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

Summer Courses 2024
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)
Senior Lecturer
Department of Chemistry, CUHK
Rm. 355, Science Centre South, CUHK
Tel: 3943 8136, Email: kendrewmak@cuhk.edu.hk

Course Content:

29 July 2024 (Monday) 9:30 am – 12:30 pm	**Lecture (1): 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 **Assessment:** Multiple-choice and short-answer questions assignment
31 July 2024 (Wednesday) 9:30 am – 12:30 pm	**Lecture (2): 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 **Assessment:** Multiple-choice and short-answer questions assignment
2 August 2024 (Friday) 9:30 am – 12:30 pm	**Lecture (3): 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 **Assessment:** Multiple-choice and short-answer questions assignment
5 August 2024 (Monday) 9:30 am – 12:30 pm	**Lecture (4): 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 **Assessment:** Multiple-choice and short-answer questions assignment
7 August 2024 (Wednesday) 9:30 am – 12:30 pm	**Lecture (5): 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 **Assessment:** Short-answer test
9 August 2024* (Friday) 9:30 am – 12:30 pm	Make-up class

Date	29, 31 July 2, 5, 7, 9* August 2024 (15 hours)
Time	9:30 am – 12:30 pm
Teaching Mode	Face to Face (The Chinese University of Hong Kong)
Enrollment	30 – 50
Expected Applicants	Students who are promoting to or studying S4 – S6
Tuition Fee	HKD 3,000.00
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*

** This date is reserved for make-up classes in case there is any cancellation of classes due to unexpected circumstances.*

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

Summer Courses 2024
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。

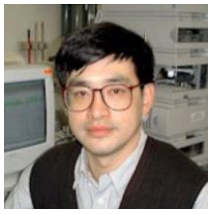
Medium of Instruction:

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:



Dr. CHAN Wing Fat (陳永發博士)
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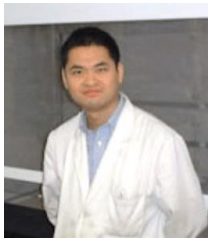

Dr. CHEUNG Yu San (張羽伸博士)
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Dr. MAK Kin Wah Kendrew (麥建華博士)
Senior Lecturer
Department of Chemistry, CUHK
Rm. 355, Science Centre South, CUHK
Tel: 3943 8136, Email: kendrewmak@cuhk.edu.hk

Course Content:

22 July 2024 (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
24 July 2024 (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
26 July 2024 (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
30 July 2024* (Tuesday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	Make-up Class

Date	22, 24, 26, 30* July 2024 (15 hours)
Time	9:30 am – 12:30 pm &/or 2:00 pm – 5:00 pm
Teaching Mode[#]	Face-to-Face (The Chinese University of Hong Kong)
Enrollment	30
Expected Applicants	Students who are studying in S5-S6 (in the academic year 2023-2024)
Tuition Fee	HKD 3,000.00
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*

** This date is reserved for make-up classes in case there is any cancellation of classes due to unexpected circumstances.*

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

Summer Courses 2024
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: Cantonese supplemented with English
粵語輔以英語

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:

19 August 2024 (Monday)	9:30 am – 12:30 pm	**Topic 1:** Introduction to Organic Chemistry (Lecture)
	2:00 pm – 5:00 pm	**Topic 2:** Separation of Mixtures by Column Chromatography (Lab)
20 August 2024 (Tuesday)	9:30 am – 12:30 pm	**Topic 3:** Alkanes and Stereochemistry (Lecture)
	2:00 pm – 5:00 pm	**Topic 4:** Resolution of *trans*-1,2-diaminocyclohexane (Lab)
21 August 2023 (Wednesday)	9:30 am – 12:30 pm	**Topic 5:** Chemistry of Life and Basic Organic Reactions (Lecture)
	2:00 pm – 5:00 pm	**Topic 6:** Amazing Molecules that Changed the World (Special Lecture)
22 August 2023* (Thursday)	Make-up Class	

Date	19, 20, 21, 22* August 2024 (18 hours)
Time	9:30 am – 12:30 pm & 2:00 pm – 5:00 pm
Teaching Mode#	Face-to-Face (The Chinese University of Hong Kong)
Enrollment	30
Expected Applicants	Students who are promoting to or studying S4 – S6
Tuition Fee	HKD 3,380.00
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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The Chinese University of Hong Kong
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Summer Courses 2024
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)
Senior Lecturer
Department of Chemistry, CUHK
Rm. 355, Science Centre South, CUHK
Tel: 3943 8136, Email: kendrewmak@cuhk.edu.hk

Course Content:

15 July 2024 (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
18 July 2024 (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
22 July 2024 (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
25 July 2024 (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
26 July 2024* (Friday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	Make-up Class

Date	15, 18, 22, 25, 26* July 2024 (12 hours)
Time	9:30 am – 12:30 pm
Teaching Mode	Face to Face (The Chinese University of Hong Kong)
Enrollment	20 – 30
Expected Applicants	Students who are studying S1 – S3
Tuition Fee	HKD 2,520.00
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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The Chinese University of Hong Kong
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Summer Courses 2024
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, nuclear reactions, 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、核反應、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

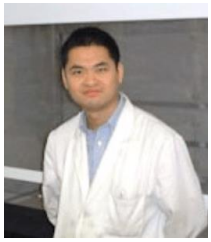
Medium of Instruction:

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:

29 July 2024 (Monday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture:** • "All that glitters is not gold" • The discovery of X-ray • The discovery of radioactivity **Assessment:** • Short-answer exercise
31 July 2024 (Wednesday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture:** • Cold fusion • Noble gases • The father of organic chemistry **Assessment:** • Short-answer exercise
2 August 2024 (Friday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture:** • Polymers **Assessment:** • Short-answer exercise
8 August 2024* (Friday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	Make-up Class

Date	29, 31 July, 2, 8* August 2024 (18 hours)
Time	9:30 am – 12:30 pm & 2:00 pm – 5:00 pm
Teaching Mode#	Face to face (The Chinese University of Hong Kong)
Enrollment	30
Expected Applicants	Students who are studying in S2 – S3 (in the academic year 2023-2024)
Tuition Fee	HKD 3,180.00
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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The Chinese University of Hong Kong
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Summer Courses 2024
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:

Dr. HAU, Chun Kit Sam (侯俊傑博士)
Lecturer
Department of Chemistry, CUHK
Rm. G1564, Science Centre South, CUHK,
Tel: 3943 8135, Email: sckhau@cuhk.edu.hk

Course Content:

15 July 2024 (Monday) 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* **Assessment:** • In Class Worksheet or Online Google Form
17 July 2024 (Wednesday) 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
19 July 2024 (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
22 July 2024* (Monday) 9:00 am – 12:00 nn 2:00 pm – 5:00 pm	Make-up Class

Date	15, 17, 19, 22* July 2024 (18 hours)
Time	9:00 am – 12:00 pm & 2:00 pm – 5:00 pm
Teaching Mode	Face to Face (The Chinese University of Hong Kong)
Enrollment	30 – 40
Expected Applicants	Students who are promoting or studying S3 – S6
Tuition Fee	HKD 3,380.00
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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The Chinese University of Hong Kong
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Summer Courses 2024
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:

5 August 2024 (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
7 August 2023 (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
12 August 2024 (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
14 August 2023 (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
19 August 2024 (Monday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	Make-up Class

Date	5, 7, 12, 14, 19* August 2024 (24 hours)
Time	9:30 am – 12:30 pm & 2:00 pm – 5:00 pm
Teaching Mode	Face to Face (The Chinese University of Hong Kong)
Enrollment	30 – 40
Expected Applicants	Students who are studying S1– S3
Tuition Fee	HKD 3,740.00
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*

** This date is reserved for make-up classes in case there is any cancellation of classes due to unexpected circumstances.*

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

Summer Courses 2024
Course Outline

CUSA1013 Great Discoveries in Biomedical Sciences
生物醫學大發現

Introduction:

This course is the foundation course of CUSA2013 Great Discoveries of Biochemical Sciences (Senior Class), aiming at providing a holistic review of the development of life sciences. The course shall provide Secondary 1 to 3 students with some general understanding of prehistoric life forms, such as prokaryotic cells to more complex organisms ever existed on Earth, followed by the evolution of human beings. Finally, some milestones of the industrial revolution associated to the highlights of modern biomedical sciences shall be covered. Throughout the study of a series of fundamental topics, students are expected to gain some foundation knowledge of life and its evolution; interested students are encouraged to join the senior class to pursue some more in-depth knowledge related to biomedical sciences.

本課程為 CUSA2013 生化科學大發現(高級班)的基礎課程，旨在讓初中生回顧生命科學的發展。課程內容包括一些史前生物的知識，例如原核細胞和其他在地球曾出現過的生物；從而再為同學介紹人類的演化。最後，本課程更將涵蓋工業革命以來的一些重要里程碑以及現代生物醫學的一些前瞻。 通過對一系列特定課題的介紹，同學們將對生命及其演化有更多的理解；此有助鼓勵感興趣的學生再報讀高級班，進而追求生物醫學更深入的科學知識。

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:

13 July 2024 (Saturday) 9:30 am – 1:00 pm	**Lecture:** • Introduction to basic biomolecules, such as genetic materials and enzymes • Evolution of life from prokaryotic cells to multicellular organisms • The stories of Homo sapiens • Industrial revolution and the development of life sciences • Next gen biomedical sciences **Activities:** • In-class discussion
3 August 2024 (Saturday) 9:30 am – 1:00 pm	Make-up Class

Date	13 July, 3* August 2024 (3.5 hours)
Time	9:30 am – 1:00 pm
Teaching Mode	Face to Face (The Chinese University of Hong Kong)
Enrollment	30 – 50
Expected Applicants	Students who are promoting or studying S1 – S3 who are interested in biomedical sciences
Tuition Fee	HKD 1,000.00
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*

** This date is reserved for make-up classes in case there is any cancellation of classes due to unexpected circumstances.*

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

Summer Courses 2024
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)	**CUSA1023B (CLASS B)**	
7 September 2024 (Saturday) 10:00 am – 1:00 pm 2:30 am – 4:30 pm	14 September 2024 (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
7 December 2024* (Saturday) 9:30 am – 12:30 pm 1:30 pm – 3:30 pm	21 December 2024* (Saturday) 9:30 am – 12:30 pm 1:30 pm – 3:30 pm	Make-up Class

Date	CUSA1023A: 7 September, 7* December 2024 (5 hours) CUSA1023B: 14 September, 21* December 2024 (5 hours)
Time	10:00 am – 1:00 pm and 2:30 am – 4:30 pm or 9:30 am – 12:30 pm and 1:30 am – 3:30 pm
Teaching Mode	Face to Face (The Chinese University of Hong Kong)
Enrollment	CUSA1023A: 9 CUSA1023B: 9
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	

	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**

** This date is reserved for make-up classes in case there is any cancellation of classes due to unexpected circumstances.*

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

Summer Courses 2024
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:

31 August 2024 (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
7*, 14* December 2024 (Saturday) 4:00 pm – 6:00 pm	Make-up Class

Date	31 August, 7*, 14* December 2024 (4 hours)
Time	10:00 am – 2:00 pm or 4:00 pm – 6:00 pm
Teaching Mode	Face to Face (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 1,200.00
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**

** This date is reserved for make-up classes in case there is any cancellation of classes due to unexpected circumstances.*

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

Summer Courses 2024
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:

6 August 2024 (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
8 August 2024 (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
13 August 2024 (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
15 August 2024 (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 Gel Electrophoresis for Protein Analysis.
16 August 2024* (Friday) 9:00 am – 12:30 pm 2:00 pm – 5:30 pm	Make up Class

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

Date	6, 8, 13, 15, 16* August 2024 (28 hours)
Time	9:00 am – 12:30 pm & 2:00 pm – 5:30 pm
Teaching Mode	Face to Face (The Chinese University of Hong Kong)
Enrollment	20 – 30
Expected Applicants	Students who are promoting to or studying S2 – S5
Tuition Fee	HKD 3,980.00
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*

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

Summer Courses 2024
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:

13 August 2024 (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
20 August 2024 (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
27 August 2024 (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
29 August 2024* (Thursday) 9:30 am – 12:00 nn 2:00 pm – 4:30 pm	Make up Class

Date	13, 20, 27, 29* August 2024 (15 hours)
Time	9:30 am – 12:00 nn & 2:00 pm – 4:30 pm
Teaching Mode	Face to Face (The Chinese University of Hong Kong)
Enrollment	25 – 30
Expected Applicants	Students who are promoting to or studying S5 – S6
Tuition Fee	HKD 3,000.00
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*

** This date is reserved for make-up classes in case there is any cancellation of classes due to unexpected circumstances.*

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

Summer Courses 2024
Course Outline

CUSA1063 Bioinformatics for secondary school students
生物信息學

Introduction:

In the past decade, high-throughput sequencing (HTS) has revolutionized scientific discoveries and breakthroughs. The sheer volume of sequencing data, consisting of just four nucleotide bases (A, T, G, and C), holds an immense wealth of information yet hidden in plain sight. Bioinformatics has emerged as an indispensable field, playing a pivotal role in managing, processing, and analyzing this vast amount of data. By leveraging computational algorithms and their design, bioinformatics addresses complex problems in biology and related disciplines. Furthermore, the development of pipelines and implementations (tools) is integral to computational biology – a field closely linked with bioinformatics. Together, these disciplines play a crucial role in transforming plain data to valuable biological insights by deciphering the information in nucleotide (DNA or RNA) sequences. While we have yet to realize the full potential of HTS and bioinformatics, their application has been widely and clearly demonstrated during the COVID-19 pandemic. For instance, the epidemiological surveillance of SARS-CoV-2 and the emergence of its variants were made possible with bioinformatics and computational biology – raising public awareness that science is indispensable and has important and practical roles in our society. While bioinformatics can be abstract and conceptual, its understanding and appreciation require practical implementation through dexterity. This course is designed to introduce bioinformatics to secondary school students as a practical science with theories and concepts largely anchored on general biology and chemistry. The concept of sequence alignment will be leveraged as a core component emphasizing on how it can be used to tackle different problems in biology such as mutations and evolution among others. The course will be implemented as lectures supplemented with hands-on drills (pen-and-paper exercise or tool-based exercise) as follow-through to provide concrete demonstrations or illustrations of relevant concepts.

在過去的十年，高通量測序技術（HTS）徹底改變了科學的發現和突破。僅由四個核苷酸鹼基（A、T、G 和 C）組成的大量測序數據蘊藏著巨大的信息，然而這些信息卻隱藏在明顯的視野之中。生物信息學在管理、處理和分析這大量數據方面發揮著關鍵作用，已經成為一個不可或缺的領域。利用計算演算法及其設計，生物信息學解決了生物學和相關學科中的複雜問題。此外，流程的設計和工具的開發對於計算生物學來說至關重要，它是與生物信息學密切相關的一個領域。通過解讀核苷酸（DNA 或 RNA）序列中的信息，這兩個學科共同在將平淡的數據轉化為有價值的生物學見解方面扮演著重要的角色。儘管我們尚未完全實現 HTS 及生物信息學的全部潛力，但在 COVID-19 大流行期間，它們的應用已經得到了廣泛而明確的證明。例如，基於生物信息學和計算生物學的流行病學監測使我們能夠追蹤 SARS-CoV-2 及其變異體的出現，提高公眾對科學的認識，了解科學的不可或缺性及其在社會中扮演重要且實際的角色。雖然生物信息學可能抽象和概念化，但通過靈巧的操作便能理解和欣賞它。本課程旨在向中學生介紹生物信息學，一個將理論和概念主要依托於一般生物學和化學的實用科學。序列比對的概念將作為本課程的核心部分，強調它在解決生物學中的不同問題，如突變和進化等方面的應用。該課程將以講座形式進行，並輔以實際演練，具體演示或說明生物信息學的相關概念。

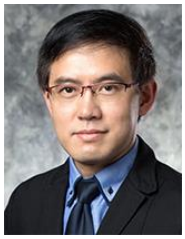
Medium of Instruction:

English supplemented with Cantonese
英語輔以粵語

Organising Unit:

School of Life Sciences, Faculty of Science, CUHK

Teachers:



Professor CHAN Ting Fung
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School of Life Sciences, Faculty of Science, CUHK
Rm 177, Science Centre South Block, CUHK
E-mail: tf.chan@cuhk.edu.hk

Course Content:

13 August 2024 (Tuesday)
 	
10:00 am – 12:30 pm
	Lecture 1
	• Introduction to Genomics and Bioinformatics
	  • DNA Structure and the Canonical Watson-Crick Base Pairing
	  • The Central Dogma of Molecular Biology
	  • Bioinformatics: Computational Analysis of Biological Sequences
	• Research Paradigms: Hypothesis-driven and Data-driven Approach
	Lab 1: Pen-and-paper Exercise: Central Dogma of Molecular Biology
	Case Discussion 1: Exceptions to the Central Dogma of Molecular Biology
	Assessment 1: Short-answer exercise

15 August 2024 (Thursday) 10:00 am – 1:00 pm	**Lecture 2** • Computational Infrastructure: Hardware and Software (Tools) • Biological Databases • Knowledge Discovery in Databases (KDD) • Types of Biological Databases Based on Contents **Lab 2** • Accessing Biological Database/s (NCBI) • Exploring Its Features: Features Most Relevant to Life Sciences • Retrieval of Information: DNA/Protein Sequence/s **Case Discussion 2** • A Specialized Database on SARS-CoV-2 (COVID-19): NCBI Virus DB • Bioinformatics Tools Developed During the Pandemic (Non-exhaustive list): What are the motivations for their design and development? **Web-based teaching 2:** Lab-based/hands-on workshop (*Lab 2*) **Assessment 2:** Short-answer exercise

20 August 2024 (Tuesday)
 	
10:00 am – 1:00 pm
	Lecture 3
	• Sequence Alignment: Pairwise and Multiple Sequence Alignment
	• Applications of Sequence Alignment: Detecting Variations, Types, and Implications
	• Are all variations bad?
	  • How does nature leverage variations?
	  • How does bioinformatics leverage variations?
	Lab 3: Online Sequence Alignment: DNA, DNA-to-Protein Translation
	Case Discussion 3: Special Case of Alignment: Structural Alignment (e.g., proteins)
	Web-based teaching 3: Lab-based/hands-on activity (*Lab 3*)
	Assessment 3: Short-answer exercise

22 August 2024 (Thursday) 10:00 am – 1:00 pm	**Lecture 4:** Phylogenetics and Molecular Evolution and Their Applications **Lab 4** • Pen-and-paper Exercise: Sequence-based Distance and Phylogeny • Using Online Phylogenetics Tool to Infer Phylogeny • Supplemented with *Case Discussion 4* on SARS-CoV-2 Variants **Case Discussion 4:** What are SARS-Cov-2 variants? How did the World Health Organization (WHO) come up with this classification? **Web-based teaching 4:** Lab-based/hands-on activity (*Lab 4*) **Assessment 4:** Short-answer exercise
27 August 2024 (Tuesday) 10:00 am – 12:30 pm	**Lecture 5** • Debriefing and Integration of Concepts • Bioinformatics: Its Past, Present and Future • Q&A
29 August 2024 (Thursday) 10:00 am – 1:00 pm	Make-up Class

Date	13, 15, 20, 22, 27, 29* August 2024 (14 hours)
Time	10:00 am – 12:30 pm/1:00 pm
Teaching Mode	Face-to-Face (The Chinese University of Hong Kong)
Enrolment	25 – 30
Expected Applicants	Students who are advancing to or studying S4 – S6
Tuition Fee	HKD 3,140.00
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*	*Pass*	*>75%*	*1*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*1*
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.**

** This date is reserved for make-up classes in case there is any cancellation of classes due to unexpected circumstances.*

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

Summer Courses 2024
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 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:

19 August 2024 (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
21 August 2024 (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?
23 August 2024 (Friday) 2:00 pm – 5:00 pm	**Lecture:** • The secrets of flying: Principle of animal flight & aerodynamics **Homework:** • Practice flying with a Glider/Pterosaur model
26 August 2024 (Monday) 2:00 pm – 5:00 pm	**Lecture:** • Use of sound by animals • Application of Bionics: art / energy / management **Homework:** • The folding leaves exercise
28 August 2024 (Wednesday) 2:00 pm – 5:00 pm	**Lecture:** • Application of Bionics: health / medicine
30 August 2024 (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"
31 August 2024* (Saturday) 2:00 pm – 5:00 pm	Make-up Class

Date	19, 21, 23, 26, 28, 30, 31* August 2024 (18 hours)
Time	2:00 pm – 5:00 pm
Teaching Mode	Face to Face (The Chinese University of Hong Kong)
Enrollment	20 – 40
Expected applicants	Students who are promoting to or studying S2 – S3
Tuition Fee	HKD 3,180.00
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*

** This date is reserved for make-up classes in case there is any cancellation of classes due to unexpected circumstances.*

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

Summer Courses 2024
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. Being the crater of life on Earth, the ocean is also the crucial factor for maintaining life on Earth. In the history of mankind, the oceans have been admired and greatly respected for its significance in the 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。 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:

16 July 2024 (Tuesday) 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.
18 July 2024 (Thursday) 2:00 pm – 5:30 pm	**Theme 1. Ocean and Man:** 1. Marine resources and their exploitation; 2. Deterioration & conservation of the marine environment.
20 July 2024 (Saturday) 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.
23 July 2024 (Tuesday) 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.
25 July 2024 (Thursday) 2:00 pm – 5:30 pm	**Theme 3. Marine Organisms:** 1. Classification of living organisms; 2. Major types of marine organisms.
27 July 2024 (Saturday) 2:00 pm – 5:30 pm	**Theme 3. Marine Organisms:** 1. Survival, adaptation & evolution of marine organisms; 2. Inspirations from marine organisms.
30 July 2024* (Tuesday) 2:00 pm – 5:30 pm	Make-up Class

Date	16, 18, 20, 23, 25, 27, 30 * July 2024 (21 hours)
Time	2:00 pm – 5:30 pm
Teaching Mode	Face to Face (The Chinese University of Hong Kong)
Enrollment	20 – 40
Expected applicants	Students who are promoting to or studying S4 – S6
Tuition Fee	HKD 3,360.00
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%*	*1.25*
Pass	*Certificate of Merit*	*Pass*	*>75%*	*1.25*
Attended	*Certificate of Attendance*	*Fail*	*>75%*	*0*
Fail	*N/A*	*Fail*	*N/A*	*0*

** This date is reserved for make-up classes in case there is any cancellation of classes due to unexpected circumstances.*

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

Summer Courses 2024
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 electron. A visit to a company in Hong Kong Science and Technology Park will also be included to let students gain hands-on experience on 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，以體驗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:

22 August 2024 (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
23 August 2024 (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
24 August 2024 (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
31* August 2024 (Saturday) 9:00 am – 12:30 pm 2:00 pm – 5:30 pm	Make up Class

Date	22, 23, 24, 31* August 2024 (21 hours)
Time	9:00 am – 12:30 pm & 2:00 pm – 5:30 pm
Teaching Mode	Face to Face (The Chinese University of Hong Kong)
Enrollment	20 – 30
Expected Applicants	Students who are promoting to or studying S4 – S6
Tuition Fee	HKD 3,560.00 (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*

** This date is reserved for make-up classes in case there is any cancellation of classes due to unexpected circumstances.*

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:

23 July 2024 (Tuesday) 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)
25 July 2024 (Thursday) 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
30 July 2024 (Tuesday) 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
1 August 2024* (Thursday) 9:00 am – 12:30 pm 2:00 pm – 5:30 pm	Make up Class

Date	23, 25, 30 July, 1* August 2024 (21 hours)
Time	9:00 am – 12:30 pm & 2:00 pm – 5:30 pm
Teaching Mode	Face to Face (The Chinese University of Hong Kong)
Enrollment	20 – 30
Expected Applicants	Students who are promoting to or studying S4 – S6
Tuition Fee	HKD 3,560.00
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*

** This date is reserved for make-up classes in case there is any cancellation of classes due to unexpected circumstances.*

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

Summer Courses 2024
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:

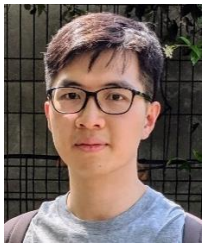
Cantonese supplemented with English
粵語輔以英語

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:

8 August 2024 (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.
9 August 2024 (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.
10 August 2024 (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.
17* August 2024 (Saturday) 9:00 am – 12:30 pm 2:00 pm – 5:30 pm	Make-up class

Date	8, 9, 10, 17* August 2024 (21 hours)
Time	9:00 am – 12:30 pm and 2:00 pm – 5:30 pm
Teaching Mode	Face to Face (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 3,560.00
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*

** This date is reserved for make-up classes in case there is any cancellation of classes due to unexpected circumstances.*

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

Summer Courses 2024
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., telescope and model aeroplanes), and to test their performance. 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（例如望遠鏡和模型飛機），並測試這些玩具的表現。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:

8 August 2024 (Thursday) 10:00 am – 1:00 pm 2:00 pm – 5:00 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, a signal generator and vibrators, vibrating structures, Chladni plates, and videos of ultra-fast motions. **Gone with the Wind:** Introduce the concepts and applications of air pressure, Bernoulli's principle, and the aerodynamics of flying using fluid dynamic toys, demonstrations, and model aeroplanes. **Hands-on Activity:** Make a model aeroplane and verify the principles of aerodynamics you have learned
9 August 2024 (Friday) 10:00 am – 1:00 pm 2:00 pm – 5:00 pm	**Lecture and demos:** **The Hammer of Thor:** Introduce stunning phenomena of electromagnetism and their applications, such as triboelectricity, Van der Graaf generator, EM induction, discharge tubes, lightning and Tesla coils. **Colourful Lights:** Introduce the basic properties of light, including colour (frequency and wavelength), reflection, retroreflection, refraction, lenses and simple optical instruments. **Hands-on Activity:** Make a model telescope and test it **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
10 August 2024 (Saturday) 10:00 am – 1:00 pm 2:00 pm – 5:00 pm	**Lecture and demos:** **Beyond the Rainbow:** Visualizing the properties and applications of EM waves, visible spectrum, optical phenomena, and the energy of invisible radiations such as infrared and ultraviolet, using colourful LEDs, ultraviolet lamps, diffraction grating, fluorescent materials, and a thermographic camera. **Ultracool World:** Introduce the properties of gases and materials under cooling, properties of liquid nitrogen, magnetic levitation and their applications. **Hands-on Activity:** Observe the spectra of different light sources using a portable spectrometer **Discussion and Assessment** Summary of essential ideas and findings, assessment
16* August 2024 (Friday) 10:00 am – 1:00 pm 2:00 pm – 5:00 pm	Makeup Class

Date	8, 9, 10, 16* August 2024 (18 hours)
Time	10:00 am – 1:00 pm & 2:00 pm – 5:00 pm
Teaching Mode	Face to Face (The Chinese University of Hong Kong)
Enrollment	20 – 30
Expected Applicants	Students who are studying S1 – S3
Tuition Fee	HKD 3,560.00 (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*

** This date is reserved for make-up classes in case there is any cancellation of classes due to unexpected circumstances.*

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

Summer Courses 2024
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
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Course Content:

29 July 2024 (Monday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture: Overview of Risk Management** • Risk and management • Qualitative and quantitative aspects of risks • Random variables • Probability distributions **Computer-lab Session: Introduction to R language and data acquisition**
1 August 2024 (Thursday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture: Measures of risk** • Distribution function and quantile • Value at risk (VaR) • Conditional value at risk (cVaR) **Computer-lab Session: Computing various risk measures**
5 August 2024 (Monday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture: 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: Simulation techniques for pricing derivatives**
8 August 2024 (Thursday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture: Modelling of Market and Financial Products – Part II** • Vector and matrix operations • Portfolio allocation • Markowitz portfolio theory **Computer-lab Session: Hedge fund manager case Study**
12 August 2024 (Monday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Lecture: Actuarial Science** • Life contingency table • Survival modelling and actuarial theories • Pricing insurance products **Computer-lab Session: Evaluation of insurance contracts**
15 August 2024* (Thursday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	Make-up Class

Date	29 July, 1, 5, 8, 12, 15* August 2024 (30 hours)
Time	9:30 am – 12:30 pm & 2:00 pm – 5:00 pm
Teaching Mode	Face to Face (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 3,900.00 (Students who have attended all sessions will be granted a HKD 1,000 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*

** This date is reserved for make-up classes in case there is any cancellation of classes due to unexpected circumstances.*

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

Summer Courses 2024
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)
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Course Content:

26 August 2024 (Monday) 9:00 am – 1:00 pm 2:00 pm – 5:00 pm	**Lecture:** • 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:** • R programming: The Basics, Sports Data Modeling, EDA **Assessment:** • Data Modeling in R
27 August 2024 (Tuesday) 9:00 am – 1:00 pm 2:00 pm – 5:00 pm	**Lecture:** • 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:** • R programming: Estimation of Time Series Models **Case Discussion and Assessment:** • Data Modeling in R
28* August 2024 (Wednesday) 9:00 am – 1:00 pm 2:00 pm – 5:00 pm	Make up Class

Date	26, 27, 28* August 2024 (14 hours)
Time	9:30 am – 1:00 pm & 2:00 pm – 5:30 pm
Teaching Mode	Face to Face (The Chinese University of Hong Kong)
Enrollment	20 – 30
Expected Applicants	Students who are promoting to or studying S4 – S6
Tuition Fee	HKD 2,940.00
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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The Chinese University of Hong Kong
Faculty of Science
Science Academy for Young Talent

Summer Courses 2024
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:

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Dr. LI Kwan Kit Ronald (李鈞傑博士)
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Course Content:

26 August 2024 (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)** • The Coriolis Force in Actioin 科氏力的實驗 ***dress code: avoid wearing dresses or skirts***
27 August 2024 (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)** • Jet Stream in a Weather Tank 大氣急流的實驗 ***dress code:* avoid wearing light-coloured clothes, or bring an apron, because we will be using some colour dyes.**
28 August 2024 (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)** Atmospheric Heat Transport and Cyclones in a Weather Tank 大氣熱傳輸和氣旋 ***dress code:* avoid wearing light-coloured clothes, or bring an apron, because we will be using some colour dyes.**
30 August 2024* (Friday) 9:30 am – 12:30 pm 2:30 pm – 4:30 pm	Make up Class

Date	26, 27, 28, 30* August 2024 (15 hours)
Time	9:30 am – 12:30 pm & 2:30 pm – 4:30 pm
Teaching Mode	Face to Face (The Chinese University of Hong Kong)
Enrollment	20 – 30
Expected Applicants	Students who are promoting to or studying S3 – 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*

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

Summer Courses 2024
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 power grids, integrated energy systems, carbon accounting and management. 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、智能電網技術、綜合能源系統和碳排放的核算與管理。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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Dr. HAN Dongkun (韓東昆博士)
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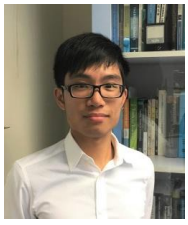

Dr. CHAN Ka Long Donald (陳家朗博士)
Lecturer
Department of Chemistry, CUHK
Rm. G54, Science Centre South, CUHK
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Course Content:

5 August 2024 (Monday) 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
6 August 2024 (Tuesday) 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
7 August 2024 (Wednesday) 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
8 August 2024 (Thursday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Engineering Lecture 1 (Prof. Yue Chen):** Introduction to smart grids 智能電網介紹 **Engineering Laboratory 1 (Dr. Dongkun Han):** Solar cell made by blueberry, and wind turbine testing 藍莓製造的太陽能電池和風力渦輪測試
9 August 2024 (Friday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Engineering Lecture 2 (Prof. Yue Chen):** Integrated energy systems 綜合能源系統 **Engineering Laboratory 2 (Dr. Dongkun Han):** Making a wind propeller with 3D print and laser cut 使用 3D 列印和鐳射切割製作風力渦輪葉片
12 August 2024 (Monday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Engineering Lecture 3 (Prof. Yue Chen):** Carbon accounting and management 碳排放核算與管理 **Engineering Laboratory 3 (Dr. Dongkun Han):** Solar powered car design 太陽能動力汽車設計
13 August 2024 (Tuesday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	**Assessment 1:** Chemistry **Assessment 2:** Engineering Project Presentation and demonstration (Solar Powered Car Racing) 項目匯報與展示(太陽能車比賽)
14 August 2024* (Wednesday) 9:30 am – 12:30 pm 2:00 pm – 5:00 pm	Make-up Class

Date	5 – 9, 12 – 13, 14* August 2024 (42 hours)
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
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*

** This date is reserved for make-up classes in case there is any cancellation of classes due to unexpected circumstances.*

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

Summer Courses 2024
Course Outline

STEM1070 Introduction to Artificial Intelligence
人工智能導論

Introduction: Artificial Intelligence is revolutionizing various industries, from healthcare and finance to transportation and entertainment. This course aims to provide you with a solid foundation in both the mathematical concepts necessary for AI and the practical skills required for machine learning.

We will cover essential mathematical topics such as linear algebra, calculus, and probability theory, exploring how they relate to AI and its algorithms. Once we have established a mathematical and statistical foundations, we will delve into the exciting world of machine learning. You will learn about different types of machine learning algorithms, including supervised and unsupervised learning, and understand how these algorithms can be used to make predictions, recognize patterns, and make intelligent decisions. This course will incorporate hands-on projects and practical exercises. You will have the opportunity to apply your knowledge to real-world problems, working with popular machine learning libraries and tools. By engaging in these practical activities, you will develop valuable skills in data analysis, model development, and evaluation.

人工智能正在革新各個行業，從醫療保健和金融到交通運輸和娛樂。本課程旨在提供人工智能所需的數學概念和機器學習所需的實踐技能的基礎。

本課程涵蓋線性代數、微積分和概率論等基本數學主題，探索它們與人工智能及其算法的關係。在建立了數學和統計基礎之後，我們將深入探索人工智能世界。學習不同類型的機器學習算法，包括監督學習和無監督學習，並了解這些算法如何用於預測、識別模式和做出智能決策。本課程將結合實踐項目和實際練習。應用所學知識於現實世界的問題，並使用流行的機器學習庫和工具進行工作。通過參與這些實踐活動，發展出有價值的數據分析、模型開發和評估技能。

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

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

Teachers:

Prof. LEE Tan (李丹教授)
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Dr. HAN Dongkun (韓東昆博士)
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Dr. LIU, Kin Yat (廖健壹博士)
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E-mail: kinyatliu@cuhk.edu.hk

Course Content:

24 July 2024 (Monday)	9:30 am – 12:30 pm	**Fundamentals of linear algebra for AI: (Dr. Liu)** 1. Scalars, vectors, and matrices 2. Vector operations (addition, subtraction, scalar multiplication) 3. Matrix operations (addition, subtraction, multiplication) 4. Matrix transformations 5. Solving systems of linear equations
	1:30 pm – 4:30 pm	**Lab 1: Linear algebra (Dr. Liu)** 1. Basic data types and operations 2. Variables, loops, and conditionals 3. Input/output and basic functions 4. Introduction to software libraries for linear algebra
25 July 2024 (Monday)	9:30 am – 12:30 pm	**Calculus and Probability in AI: (Dr. Liu)** 1. Differentiation and its role in optimization 2. Partial derivatives and gradients 3. Chain rule 4. Common discrete and continuous random variables 5. Probability mass function (PMF) and probability density function (PDF) 6. Expected value and variance
	1:30 pm – 4:30 pm	**Lab 2: Calculus, Probability and Visualization (Dr. Liu)** 1. Implementing differentiation in Python 2. Solving basic optimization problems using calculus 3. Visualizing functions 4. Generating random samples from distributions 5. Visualizing and analyzing data using probability distributions
26 July 2024 (Monday)	9:30 am – 12:30 pm	**Linear regression: (Dr. Liu)** 1. Simple linear regression 2. Multiple linear regression 3. Model evaluation (R-squared, adjusted R-squared) 4. Assumptions and diagnostics
	1:30 pm – 4:30 pm	**Lab 3: Linear Regression (Dr. Liu)** 1. Implementing linear regression 2. Model evaluation using different metrics 3. Visualization techniques for regression
29 July 2024 (Monday)	9:30 am – 12:30 pm	**Fundamentals of AI (Prof. Lee)** 1. What is AI 2. Basic principles of AI 3. Modern AI technologies
	1:30 pm – 4:30 pm	**Lab 4: Face recognition (Dr. Han)** 1. Familiarize the procedures of face recognition with Machine Learning 2. Investigate a demo code of Face recognition 3. Complete hands-on tasks by studying an open-source project of face recognition

30 July 2024 (Monday)	9:30 am – 12:30 pm	**Basics of Machine Learning (ML) (Prof. Lee)** 1. Vision AI 2. Language AI 3. Sound AI
	1:30 pm – 4:30 pm	**Lab 5: Neural Machine Translation (NMT) (Dr. Han)** 1. Study the procedures to build a NMT model in a toy example 2. Introduce a pre-trained model and learn the procedure of fine-tuning with custom datasets 3. Understand the factors affecting the model performance
31 July 2024 (Monday)	9:30 am – 12:30 pm	**Data in AI (Dr. Han)** 1. Preliminaries of Data 2. Data in the world: Storages, types, and impact 3. Workflow in data analysis 4. Review and conclusion
	1:30 pm – 4:30 pm	**Lab 6: Voice cloning (Dr. Han)** 1. Understand the background and motivation of Text-to-Speech 2. Understand the basic procedure of Text-to-Speech 3. Be aware of different models for Text-to-Speech 4. Try to clone your own voice by using given open-source voice cloning interface
1 August 2024 (Monday)	9:30 am – 12:30 pm	Evaluation through project presentation and project report **(Dr. Liu)**
	1:30 pm – 4:30 pm	Evaluation through project presentation and project report **(Dr. Han)**
2August 2024 (Monday)	9:30 am – 4:30 pm	Make-up class

Date	24 – 26, 29 – 30 July, 1, 2* August 2024 (42 hours)
Time	9:30 am – 12:30 pm & 1:30 pm – 4:30 pm
Teaching Mode	Face to Face (The Chinese University of Hong Kong)
Enrollment	25 – 30
Expected Applicants	Students studying S4-S6 or equivalents
Tuition Fee	HKD 3,500.00
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*

** This date is reserved for make-up classes in case there is any cancellation of classes due to unexpected circumstances.*