 1 credit course **RMSC1101 Elementary Concepts in Risk Management***

Grading Methods

	Certificate	*Assessment*	*Attendance*	*Credit(s)*
A to A-	*Certificate of Distinction*	*Excellent*	*>75%*	*1*
B+ to D	*Certificate of Merit*	*Pass*	*>75%*	*1*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
F	*N/A*	*Fail*	*N/A*	*0*

The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2025
Course Outline

CUSA1026 Statistical Modeling and Big Data Analytics
統計模型及大數據分析

Introduction:

Data from various fields, such as climatology, finance and sports, exhibit different properties. This course aims to use the R-package (a statistical software) to visualize the properties of the data, fit the data into various statistical models, evaluate model performance and perform model predictions. Topics include exploratory data analysis, time series models, hidden Markov models, Poisson process and analysis of big data problems. Students will gain hands-on experience in statistical programming at the computer lab.

各種領域的數據（如氣候學，金融及運動）會展示不同的特質。本課程目標是透過統計軟件 R 去透視數據多方面的特性，從而用適當的統計模型去解釋，評估模型的表現及作出數據預測。本課程涵蓋範圍包括：探索性數據分析，時間序列模型，隱馬爾可夫模型，泊松過程和大數據問題的分析。學生將親身體驗統計程式的編寫。

Medium of Instruction:

Cantonese supplemented with English
粵語輔以英語

Organising Unit:

Department of Statistics, Faculty of Science, CUHK

Teachers:

Dr. LIU, Kin Yat (廖健壹博士)
Lecturer
Department of Statistics, Faculty of Science, CUHK
Room 116, Lady Shaw Building, CUHK
E-mail: kinyatliu@cuhk.edu.hk

Course Content:

25 August 2025 (Monday) 09:00 am – 01:00 pm 02:00 pm – 05:00 pm	**Lecture 1:** • Basics in Statistical Modeling: Random Variables, Probability Distributions • Sports Data: Properties, Poisson Process, Implied Probability and Odds • Exploratory Data Analysis (EDA): Scatter plot, Box plot, Histogram, Quartile-quartile Plot, Correlation and Autocorrelation **Computer Lab Activities 1:** • R programming: The Basics, Sports Data Modeling, EDA **Assessment:** • Data Modeling in R
26 August 2025 (Tuesday) 09:00 am – 01:00 pm 02:00 pm – 05:00 pm	**Lecture 2:** • Climate Data: Properties, Seasonal ARIMA Model, Model Prediction • Financial Data: Properties, Hidden Markov Model, GARCH Model • Monte Carlo Simulation • Big Data Problems and Analysis **Computer Lab Activities 2:** • R programming: Estimation of Time Series Models **Case Discussion and Assessment:** • Data Modeling in R

Date	25, 26 August 2025 (14 hours) *(27 August 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	09:30 am – 01:00 pm & 2:00 pm – 05:30 pm
Venue	The Chinese University of Hong Kong
Enrollment	20 – 30
Expected Applicants	Students who are promoting to or studying S4 – S6
Tuition Fee	HKD 3,200.00
Credit	1 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*

Grading Methods

	Certificate	***Assessment***	***Attendance***	***Credit(s)***
Distinction	*Certificate of Distinction*	*Excellent*	*>75%*	*1*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*1*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2025
Course Outline

CUSA1017 Weather and Climate
天氣與氣候

Introduction:

This course will offer basic understanding of how the weather and climate work and how humans make use of our scientific understanding to perform weather forecasts. Different atmospheric phenomena including cloud formation, land-sea breeze, ocean current, atmospheric jet stream and cyclones will be introduced. Demonstrations and hands-on experiments will be available to facilitate understanding. The interpretation of the phenomena in weather charts and how to understand forecast output from models will also be discussed. Studies of climate starting from the perspectives of the climate of Hong Kong to the scale of global climate change will be covered. Furthermore, the quantitative method of examining an atmosphere-ocean cycle, namely the El Niño Southern Oscillation (ENSO), will allow students to look beyond the usual narrative of the ENSO effect.

本課程將提供對天氣和氣候如何運作的基本了解，以及人類如何利用科學知識進行天氣預報。本課程將介紹不同的大氣現象，包括雲的形成、海陸風、海洋流、大氣急流和氣旋。還將提供示範和實驗以促進理解。本課程也將解釋天氣圖表，如何理解模型的預報結果，並涵蓋從香港氣候到全球氣候的變化，以及厄爾尼諾南方振盪的影響。

Medium of Instruction:

Cantonese supplemented with English
粵語輔以英語

Organising Unit:

Earth and Environmental Sciences Programme (EESC), Faculty of Science, CUHK

Teachers:

Dr. AU-YEUNG Yee Man Andie (歐陽綺雯博士)
Lecturer
Earth and Environmental Sciences Programme, Faculty of Science, CUHK
Room 341, 3/F, Science Centre, CUHK
E-mail: andie.ay@cuhk.edu.hk

Dr. LI Kwan Kit Ronald (李鈞傑博士)
Assistant Lecturer
Earth and Environmental Sciences Programme, Faculty of Science, CUHK
Room 342, 3/F, Science Centre, CUHK
E-mail: kkrli@cuhk.edu.hk

Course Content:

25 August 2025 (Monday) 9:30 am – 12:30 pm 2:30 pm – 4:30 pm	**Atmospheric and Oceanic Phenomena 大氣與海洋現象 (3 hours by Dr. AU-YEUNG)** • Cloud Formation 雲的形成 • Land-sea Breeze 海陸風 • Ekman Spiral 螺旋流 • Ocean Currents 海洋流 • Atmospheric Gravity Wave 大氣波動 **Laboratory Experiments 實驗活動 (2 hours by Dr. LI)** • Visualizing the Coriolis Force 觀看科氏力 ***dress code: avoid wearing dresses or skirts***
26 August 2025 (Tuesday) 9:30 am – 12:30 pm 2:30 pm – 4:30 pm	**Basic Weather Systems and Forecast 基本天氣系統和預報 (3 hours by Dr. AU-YEUNG)** • History of Modern Weather Prediction 現代天氣預報史 • Weather Phenomena in Weather Charts 天氣圖中的天氣現象 a. Fronts 暖鋒和冷鋒 b. Typhoon 颱風 • Understanding Forecast Outputs 如何理解天氣預報 • Assessment of Weather Prediction Performance 天氣預報的性能評估 **Laboratory Experiments 實驗活動 (2 hours by Dr. LI)** • Measuring the Coriolis Deflection in Geophysical Fluid 測量地球物理流體中的科氏偏轉 ***dress code:* avoid wearing light-coloured clothes, or bring an apron, because we shall be using some colour dyes.**
27 August 2025 (Wednesday) 9:30 am – 12:30 pm 2:30 pm – 4:30 pm	**Climate Statistics 氣候統計 (3 hours by Dr. AU-YEUNG)** • Climate of Hong Kong 香港氣候 • Global Warming 全球暖化 • ENSO 厄爾尼諾南方振盪 **Laboratory Experiments 實驗活動 (2 hours by Dr. LI)** Geophysical Fluid Heat Transport and Cyclones 地球物理流體熱傳輸和氣旋 ***dress code:* avoid wearing light-coloured clothes, or bring an apron, because we shall be using some colour dyes.**

Date	25, 26, 27 August 2025 (15 hours) *(29 August 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	9:30 am – 12:30 pm & 2:30 pm – 4:30 pm
Venue	The Chinese University of Hong Kong
Enrollment	20 – 30
Expected Applicants	Students who are promoting to or studying S3 – S6
Tuition Fee	HKD 3,400.00
Credit	1 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*

Grading Methods

	Certificate	*Assessment*	*Attendance*	*Credit(s)*
Distinction	*Certificate of Distinction*	*Excellent*	*>75%*	*1*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*1*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2025
Course Outline

CUSA1027 Environment and Technology
環境與科技

Introduction:

The course aims to develop a broad understanding of current environmental and technology issues, their interrelationship, and their impact on society. A minimal but sufficient treatment of basic scientific and technical knowledge is introduced to prepare students for participation in meaningful discussion of, and dialog on, environmental issues. An important goal is to facilitate understanding of developments, especially as reported in the media, which have an impact on our lives, and thereby facilitate informed participation in civic decision making.

這課程旨在培養學生對當前環境和科技議題、兩者之間的相互關係，以及它們對社會影響的全面理解。課程會以最基本但足夠的方式介紹基礎科學和技術知識，讓學生為參與環境議題的有意義討論和對話作好準備。另一個重要目標是幫助學生理解各種發展趨勢，尤其是媒體報導中對我們生活有影響的議題，從而促進他們在公民決策過程中作出明智的參與。

Medium of Instruction: English supplemented by Cantonese
英語輔以粵語

Organising Unit: Department of Earth and Environmental Sciences (EES), Faculty of Science, CUHK

Teachers:

Dr. LAU Yee Wai Christy (劉議蔚博士)
Lecturer
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Course Content:

4 August 2025
(Monday)
 	
9:30 am – 12:30 pm
2:00 pm – 5:00 pm
	Lecture 1 (By Dr. LAU Yee Wai Christy)
	• Our Environment 我們的環境
	  • Introduction and the solar system
	  • Evolution, genetics and ecology
	• Climate 氣候
	  • Climate
	  • Greenhouse effect and climate change
	
	Exercise and Assignment 1: Our planet Earth
	Case Discussion 1: Gaia hypothesis

5 August 2025
(Tuesday)
 	
9:30 am – 12:30 pm
2:00 pm – 5:00 pm
	Lecture 2 (by Dr. Zhang Li)
	• Environmental Degradation 環境退化
	  • Ocean and water pollution
	• Energy Technology and the Environment 能源科技與環境
	  • Energy and power
	
	Exercise and Assignment 2: Environmental Pollution Analysis
	Lab 2: Water Quality Testing and Analysis
	Case Discussion 2: The Tragedy of the Commons

6 August 2025
(Wednesday)
 	
9:30 am – 12:30 pm
2:00 pm – 5:00 pm
	Lecture 3 (By Dr. LAU Yee Wai Christy)
	• Technology, Lifestyle and the Environment 科技、生活方式與環境
	  • Consumer products and architecture
	• Technology, Food Safety and the Environment 科技、食品安全與環境
	  • Transportation, Food additives, GM organisms
	
	Exercise and Assignment 3: Technology, Consumerism and environment
	Case Discussion 3: Designer baby

Date	4, 5, 6 August 2025 (18 hours) *(7 August 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	9:30 am – 12:30 pm & 2:00 pm – 5:00 pm
Venue	The Chinese University of Hong Kong
Enrollment	30
Expected Applicants	Students who are promoting to or studying S4 – S6
Tuition Fee	HKD 3,600.00
Credit	1.25 Academy Unit(s) *Students can accumulate credits which will be regarded as "Other Learning Experience" when applying University.*
Grading Methods	

	Certificate	*Assessment*	*Attendance*	*Credit(s)*
Distinction	*Certificate of Distinction*	*Excellent*	*>75%*	*1*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*1*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

The Chinese University of Hong Kong
Faculty of Engineering and Faculty of Science
Science Academy for Young Talent

Summer Courses 2025
Course Outline

STEM1060 Sustainable Energy Toward Carbon Neutrality
邁向碳中和的可持續能源

Introduction: The global climate change is a major challenge confronting our generation. It is crucial to identify sustainable energy solutions that effectively reduce carbon emissions and pave the way for an affordable, reliable, and low-carbon future. This course is designed to give students an overview of the following topics: carbon capture and utilisation, energy storage, renewable energy, smart grids, low-carbon power system operation. This course also consists of laboratory sections for students to acquire hands-on experience. After taking this course, students are expected to gain a comprehensive understanding of these topics, enabling them to better contribute to building a sustainable energy future.

全球氣候變化已成為我們時代所面臨的緊迫挑戰。尋求可持續的能源路徑，以顯著減少溫室氣體排放，對於實現一個經濟高效、穩定可靠且低碳的未來至關重要。本課程的目的是向學生們傳授一系列關鍵知識，包括但不限於：碳捕獲與利用、能源儲存技術、可再生能源、智能電網、低碳電力運營。本課程亦包括實驗室課節，讓學生獲得相關的實踐經驗。通過本課程，學生們將能夠全面掌握這些關鍵知識，進而更好地為構建一個可持續的能源未來貢獻自己的力量。

Medium of Instruction: Cantonese supplemented with English
粵語主講及輔以英語

Organising Unit: Department of Mechanical and Automation Engineering, Faculty of Engineering, CUHK
Department of Chemistry, Faculty of Science, CUHK

Teachers:

Professor CHEN Yue (陳玥教授)
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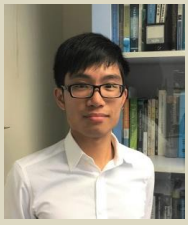

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Course Content:

16 July 2025 (Wednesday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Chemistry Lecture 1 (Dr. Donald Chan):** Environmental challenges: energy and pollution 環境挑戰：能源和污染 **Chemistry Lecture 2 (Dr. Donald Chan):** Carbon capture and utilisation 碳捕獲與利用
17 July 2025 (Thursday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Chemistry Lecture 3 (Dr. Donald Chan):** Chemical energy storage 化學能的儲存 **Chemistry Laboratory 1 (Dr. Donald Chan):** Chemical analysis of battery materials using advanced instruments 電池物料的化學分析
18 July 2025 (Friday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Chemistry Lecture 4 (Dr. Donald Chan):** Green chemistry and advanced technologies for renewable energy 綠色化學和可再生能源的先進技術 **Chemistry Laboratory 2 (Dr. Donald Chan):** Electrochemical synthesis and analysis of fuels 燃料的電化學合成與分析
21 July 2025 (Monday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Engineering Laboratory 1 (Dr. Dongkun Han):** Wind turbine design and test 風力渦輪設計與測試 **Engineering Lecture 1 (Prof. Yue Chen):** Introduction to smart grids 智能電網介紹
22 July 2025 (Tuesday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Engineering Laboratory 2 (Dr. Dongkun Han):** Solar powered car wheel selection and chassis design 太陽能動力汽車輪胎與底盤設計 **Engineering Lecture 2 (Prof. Yue Chen):** Energy storage devices and system 儲能設備與系統
23 July 2025 (Wednesday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Engineering Laboratory 3 (Dr. Dongkun Han):** Solar powered car assembly and design 太陽能動力汽車組裝與設計 **Engineering Lecture 3 (Prof. Yue Chen):** Low-carbon power system 低碳電力系統
24 July 2025 (Thursday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Assessment 1 (AM):** Engineering Project Presentation and demonstration (Solar Powered Car Racing) 項目匯報與展示(太陽能車比賽) **Assessment 2 (PM):** Chemistry

Date	16 – 18, 21 – 24 July 2025 (42 hours) *(25 July 2025 is reserved for class make-up in case there is any cancellation of classes due to bad weather or other unexpected factors.)*
Time	9:30 am – 12:30 pm and 2:00 pm – 5:00 pm
Teaching Mode#	Face-to-Face (The Chinese University of Hong Kong)
Enrollment	25 – 30
Expected Applicants	Students studying S4-S6 or equivalents with Chemistry background
Tuition Fee	HKD 3,500.00 *Students who attend all sessions will be granted a HKD 500 scholarship*
Credit	2 University Unit(s) *Students who complete the course and meet its requirement can opt for credit exemption when studying at CUHK.*
Grading Methods	

	Certificate	***Assessment***	***Attendance***	***Credit(s)***
A to A-	*Certificate of Distinction*	*Excellent*	*>75%*	*2*
B+ to D	*Certificate of Merit*	*Pass*	*>75%*	*2*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
F	*N/A*	*Fail*	*N/A*	*0*