The Center for the Development of the Gifted and Talented
香港科技大學資優教育發展中心

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Enrichment Program for Gifted Learners (Summer Program 2023)
優才增益課程 (暑期課程 2023)

Course Introduction 課程簡介

The **"Enrichment Program for Gifted Learners (EPGL)"** offered by the Center for the Development of the Gifted and Talented (CDGT) will be held from July to August 2023 and is now open for application. EPGL offers workshops and short courses in Chemistry, Computer Science, Engineering, Humanities & Arts, Life Science, Mathematics and Physics to students from senior primary to secondary school. The program emphasizes diversified in-class activities that give inspirations, enhance students' thinking skills and expand their creative capacity. Students can also experience the teaching style and learning environment of a university under the guidance of HKUST's faculty and professional instructors.

香港科技大學資優教育發展中心將於 7 月至 8 月份舉辦「優才增益課程 」，現正接受報名。優才增益課程提供工作坊及短期課程，科目涵蓋化學、計算機科學、工程、人文藝術、生命科學、數學及物理等不同範疇，供有興趣的高小至中學學生選讀。課程著重多元化的課堂活動，啟發學生的思考及創意能力，並在科大教授、教員及專業導師的指導下，體驗大學的教學模式和學習環境。

Little Programmer: Introduction to Scratch
小小程式設計師：Scratch 初探

(Course Code 課程編號：D003)

Description 課程簡介 : With the new advances in the artificial intelligence (AI) technology, digital computers are providing an extremely promising future to the humanity in changing the world forever. Those who are youngsters today will be the one living with this revolutionary change.

Scratch is a programming language developed by MIT Media Lab. With drag-n-drop, you can easily create projects with audio and video effects, and share your creations with others. This course will focus on sharpening the basic logical skills required for driving a dumb digital computer into an intelligent "electronic brain". In a relaxed and fun way, instructor will be showing students how constructing logics can drive the general purpose computers. Students will have a glimpse into the logical abilities required for understanding the world of digital intelligence. Through discussions, demonstrations, class exercises and competition, students will solve programming problems and maze challenges.

隨著人工智能科技 的發展，數碼電腦為人類帶來充滿希望的將來，並將永遠改變世界。現在的年青一代將見證這革命性的轉變。

Scratch 是由美國 MIT 開發的可視化計算機編程語言，方便易用的「拖放」界面，可幫助你輕鬆地編寫有動畫聲效的程序，更可以與他人在線分享。本課程主要的學習目標在於讓學生理解數碼智能的邏輯思維及增強他們的邏輯思維能力，導師將以輕鬆有趣的方式指導學生運用編程語言，驅使一台愚蠢的數碼電腦變成有智慧、邏輯思維、和解決問題的能力的「電子腦袋」。透過討論、示範、課堂練習及比賽，學生將會解決編程難題及破解迷宮遊戲。

Instructor 導師 : **Dr. Alex Lam——**Dr. Lam received his Ph.D. degree in Electronic and Computer Engineering from the McGill University of Canada in 2011. Since then he has been teaching at the Department of Computer Science and Engineering of HKUST, teaching various courses at the undergraduate level. He has experience in developing diverse course materials and he enjoys teaching and sharing the joy of learning with his students. He feels that computer programming offers the best platform for the youth to unleash their full logical thinking capability.

林岳博士——於 2011 年在加拿大麥基爾大學電子及計算機工程系取得哲學博士學位。林博士參與不少香港科技大學的教學活動。他非常熱愛教學，享受與同學一起分享學習及思考的樂趣。他深信透過有系統地學習電腦編程，同學能更全面完整地發展他們的邏輯思考能力，為將來的個人發展打下良好基礎。

Date & Time 日期及時間 : **Lectures**
Jul 15, 17, 19, 22 & 24 (Sat, Mon, Wed) 【2:30pm – 5:30pm】

Practice
Jul 26 (Wed) 【2:30pm – 6:00pm】

(In case of bad weather, make-up class may be held on 29 Jul. Please refer to the latest updates by CDGT.)

講課
2023 年 7 月 15、17、19、22 及 24 日（週六、週一、週三）
【下午 2 時 30 分至 5 時 30 分】

編程實踐
2023 年 7 月 26 日（週三）【下午 2 時 30 分至 6 時】

（倘遇惡劣天氣，補堂暫定在 7 月 29 日進行，請留意本中心的最新公布。）

Language 教學語言	:	Cantonese supplemented with simple English (lecture notes in Chinese) 粵語輔以英語（中文課程筆記）
Requirements 修讀條件	:	P.5 – P.6 students with basic computer skills (Scratch experience is not required) 對計算機科學有基本認識的小五或小六學生（無需編程經驗）
Award 獎勵	:	Students who have attained 80% attendance and completed all assessment activities with passing grades will be issued a certificate 學生出席率達 80%，並完成及通過所有評核，將獲頒發證書乙張
Course Fee 費用	:	HKD 3,800 港幣 3,800 元
Remarks 備註	:	(1) All EPGL summer courses will adopt face-to-face mode in 2023. Online mode may be adopted subject to the pandemic latest situation. The course instructor(s) may modify the course contents to facilitate the change of delivery mode if necessary. (1) 本年度的優才增益暑期課程將採用面授教學模式進行。因應疫情發展，網上教學模式或會取代面授模式。如有需要，導師將調整課程內容以配合教學模式的更改。

Blended Learning: Appreciation of Daily Life Mathematics*
混合學習：欣賞現代生活中的數學*

(Course Code 課程編號：M106)

Description 課程簡介 : In this course, we will introduce various important topics of daily life mathematics, via the combination of classroom teaching and online visualization, with the aim of enhancing students' appreciation of the beauty of mathematics, and illustrating how mathematics can be appropriately applied in our daily lives. The connections between these topics with various disciplines, for example computer science, physics and architecture, will also be explored so that interdisciplinary learning can be effectively promoted.

Topics to be covered in this course mainly include the historical advancement of numeral system; applications of geometry in various scientific aspects; the connection of fractal geometry, origami and modern architecture; and topics in combinatorics (counting, probability and graphs), with focus on respective mathematical principles, numerical examples and practical applications.

****The course content is developed based on the "Blended Learning in Mathematics" (EPGL Online Summer Program 2022).***

本課程結合課堂講學及網上學習模式，生動地介紹一些重要的數學課題，使同學們能更深入地欣賞數學之美，並懂得把數學課題融入於日常生活當中。課程亦會探討這些課題與不同領域間的聯繫，包括電腦科學、物理及建築，藉此推廣跨學科學習。

本課程將包括以下課題：數字系統的歷史進程、幾何在不同科學領域的應用、分形幾何與摺紙和現代建築的關係、組合數學的某些課題 (計數、概率及圖)。講課內容主要集中這些課題的數學原理、數值計算及實際應用等方面。

****本課程內容設計及編排，是以「網上學習——數學 」（優才增益課程 ：網上暑期課程 2022）內容為基礎。***

Instructor 導師	:	**Dr. Hugo Mak ──** Dr. Mak obtained his Ph.D. in Mathematics (with Scientific Computation Concentration) at HKUST. He is currently a Visiting Faculty at the Department of Mathematics, HKUST, and a Lecturer at the Department of Mathematics, CUHK. He was a Research Assistant Professor at HKU, with extensive experience in gifted education, course design and supervising students to complete graduation dissertations, and has been awarded numerous university-wide and departmental research and teaching awards. Dr. Mak is also the Programme Coordinator of Mathematics at The Center for the Development of the Gifted and Talented (CDGT), and is passionate in broadening students' horizons through different pedagogical means. His research interests include applied mathematics, remote sensing, data assimilation in atmospheric science, and smart city development. **麥偉樑博士──**麥博士於香港科技大學取得數學哲學博士學位，專注於科學計算。現任香港科技大學數學系訪問教員及香港中文大學數學系講師。他曾任香港大學的研究助理教授，在資優教育、課程設計及指導學生完成畢業論文方面有豐富的經驗，曾獲大學及學系頒發多個研究及教學獎項。麥博士現為資優教育發展中心數學科的統籌，致力以不同教學模式幫助學生擴闊視野。他的研究興趣包括應用數學、衛星遙感、大氣科學的數據同化、以及智慧城市的發展。
Date & Time 日期及時間	:	**<u>Lectures</u>** **Jul 8, 22, Aug 5 & 12 (Sat)** **【Class A: 10:00am – 12:00nn】【Class B: 2:00pm – 4:00pm】** **<u>Self-Online Learning</u>** **Jul 8 to Aug 30** *(In case of bad weather, make-up class(es) may be held on 29 Jul and/or 26 Aug. Please refer to the latest updates by CDGT.)* **<u>講課</u>** **2023 年 7 月 8、22 日、8 月 5 及 12 日（週六）** **【A 班:上午 10 時至中午 12 時】【B 班:下午 2 時至 4 時】** **<u>網上自學</u>** **2023 年 7 月 8 日 至 8 月 30 日** *（倘遇惡劣天氣，補堂暫定在 7 月 29 日及／或 8 月 26 日進行，請留意本中心最新公布。）*
Language 教學語言	:	Cantonese (lecture notes mainly in Chinese; some lecture materials in English with Chinese translation of mathematical terms.) 粵語（課程筆記以中文為主，部分英文課程資料將附有數學詞彙之中文翻譯。）
Requirements 修讀條件	:	P.4 – P.6 students who are interested in mathematics 對數學有興趣的小四至小六學生
Award 獎勵	:	Students who have completed Self-Online Learning activities and assessments with passing grades will be issued a certificate 同學完成網上自學之活動，並通過所有評核，將獲發證書乙張
Course Fee 費用	:	HKD 1,800 港幣 1,800 元
Remarks 備註	:	(1) All EPGL summer courses will adopt face-to-face mode in 2023. Online mode may be adopted subject to the pandemic latest situation. The course instructor(s) may modify the course contents to facilitate the change of delivery mode if necessary. (1) 本年度的優才增益暑期課程將採用面授教學模式進行。因應疫情發展，網上教學模式或會取代面授模式。如有需要，導師將調整課程內容以配合教學模式的更改。

Experiments with Fun: Through Lens and Aperture*
奇趣科學實驗 ：光圈漫遊之旅

(Course Code 課程編號：S101)

Description
課程簡介 ： The essence of STEM is the nurture of scientific thinking. The course aims to provide an inquiry-based learning experience for primary school students through hands-on experiments. Instructors will lead and guide the students through a variety of activities. From preparation to assembling materials, students learn to make their own DIY optical tools and instruments step by step. Through a series of inquiry experiments, students will be guided to explore the underlying scientific knowledge.

The theme of this course is "Light". Interesting optical phenomena and daily-life examples will be shown to raise students' interest and curiosity on the topic. Basic concepts in optics, including characteristics of light transmission, reflection, refraction, as well as their applications will be covered. The small class size (with an instructor-student ratio of 1:5-7) will allow more interactive elements between students and instructors.

****The course content is developed based on the Kids@UST Science Workshop: "Science — Now You See Me" (Apr 2018), "Little Detective: The Thief of Helios" (Dec 2018), and almost identical to the contents of "Experiments with Fun: A Story of Optical Riddles" (Aug 2019 and Aug 2020) and "Experiments with Fun: A tour of Aperture" (Aug, Dec 2021 and Aug 2022).***

培養科學思辨能力，是 STEM 教育的宗旨。本課程會以手作活動和科學探究實驗為主。課堂上，導師將帶領學生組裝材料，一步步製作自己的光學工具及儀器，進行一系列探究實驗，並引領學生逐步探索背後的科學原理和知識。

課程內容以「光」為主題，藉著日常生活中有趣的光學現象，提起學生的興趣及好奇心。學生會認識到一些基本光學概念，包括光的傳播特性、反射、折射和科技應用。本課程將採用小班教學模式（導師與學生比例為 1:5-7），務求令學生和導師在課堂上有更多互動。

****本課程內容設計及編排，是以「小朋友@科大」科學工作坊——「科學：感官」(2018 年 4 月)、「科學小偵探：光影神偷」(2018 年 12 月) 內容為基礎；並與「奇趣科學實驗 — 光影神偷」(2019 年 8 月及 2020 年 8 月) 及「奇趣科學實驗 — 光圈漫遊之旅」(2021 年 8 月, 12 月及 2022 年 8 月) 內容幾乎相同。***

Instructor
導師 ： **"Kids@UST" Undergraduate Student Instructors** —— A team of HKUST undergraduate students who are leading and teaching the Kids@UST Science/Mathematics workshops organized by the Center for the Development of the Gifted and Talented, HKUST. They are of different academic backgrounds (Science, Engineering, Business, etc.), but share the same passion in teaching and STEM education. They also actively take part in teaching STEM classes for different primary schools and education centers. All of them are well-equipped and experienced in leading diversified science activities, and aspire to pursue a career in education in the future.

「小朋友@科大」本科生導師 —— 一群對教學有熱誠及抱負的香港科技大學本科生，現正任教和協助籌劃本中心的「小朋友@科大」科學／數學工作坊。他們來自不同學院（理科、工程、商科等），於課餘時積極參與各小學或坊間教育機構的 STEM 教學工作，累積了和小學生進行多元化科學活動的豐富教學經驗，期盼將來能投身教育工作。

Date & Time
日期及時間 ： **Class A: Aug 7, 8, 10 & 11 (Mon, Tue, Thu & Fri) 【10:30am – 12:45pm】**
Class B: Aug 7, 8, 10 & 11 (Mon, Tue, Thu & Fri) 【2:30pm – 4:45pm】
Class C: Aug 14, 15, 17 & 18 (Mon, Tue, Thu & Fri) 【10:30am – 12:45pm】

In case of bad weather, make-up lesson(s) will be arranged as below:
Class A & B: Aug 16 (Wed) 【Class A: 10:30am – 12:45pm】【Class B: 2:30pm – 4:45pm】
Class C: Aug 21 (Mon) 【10:30am – 12:45pm】

A 班：2023 年 8 月 7、8、10 及 11 日（週一、二、四及五）
【上午 10 時 30 分至下午 12 時 45 分】

B 班：2023 年 8 月 7、8、10 及 11 日（週一、二、四及五）
【下午 2 時 30 分至 4 時 45 分】

C 班：2023 年 8 月 14、15、17 及 18 日（週一、二、四及五）
【上午 10 時 30 分至下午 12 時 45 分】

倘遇惡劣天氣，補課日期及時間如下：
A 班及 B 班：8 月 16 日（週三）【A 班：上午 10 時 30 分至下午 12 時 45 分】
【B 班：下午 2 分 30 分至 4 時 45 分】
C 班：8 月 21 日（週一）【上午 10 時 30 分至下午 12 時 45 分】

****The three classes have identical contents. 三班授課內容相同。***

Language 教學語言	：	Cantonese (lecture notes in Chinese) 粵語（中文課程筆記）
Requirements 修讀條件	：	P.4 – P.6 students who are interested in Science 對科學有興趣的小四至小六學生
Award 獎勵	：	Students with 75% attendance will be issued a certificate 學生出席率達 75%，將獲頒發證書乙張
Course Fee 費用	：	HKD 2,600 (Including a material pack valued at HKD 250) 港幣 2,600 元（學生將獲取價值 250 元之材料包）

Remarks
備註

(1) All EPGL summer courses will adopt face-to-face mode in 2023. Online mode may be adopted subject to the pandemic latest situation. The course instructor(s) may modify the course contents to facilitate the change of delivery mode if necessary.

(2) Students are expected to:
- i) take part in interactive class exercises during face-to-face lessons;
- ii) a material pack will be distributed to students. Students are required to prepare some of the items and stationeries by themselves;
- iii) carry on with self-learning activities with the post-class extension materials provided for the best learning outcome.

(1) 本年度的優才增益暑期課程將採用面授教學模式進行。因應疫情發展，網上教學模式或會取代面授模式。如有需要，導師將調整課程內容以配合教學模式的更改。

(2) 課程將以多元形式進行：
- i) 面授課堂，包括堂上互動學習活動；
- ii) 學生將獲發材料包，亦需自行準備部分材料及文具。
- iii) 善用課程提供的課後延伸活動自學，加強學習成效。

Introduction to Microbiology: Germs or Gems?
基礎微生物學：病菌或寶藏?

(Course Code 課程編號：B201)

Description 課程簡介 : Since microbes are the causative agent of most infectious diseases, the public tends to have a negative impression on them and becomes unaware of their positive role in our society as well as the entire ecosystem. In this course, we will explore the diversity of different microbes, including fungi, protists, archaea, bacteria as well as viruses. We will then look into some disease-causing mechanisms of pathogens, beneficial applications of microbes, as well as the case study of COVID-19.

Apart from online laboratory demonstrations, hands-on practices and virtual experiments will provide precious opportunities for students to gain technical skills related to microbiological analysis of environmental or clinical samples. In addition, in-class discussion and result presentation sessions will allow students to further develop their problem-solving skills as well as communication skills.

由於微生物能導致多種傳染病，大家一直對其有負面印象，從而忽略了它們對人類社會以及整個生態系統的重要性。此課程會引領學生探討各類微生物，包括真菌、原生生物、古菌、細菌及病毒。我們亦會了解一些病原體的致病機制、微生物的正面應用，以及新冠肺炎的詳細分析。

除了網上實驗示範，學生也可透過親身實踐和虛擬實驗所提供的寶貴經驗，學習分析環境或臨床樣本中的微生物。此外，課堂討論和成果展示環節亦會進一步培養學生解決問題的能力和溝通技巧。

Instructor 導師 : **Dr. Amy Li ──** Dr. Li is currently a Teaching Associate in Division of Life Science, HKUST. She received her Ph.D. in Microbiology from McGill University, Canada, and a conference presentation award from American Society for Microbiology. She has over ten research publications in international academic journals and been a reviewer for the journal Environmental Microbiology. Dr. Li has extensive teaching experience in various biology courses at local and overseas universities. She is particularly good at integrating a combination of teaching strategies and class activities to develop students' critical thinking and communication skills, as well as inspire their interest in further study.

李嵐博士──李博士為現任香港科技大學生命科學部教學助理，於加拿大麥基爾大學取得微生物學博士學位及曾獲美國微生物學會的會議報告獎項。她在國際性學術期刊發表過十多份研究報告，亦擔任《環境微生物學》期刊的審稿員。李博士曾於香港及海外數間大學任教不同生物學課程，善於靈活運用多種教學模式及課堂活動去訓練學生的批判性思維和溝通能力，以及啟發他們對深入學習的興趣。

Date & Time 日期及時間 : **Jul 22, 29, Aug 5, 12 & 19 (Sat)**
【Class A: 10:00am – 1:00pm】
【Class B: 3:00pm – 6:00pm】

(In case of bad weather, make-up class may be held on 26 Aug. Please refer to the latest updates by CDGT.)

2023 年 7 月 22、29 日、8 月 5、12 及 19 日（週六）
【Class A:上午 10 時至下午 1 時】
【Class B:下午 3 時至下午 6 時】

（倘遇惡劣天氣，補堂將暫定在 8 月 26 日進行，請留意本中心的最新公布。）

Language 教學語言	:	Cantonese supplemented with English (lecture notes in English) 粵語輔以英語（英文課程筆記）
Requirements 修讀條件	:	Secondary students with genuine interest in Microbiology 對微生物學有興趣的中學生
Award 獎勵	:	Students who have attained 80% attendance and completed all assessment activities with passing grades will be issued a certificate 學生出席率達 80%，並完成及通過所有評核，將獲頒發證書乙張
Course Fee 費用	:	HKD 3,600 (material pack included) 港幣 3,600 元（已包括材料費）
Remarks 備註	:	(1) All EPGL summer courses will adopt face-to-face mode in 2023. Online mode may be adopted subject to the pandemic latest situation. The course instructor(s) may modify the course contents to facilitate the change of delivery mode if necessary. (2) The course will include lectures, demonstrations, hands-on experiment and interactive class activities. For face-to-face mode, most materials will be distributed to students during class, while some materials will be prepared by the students themselves. In case of online lesson, a material pack will be distributed to students before class. (1) 本年度的優才增益暑期課程將採用面授教學模式進行。因應疫情發展，網上教學模式或會取代面授模式。如有需要，導師將調整課程內容以配合教學模式的更改。 (2) 課程設有講課、示範、基礎實驗及互動式課堂活動。如課堂以面授模式進行，學生將於課堂上獲發材料包，並需自行準備部分材料及工具。如課堂以網上模式進行，學生將於開課前獲發材料包。

Look Inside Our Body – Animal Physiology
「解剖」動物生理學

(Course Code 課程編號：B808)

Description 課程簡介	:	In this course, we will use a comparative approach to examine the physiology of selected animal systems (such as the circulatory, nervous and sensory systems) with an emphasis on vertebrates. We will also examine how physiological systems are integrated and thus allow animals to respond in different environments. Moreover, dissection demonstrations will be conducted by the instructor, through which students can observe the structures and feel the textures of various animal organs, including hearts, lungs and eyes. 本課程會以脊椎動物的生理結構為基礎，集中觀察幾個重要的系統，例如循環、神經與感官系統等，進而探討不同物種怎樣透過系統與系統之間的聯繫，去適應不同的生活環境。導師亦會在課堂上示範解剖動物器官（如心臟、肺、眼），讓學生可以第一身觀察器官的結構和感受器官的質感。
Instructor 導師	:	**Dr. Philip Lam——**Dr. Lam received his Ph.D. in Molecular Pharmacology and Toxicology from University of Southern California, USA. He is currently a lecturer at the Division of Life Science, HKUST. He has years of substantial teaching experience. He is familiar with various new pedagogical strategies such as e-learning and blended learning. Dr. Lam believes that it is of utmost importance to provide students with a learning environment that nurtures critical thinking.

林陽博士——林博士畢業於美國南加州大學分子藥理及毒理學，現任香港科技大學生命科學部講師，有多年教學經驗，熟悉各種新穎的教學模式，如網絡化學習和混成學習。林博士重視為學生提供一個可以培養批判性思維的學習環境。

Date & Time 日期及時間 : **Jul 24, 26, 28, 31 & Aug 2 (Mon, Wed, Fri)**
【Class A: 10:00am – 1:00pm】
【Class B: 3:00pm – 6:00pm】

(In case of bad weather, make-up class may be held on 4 Aug. Please refer to the latest updates by CDGT.)

2023 年 7 月 24、26、28、31 及 8 月 2 日（週一、週三及週五）
【Class A:上午 10 時至下午 1 時】
【Class B:下午 3 時至下午 6 時】

（倘遇惡劣天氣，補堂暫定在 8 月 4 日進行，請留意本中心的最新公布。）

Language 教學語言 : Cantonese supplemented with English (lecture notes in English)
粵語輔以英語（英文課程筆記）

Requirements 修讀條件 : Students who have a genuine interest in animal biology
所有對動物生物學有興趣的學生

Award 獎勵 : Students with 80% attendance will be issued a certificate
學生出席率達 80%，將獲頒發證書乙張

Course Fee 費用 : HKD 3,600 (material pack included)
港幣 3,600 元（已包括材料費）

Remarks 備註 :

(1) All EPGL summer courses will adopt face-to-face mode in 2023. Online mode may be adopted subject to the pandemic latest situation. The course instructor(s) may modify the course contents to facilitate the change of delivery mode if necessary.

(2) In case of the change to online mode, students are expected to perform interactive class exercises during the online lessons. A material pack will be distributed to students before the lesson. Students are required to prepare some of the items and small tools by themselves. Details will be announced via email around two weeks before the course commencement.

(1) 本年度的優才增益暑期課程將採用面授教學模式進行。因應疫情發展，網上教學模式或會取代面授模式。如有需要，導師將調整課程內容以配合教學模式的更改。

(2) 若課程以網上形式進行，將設有互動課堂練習。開課前，學生將獲發材料包，亦需自行準備部分材料及小工具。詳情將於開課前約兩星期以電郵通知學生。

Molecular Science of Food and Beverages
飲與食的分子科學

(Course Code 課程編號：C101)

Description 課程簡介 : What is your understanding of food and beverage besides seeing them as delicacies and items for culinary art? What is the magic behind molecular cooking? As simple as a hot cup of tea, the color, taste and aroma are manifests of a collection of scientific knowledge. The concept of chemical synthesis will be introduced in this course. Topics include molecular science of tastes, aromas, carbohydrates and food colorings. Instructor will also introduce the concept of molecular cooking.

Students will learn abstract concepts in molecular science mainly through face-to-face lectures. The experiment and laboratory demonstrations with explanation allow students to understand chemistry concepts of some basic techniques in molecular cooking. Students need to work on a project focusing on a selected topic about food and beverages.

除了美食和廚藝之外，你如何理解食物和飲料？分子烹飪背後的魔法又是什麼？簡單如一杯熱茶的顏色、味道和香氣，背後蘊藏著許多科學知識。本課程將介紹化學合成的概念，主題包括味道、香氣、碳水化合物和食用色素的分子科學。此外，導師亦會介紹分子烹飪的概念。

學生將會通過面授講座學習分子科學中的抽象概念，並且透過實驗及示範了解分子烹飪中某些基本技術的化學概念。學生須就有關食品和飲料的題目進行專題研習。

Instructor 導師 : **Dr. Dennis Chan——**Dr. Chan is an Adjunct Associate Professor in the Department of Chemistry, HKUST. He specializes in organic synthesis of compounds with pharmaceutical potential and application of organometallic reagents in chemical synthesis. He currently teaches a University Common Core course (in science and technology area) and practical chemistry courses in the Department of Chemistry covering various areas of chemistry realm — including organic chemistry, inorganic chemistry, biomolecular chemistry, material chemistry and pure chemistry. He also supervises final year undergraduate students in completing their capstone projects. He has extensive experience in teaching gifted students and has been teaching a variety of courses offered by the Center for the Development of the Gifted and Talented, HKUST since 2007.

Dr. Man Sing CHEUNG——Dr. Cheung is currently an Assistant Manager (Laboratory) in the Department of Chemistry, HKUST. His research area mainly focuses on theoretical organic and organometallic chemistry, with the emphasis on designing catalysts and other useful materials. He is experienced in teaching chemistry to various types of students. He now teaches laboratory courses of general chemistry and synthetic chemistry in the Department of Chemistry and the chemistry courses offered by the Center for the Development of the Gifted and Talented, HKUST.

陳浩懷博士——香港科技大學化學系兼任副教授。他擅長有機化學合成和有機金屬試劑在化學合成中的應用。他目前在化學系任教大學共同核心課程（科學和技術領域）和化學系的實驗課程，涉及化學領域的各個專業—包括有機化學、無機化學、生物分子化學合成和分析、材料化學製備和分析及高級化學合成和分析，還負責監督四年級本科生完成他們的畢業論文。陳博士於資優學生教學方面擁有豐富經驗，自 2007 年起為香港科技大學資優教育發展中心任教多項課程。

張文星博士——現任香港科技大學化學系的實驗室助理經理。他的研究領域主要集中於有機理論及有機金屬化學，著重於設計催化劑和其他有用的材料。張博士對於教導不同類型學生有豐富經驗。他現於化學系教授基礎化學和合成化學的實驗室課程，以及由資優教育發展中心提供的化學課程。

Date & Time 日期及時間 : **Jul 17, 20, 24, 27, 31 & Aug 7* (Mon & Thu)**
【2:00pm – 5:00pm】
**No lesson on Aug 3. Aug 7 will be the day for oral presentation and final exam.*

(In case of bad weather, make-up class may be held on Aug 10. Please refer to the latest updates by CDGT.)

2023 年 7 月 17、20、24、27、31 及 8 月 7 日*（週一及週四）
【下午 2 時至 5 時】
**8 月 3 日不用上課；8 月 7 日會進行口頭匯報及評核。*

（倘遇惡劣天氣，補堂暫定在 8 月 10 日進行，請留意本中心的最新公布。）

Language 教學語言 : English supplemented with Cantonese (lecture notes in English)
英語輔以粵語（英文課程筆記）

Requirements 修讀條件	:	Secondary school students interested in food chemistry. Preferably with basic knowledge in atomic structure, periodic table, ionic and covalent bonds. 對食品化學感興趣的中學生。具有原子結構、元素週期表、離子鍵和共價鍵的基礎知識優先。
Award 獎勵	:	Students who have attained 80% attendance and completed all assessment activities with passing grades will be issued a certificate 學生出席率達 80%，並完成及通過所有評核，將獲頒發證書乙張
Course Fee 費用	:	HKD 4,400 港幣 4,400 元
Remarks 備註	:	(1) All EPGL summer courses will adopt face-to-face mode in 2023. Online mode may be adopted subject to the pandemic latest situation. The course instructor(s) may modify the course contents to facilitate the change of delivery mode if necessary. (1) 本年度的優才增益暑期課程將採用面授教學模式進行。因應疫情發展，網上教學模式或會取代面授模式。如有需要，導師將調整課程內容以配合教學模式的更改。

The Chemical Adventures of Sherlock Holmes: Chemistry in Forensic Science
福爾摩斯的化學歷險記：鑑證科學中的化學原理

(Course Code 課程編號：C105)

Description 課程簡介	:	Public understanding of forensic science is largely based on TV shows, such as CSI (Crime Scene Investigation), which use hi-tech imagery for dramatic effect at the expense of understanding an increasingly important part of the criminal justice process. Dramatic scientific breakthroughs in the past decades, especially the discovery of DNA profiling, have revolutionized forensic science. Evidence can be obtained from microscopic traces of body fluids, drugs, and explosives of sufficient quality for them to play a key role in an investigation or trial. Forensic science is now firmly embedded in the criminal justice agenda because it answers investigative questions better than any other in many cases. This course will introduce students to the theories, techniques, and analytical instruments for forensic science, including the analysis of fingerprints, blood stains, DNA profiling, DNA sequencing, drug chemistry, fibers, etc. Students need to conduct project studies on topics of their interest. In addition, laboratory demonstrations and explanations will be provided so as to allow students to understand how to analyze samples with various instruments in forensic science. 鑑證科學在刑事司法程序的重要性與日俱增，然而公眾的理解主要基於電視節目，例如 CSI（犯罪現場調查），這些節目使用高科技圖像來產生戲劇性的效果，卻忽略解釋背後的科學原理。過去幾十年，科學上有眾多突破性的發展，尤其是發現了 DNA 分析技術，徹底改變了鑑證學。我們可以從體液、藥物和爆炸物等的微量痕跡中獲得足夠及有質量的證據，蛛絲馬跡都會成為調查中的關鍵。鑑證科學現已成為刑事司法議程不可或缺的一環。 本課程將向學生介紹鑑證科學的理論、技術和分析工具，其中包括指紋、血跡分析、DNA 分析、DNA 測序、藥物化學、纖維等的分析。學生可就自己感興趣的題目進行專題研習。此外，課程將提供實驗室演示和解釋，讓學生瞭解如何使用法醫科學儀器分析樣品。

Instructor
導師

: **Dr. Veronica Tse**——Dr. Tse is an Assistant Manager (Laboratory) at the Department of Chemistry, HKUST. She holds a bachelor's degree in Chemistry, a bachelor's degree in Health Science, a master's degree in Analytical Chemistry and a Ph.D. degree in Chinese Medicine. She specializes in analytical chemistry, instrumental analysis, biomolecular analysis and Traditional Chinese Medicine (TCM) research. She has extensive experience in teaching chemistry laboratory courses in various fields, including organic chemistry, inorganic chemistry, biomolecular chemistry and analytical chemistry. She is currently teaching general, synthetic, biomolecular, and pure chemistry laboratory courses at the Department of Chemistry and courses offered by the Center for the Development of the Gifted and Talented, HKUST. She also involves in postgraduate-level laboratory courses.

謝惠佩博士——現任香港科技大學化學系實驗室助理經理，她擁有化學學士學位、健康科學學士學位、分析化學碩士學位和中醫藥博士學位。她擅長分析化學、儀器分析、生物分子分析和中醫藥研究。謝博士擁有豐富的教學經驗，教授不同化學領域的實驗課程，包括有機化學、無機化學、生物分子化學和分析化學。她目前在化學系教授普通化學、合成化學、生物分子化學和纯化學實驗室課程，以及由資優教育發展中心提供的課程。她還參與研究生程度的實驗室課程。

Date & Time
日期及時間

: **【Class A】: Jul 17, 20, 24, 27, 31 & Aug 7* (Mon & Thu)**
【10:00am – 1:00pm】
**No lesson on Aug 3; Aug 7 will be the day for oral presentation with written exam.*

【Class B】: Jul 18, 21, 25, 28, Aug 1 & 8* (Tue & Fri)
【10:00am – 1:00pm】
**No lesson on Aug 4. Aug 8 will be the day for oral presentation and final exam.*

(In case of bad weather, make-up class may be held on Aug 10 for Class A, and Aug 11 for Class B. Please refer to the latest updates by CDGT.)

【A 班】: 2023 年 7 月 17、20、24、27 、31 及 8 月 7 日*（週一及週四）
【上午 10 時至下午 1 時】
**8 月 3 日不用上課；8 月 7 日會進行口頭匯報及評核。*

【B 班】: 2023 年 7 月 18、21、25、28、8 月 1 及 8 日* (週二及週五)
【上午 10 時至下午 1 時】
**8 月 4 日不用上課；8 月 8 日會進行口頭匯報及評核。*

（倘遇惡劣天氣，補堂暫定在（A 班）8 月 10 日／（B 班）8 月 11 日進行，請留意本中心的最新公布。）

Language
教學語言

: English supplemented with Cantonese (lecture notes in English)
英語輔以粵語（英文課程筆記）

Requirements
修讀條件

: Secondary school students interested in the chemistry and techniques used in forensic science
對鑑證科學中使用的化學知識和技術感興趣的中學生

Award
獎勵

: Students who have attained 80% attendance and completed all assessment activities with passing grades will be issued a certificate
學生出席率達 80%，並完成及通過所有評核，將獲頒發證書乙張

Course Fee
費用

: HKD 4,400
港幣 4,400 元

Remarks
備註

: (1) All EPGL summer courses will adopt face-to-face mode in 2023. Online mode may be adopted subject to the pandemic latest situation. The course instructor(s) may modify the course contents to facilitate the change of delivery mode if necessary.

(1) 本年度的優才增益暑期課程將採用面授教學模式進行。因應疫情發展，網上教學模式或會取代面授模式。如有需要，導師將調整課程內容以配合教學模式的更改。

Python for Everyone
Python 編程初探

(Course Code 課程編號：D002)

Description
課程簡介 : The ability to code computer programs is an important part of literacy in today's society. Coding allows you to use computer as a tool to express yourself and realize your creative ideas.

This course is a programming course for everyone, teaching the popular Python programming language. No pre-requisite knowledge in programming is needed. The course introduces programming fundamentals, such as variables and expressions, program control flow with branches and loops, functions, strings, and lists. Via lectures and programming exercises, you will be able to write simple Python programs to solve practical problems. Learning to program is ultimately about learning to think logically and to approach problems methodically. Such abilities can be carried ahead and prepare you for any advanced programming courses in the future.

每個人都可以學習編程！學習寫程式可讓電腦成為你的工具，幫你表達自己實現創意。

本課程是專門為初學者設計的編程課，教授流行的 Python 編程語言，不需任何先修知識。課程將由編程的基礎知識開始，介紹變量和表達式、條件語句、循環、函數、字符串、列表等。透過講課、 編程練習，課程將滲透編程的基本思維，從而幫助學生逐步掌握利用編程解決問題的能力，並強化學生的邏輯思維及分析問題的能力。這些概念適用於任何編程語言，可以幫助你在未來接觸更加深入的高級編程課程。

Instructor
導師 : **Dr. Cecia Chan** —— Dr. Chan is a lecturer at the Department of Computer Science and Engineering, HKUST. She received her Ph.D. from the Chinese University of Hong Kong and joined HKUST in 2012. Dr. Chan has a strong passion in education and has rich experience in teaching students from different backgrounds and at different levels. She teaches computer programming courses for both undergraduate and postgraduate students, including two popular languages, C++ and Python, and fundamental courses on Big Data. Her research interests include information extraction, text mining, machine learning, and knowledge system.

陳祈博士 —— 現任香港科技大學電腦科學及工程學系講師。陳博士畢業於香港中文大學，於 2012 年加入香港科技大學。陳博士熱心教學，並擁有豐富的教學經驗，曾教授來自不同背景及不同程度的學生。陳博士教授多個為大學本科生及研究生而設的程式編寫課程，包括 C++ 及 Python 這兩種常用的編程語言，以及大數據基礎課程。陳博士的研究興趣包括信息提取、文本挖掘、機器學習和知識系統等。

Date & Time
日期及時間 : **Jul 17, 19, 21, 24, 26 & 28 (Mon, Wed & Fri)**
【10:00am – 12:30pm】

(In case of bad weather, make-up class may be held on Jul 31. Please refer to the latest updates by CDGT.)

2023 年 7 月 17、19、21、24、26 及 28 日（週一、週三及週五）
【上午 10 時至下午 12 時 30 分】

（倘遇惡劣天氣，補堂暫定在 7 月 31 日進行，請留意本中心的最新公布。）

Language
教學語言 : English
英語

Requirements
修讀條件 : Students with basic computer skills and interested in computer science and programming
熟悉一般電腦操作，對計算機科學及編程有興趣的學生

Award
獎勵 : Students who have attained 80% attendance and completed programming exercises and projects will be issued a certificate
學生出席率達 80%，並完成編程功課，將獲頒發證書乙張

Course Fee
費用 : HKD 3,400
港幣 3,400 元

Remarks:
備註 : (1) All EPGL summer courses will adopt face-to-face mode in 2023. Online mode may be adopted subject to the pandemic latest situation. The course instructor(s) may modify the course contents to facilitate the change of delivery mode if necessary.

(2) In case of online teaching, students are expected to participate in the programming exercises during online lessons and must download Python (version 3.11.2 or newer version if any) from its official website (https://www.python.org/downloads/) before the course commencement.

(1) 本年度的優才增益暑期課程將採用面授教學模式進行。因應疫情發展，網上教學模式或會取代面授模式。如有需要，導師將調整課程內容以配合教學模式的更改。

(2) 網上教學模式下，學生亦須於網上課堂期間參與編程練習。開課前，請於 Python 官方網頁下載 3.11.2 或最新版本（如有）的軟件 (https://www.python.org/downloads/)。

Python: Beyond the Basics
Python 編程進階

(Course Code 課程編號：D104)

Description
課程簡介 : This course is a continuation of the introductory course “Python for Everyone”. After learning some programming fundamentals of Python, are you ready to proceed to more advanced features and level up your programming skills to solve complex problems?

In this course, you will learn how to utilize functions in different ways to make the code more manageable and flexible. Advanced topics include basic file I/O, creating Graphical User Interface (GUI) using the turtle module, recursive functions (recursion) and introduction to object-oriented programming. Via lectures and programming exercises, you will be able to create an interactive program and visualize your creative ideas with file processing and GUI programming.

本課程是入門課程“Python 編程初探”之延續。學習了編程的基礎知識之後，你準備好進一步探索 Python 編程語言的進階功能並且提升編程技能以解決複雜的問題了嗎？

在本課程中，你將學習如何以不同的方式使用函數令編碼更容易管理和靈活。進階主題包括基本檔案輸入與輸出、運用海龜繪圖組件創建圖形使用者介面、遞歸函數（ 遞回）和物件導向程式編寫簡介。通過講課和編程練習，你可運用文件處理和圖形使用者介面編程，創建互動的程式並實現創意。

Instructor
導師 : **Dr. Cecia Chan ——** Dr. Chan is a lecturer at the Department of Computer Science and Engineering, HKUST. She received her Ph.D. from the Chinese University of Hong Kong and joined HKUST in 2012. Dr. Chan has a strong passion in education and has rich experience in teaching students from different backgrounds and at different levels. She teaches computer programming courses for both undergraduate and postgraduate students, including two popular languages, C++ and Python, and fundamental courses on Big Data. Her research interests include information extraction, text mining, machine learning, and knowledge system.

陳祈博士 —— 現任香港科技大學電腦科學及工程學系講師。陳博士畢業於香港中文大學，於 2012 年加入香港科技大學。陳博士熱心教學，並擁有豐富的教學經驗，曾教授來自不同背景及不同程度的學生。陳博士教授多個為大學本科生及研究生而設的程式編寫課程，包括 C++ 及 Python 這兩種常用的編程語言，以及大數據基礎課程。陳博士的研究興趣包括信息提取、文本挖掘、機器學習和知識系統等。

Date & Time : **Jul 17, 19, 21, 24, 26 & 28 (Mon, Wed & Fri)**
日期及時間 **【2:30pm – 5:00pm】**

(In case of bad weather, make-up class may be held on Jul 31. Please refer to the latest updates by CDGT.)

2023 年 7 月 17、19、21、24、26 及 28 日（週一、週三及週五）
【下午 2 時 30 分至 5 時】

（倘遇惡劣天氣，補堂暫定在 7 月 31 日進行，請留意本中心的最新公布。）

Language : English
教學語言 英語

Requirements : Students who have completed "D002 Python for Everyone" or with basic programming knowledge, such as variables, control flow and functions.
修讀條件 已完成《D002 Python 編程初探》，或具基本編程知識（例如變量、條件語句和函數）的學生。

Award : Students who have attained 80% attendance and completed programming exercises and projects will be issued a certificate
獎勵 學生出席率達 80%，並完成編程功課，將獲頒發證書乙張

Course Fee : HKD 3,400
費用 港幣 3,400 元

Remarks : (1) All EPGL summer courses will adopt face-to-face mode in 2023. Online mode may be adopted subject to the pandemic latest situation. The course instructor(s) may modify the course contents to facilitate the change of delivery mode if necessary.
備註

(2) In case of online teaching, students are expected to participate in the programming exercises during online lessons and must download Python (version 3.11.2 or newer version if any) from its official website (https://www.python.org/downloads/) before the course commencement.

(1) 本年度的優才增益暑期課程將採用面授教學模式進行。因應疫情發展，網上教學模式或會取代面授模式。如有需要，導師將調整課程內容以配合教學模式的更改。

(2) 網上教學模式下，學生亦須於網上課堂期間參與編程練習。開課前，請於 Python 官方網頁下載 3.11.2 或最新版本（如有）的軟件 (https://www.python.org/downloads/)。

Exploration of Engineering
工程學透視

(Course Code 課程編號：E102)

Description
課程簡介 : Engineering plays an important role in the 21st century. It can be divided into different branches, each of which is closely related to our daily life. For instance, engineers have devoted to research and application of renewable energy, thus contributing to a low-carbon future. Various products have been created and developed to meet our needs, making our life more wonderful and convenient. Materials engineering has great influence on our daily living, from the development of construction materials of our homes, to the application of nano-particles in sunscreen products which protect us from UV lights.

This course aims at introducing to students these very important branches of engineering through lectures, demonstrations and discussion sessions. Topics include: 1. The fundamental correlations among processing, structures, properties, and performances of common engineering materials, and the evolution of materials technology. 2. Relation between engineering and innovation, as well as the latest trend of the engineering and technology with the concept problem solving skills for daily-life challenges. 3. An introduction to the relationship between product design and engineering, through examples of pharmaceuticals, beverages, electrical appliances, personal and health care products.

工程學在二十一世紀扮演了非常重要的角色，它可細分為不同領域，每個領域都與現代人生活息息相關。例如，工程學家致力研究及推動可再生能源的應用，為邁向低碳未來作出貢獻；為滿足不同需求，工程學家創造及開發各種產品，讓我們的生活更方便、美好；材料工程學亦大大改善我們的生活，從建築物料到防曬用品，都是這個範疇的科研成果。

本課程將透過課堂講解、示範及討論等教學活動，讓學生對工程學不同範疇有初步認識。課題包括：一、工程材料的工藝、結構、性質及性能的基本關係，以及材料技術由古至今的演化（包括新近發展的 3D 打印技術）；二、工程與創新的關係，以及工程和技術的最新趨勢以及解決日常生活挑戰的概念問題能力；三、以具體實例（如醫藥、飲料、電器及個人護理產品），展示產品設計與工程學的關係，例如產品配方／構造及測試／評估原型。

Instructor
導師 : **Prof. Tao Hong**——Prof. Tao is currently working as an Assistant Professor in the Department of Mechanical and Aerospace Engineering, HKUST. She obtained her Ph.D. degree in Mechanical Engineering at Yale University. She is currently teaching undergraduate courses "Engineering Materials I & II", which have been greatly enriched by her more than 10 years' experiences in both research and market-driven R&D services to multiple industries through governmental and industrial funded projects.

Prof. Marshal Liu——Prof. Liu is currently an Associate Professor of Engineering Education in the Department of Chemical and Biological Engineering, and Associate Director of Center for Engineering Education Innovation, HKUST. Prof. Liu has received numerous teaching awards from different departments, schools and universities, including Distinguished Teaching Award in School of Engineering at HKUST. He was nominated for the UGC Teaching Award 2021. In 2020, he received the prestigious Common Core Teaching Excellence Award for his course Introduction to Food Science and Technology. His research focuses on food processing and product development. In recent years, he has supervised students in founding start-ups and commercializing several products, including biodegradable flocculants, craft beer, long-term antimicrobial hand cream and healthy snacks.

Prof. Robin Ma——Prof. Ma is an Associate Professor of Engineering Education in the Department of Mechanical and Aerospace Engineering (MAE) at HKUST. He is also a Chartered Engineer of Institution of Mechanical Engineers (IMechE), UK. He obtained his Ph.D. in the School of Materials Science and Engineering at the University of New South Wales (UNSW), Sydney. He has been active in engineering education for over 15 years. He has also had an increasing involvement with new approaches to education, including experiential learning,

blended learning and undergraduate research. He believes that this broader contemporary approach is beneficial for students, especially for engineering students preparing for professional careers. He received the School of Engineering Teaching Award and the MSc program Teaching Excellence Appreciation Award in 2015 and 2018, respectively. On the other hand, Prof. Ma is the Director of the Center for Industry Engagement and Internship (IEI) in the School of Engineering (SENG) at HKUST, assisting students to find overseas and local internships and jobs. Prof. Ma is an advisor of two local technology start-up companies.

陶宏教授——陶教授現為香港科技大學機械與航空航天工程學系助理教授。她於美國耶魯大學取得機械工程博士學位。目前，陶教授任教本科生的工程材料 I 和 II 課程，並將超過十年的科研與市場導向的研發經驗注入到教學當中。

劉元帥教授——劉教授現任香港科技大學化學及生物工程系工程教育副教授及工程創新教育中心副總監。劉教授在教學方面深受學生認可，曾在不同大學獲得多項教學大獎，包括香港科技大學工學院卓越教學獎（2015），以及獲香港大學資助委員會傑出教師獎（2021）提名。他教授的*食品科學和技術導論*課程，於 2020 年獲得香港科技大學通識教育傑出教學獎。劉教授目前研究領域包括食品加工以及產品開發等。近年，他指導的學生先後成立數間初創公司，成功開發出不少產品並推出市場，包括生物可降解絮凝劑、精釀啤酒、長效抗菌護手霜、健康零食等。

馬諾宏教授——馬教授現任現任香港科技大學機械及航空航天工程系工程教育副教授，同為英國工程師學會註冊工程師，於澳洲新南威爾斯大學材料及科學工程學系取得博士學位，擁有超過 15 年工程教育的經驗。透過不同的教學方式，例如體驗式學習，混合式學習和本科研究，幫助學生確認自己的興趣。在 2015 及 2018 分別獲得香港科技大學工學院本科卓越教學獎和學分碩士卓越教學獎。馬教授目前同為科大工學院業界交流及實習中心總監，幫助工學院學生尋找海外及本地實習交流機會。現時在香港與學生共同擁有兩間科技創業公司。

Date & Time : **Aug 14, 15, 17, 18, 21 & 22 (Mon, Tue, Thu & Fri)【2:00pm – 4:30pm】**
日期及時間

(In case of bad weather, make-up class may be held on Aug 24. Please refer to the latest updates by CDGT.)

2023 年 8 月 14、15、17、18、21 及 22 日（週一、週二、週四及週五）
【下午 2 時至 4 時 30 分】

（倘遇惡劣天氣，補堂暫定在 8 月 24 日進行，請留意本中心的最新公布。）

Language : English supplemented with Cantonese (lecture notes in English)
教學語言 英語輔以粵語（英文課程筆記）

Requirements : S.1 – S.3 students
修讀條件 中一至中三學生

Award : Students who have attained 80% attendance and completed all assessment activities with passing grades will be issued a certificate
獎勵 學生出席率達 80%，並完成及通過所有評核，將獲頒發證書乙張

Course Fee : HKD 3,400
費用 港幣 3,400 元

Remarks : (1) All EPGL summer courses will adopt face-to-face mode in 2023. Online mode may be adopted subject to the pandemic latest situation. The course instructor(s) may modify the course contents to facilitate the change of delivery mode if necessary.
備註

(1) 本年度的優才增益暑期課程將採用面授教學模式進行。因應疫情發展，網上教學模式或會取代面授模式。如有需要，導師將調整課程內容以配合教學模式的更改。

An Engineering Perspective: Renewable Energies & Energy Conversion
工程視覺：可再生能源及能量轉換

(Course Code 課程編號：E105)

Description 課程簡介 : Energy plays a significant role in both our daily lives and society. Without energy, we would not be able to perform any activities, as simple as cooking meals, taking a hot shower, charging smart devices, to manufacturing, construction, etc. Energy shortage is one of the global challenges in the 21st Century and renewable energies are increasing in-demand as alternative energy solutions. This course will introduce students to different types of renewable energies, such as wind, solar, marine energies, etc. and how these natural resources can be converted into usable forms of energy through energy conversion processes. Students will work as a group and study a variety of energy conversion systems, based on some exciting real-world applications of energy and its transfer. Finally, students will study the efficiencies of different energy conversion processes, and examine their impact on the environment.

能源對我們社會及日常生活十分重要。缺乏能源，許多活動會變得難以進行，小至日常煮食、洗熱水澡、充電；以至製造、生產以及建築等，都會受到影響。能源短缺是廿一世紀全球面臨的挑戰之一。為解決能源危機，世界對再生能源的需求日益增加。本課程將會介紹不同類型的可再生能源，例如風能、太陽能、海洋能等，探討這些自然資源如何透過能量轉換過程化為可供我們利用的再生能源。學生將以小組形式為學習單位，研習多種能量轉換系統、能量及其傳輸的現實應用，並探索不同能量轉換過程之效率，明白它們對環境所帶來的影響。

Instructor 導師 : **Prof. Robin Ma**——Prof. Ma is an Associate Professor of Engineering Education in the Department of Mechanical and Aerospace Engineering (MAE) at HKUST. He is also a Chartered Engineer of Institution of Mechanical Engineers (IMechE), UK. He obtained his Ph.D. in the School of Materials Science and Engineering at the University of New South Wales (UNSW), Sydney. He has been active in engineering education for over 15 years. He has also had an increasing involvement with new approaches to education, including experiential learning, blended learning and undergraduate research. He believes that this broader contemporary approach is beneficial for students, especially for engineering students preparing for professional careers. He received the School of Engineering Teaching Award and the MSc program Teaching Excellence Appreciation Award in 2015 and 2018, respectively. On the other hand, Prof. Ma is the Director of the Center for Industry Engagement and Internship (IEI) in the School of Engineering (SENG) at HKUST, assisting students to find overseas and local internships and jobs. Prof. Ma is an advisor of two local technology start-up companies.

馬諾宏教授——現任香港科技大學機械及航空航天工程系工程教育副教授，同為英國工程師學會註冊工程師，於澳洲新南威爾斯大學材料及科學工程學系取得博士學位，擁有超過 15 年工程教育的經驗。透過不同的教學方式，例如體驗式學習，混合式學習和本科研究，幫助學生確認自己的興趣。在 2015 及 2018 分別獲得香港科技大學工學院本科卓越教學獎和學分碩士卓越教學獎。馬教授目前同為科大工學院業界交流及實習中心總監，幫助工學院學生尋找海外及本地實習交流機會。現時在香港與學生共同擁有兩間科技創業公司。

Date & Time 日期及時間 : **Jul 17, 18, 19, 20, 21 & 24 (Mon to Fri)**
【2:00pm – 4:30pm】

(In case of bad weather, make-up class(es) may be held on Jul 22 and/or Jul 25. Please refer to the latest updates by CDGT.)

2023 年 7 月 17、18、19、20、21 及 24 日（週一至週五）
【下午 2 時至 4 時 30 分】

（倘遇惡劣天氣，補堂暫定在 7 月 22 及／或 25 日進行，請留意本中心的最新公布。）

Language 教學語言	:	English supplemented with Cantonese (lecture notes in English) 英語輔以粵語（英文課程筆記）
Requirements 修讀條件	:	S.4 and above who are interested in Energy and Engineering 對再生能源及工程學有興趣，中四及以上的學生
Award 獎勵	:	Students who have attained 80% attendance and completed all assessment activities with passing grades will be issued a certificate 學生出席率達 80%，並完成及通過所有評核，將獲頒發證書乙張
Course Fee 費用	:	HKD 3,800 港幣 3,800 元
Remarks 備註	:	(1) All EPGL summer courses will adopt face-to-face mode in 2023. Online mode may be adopted subject to the pandemic latest situation. The course instructor(s) may modify the course contents to facilitate the change of delivery mode if necessary. (1) 本年度的優才增益暑期課程將採用面授教學模式進行。因應疫情發展，網上教學模式或會取代面授模式。如有需要，導師將調整課程內容以配合教學模式的更改。

Music Speaks: An Introduction to Composition
會說話的音樂：作曲入門

(Course Code 課程編號：H002)

Description 課程簡介	:	Composition is the process of creating music that expresses your thoughts and emotions. When listening or playing masterpieces by Bach and Mozart, have you ever wondered how classical music works? How did Debussy and Satie convey the beauty of impressionistic style? And why are the tunes and harmony by John Williams and Joe Hisaishi so catchy and enchanting? This course will let students understand some basic principles of classical music and tonal contemporary music, and the elements of writing a beautiful melody and a good harmony. Students will explore the variety of styles and characters of musical writing — fundamental composition techniques that equip young composers to develop their musical ideas into an interesting musical piece. Under guidance, each student will create a unique music piece of their own at the end of the course. 作曲是透過創作音樂來表達思想和情感的過程。你聆聽或演奏巴赫與莫扎特的經典作品時，有否想過古典音樂包含哪些原理？德布西與薩提如何透過音樂表達優美的印象派音樂風格？為何約翰威廉斯與久石讓的旋律與和聲如此引人入勝？ 這個課程讓學生理解古典音樂和有調性的當代音樂之基本原理，導師亦會講解寫作優美旋律及和聲的要素。學生將探索不同音樂風格與寫作技巧，將創作意念變成動人的音樂作品，讓年青作曲家打好音樂創作的基礎。在導師的指導下，學生將於課程中創作屬於自己獨一無二的音樂作品。
Instructor 導師	:	**Dr. Phoebus Lee ——** Dr. Lee graduated from the Chinese University of Hong Kong. He is a composer and educator. His compositions and papers have reached numerous international musical festivals and academic platforms, such as festivals in Hong Kong, Japan, Italy, Israel, Latvia, Shanghai, Singapore, Switzerland, Taiwan. His music covers a wide range of genres including solo, chamber, vocal, choral, orchestral, for moving pictures, and for art gallery. Dr. Lee has extensive experience in music education. He is a part-time lecturer at the Chinese University of Hong Kong and the Education University of Hong Kong, and a teacher at various colleges and schools for HKDSE Music curriculum. He also served as tutor of composition programmes organized by the Hong Kong Composers Guild and Young Composers Workshop

of Hong Kong Arts Festival. He was often invited by the Education Bureau to give workshop, consultation and adjudication service at various composition and creativity programmes.

李家泰博士 —— 李博士畢業於香港中文大學。他熱衷於音樂創作、當代音樂研究、音樂教育及創意推廣。他曾於多個國際音樂節與學術平台發表作品與論文，包括香港、日本、意大利、以色列、拉脫維亞、上海、新加坡、瑞士、台灣的音樂節。作品涵蓋獨奏、室內樂、聲樂、合唱、管弦樂團、影片配樂、畫展委約等。

李博士從事音樂教育多年，現為香港中文大學和香港教育大學兼職講師，同時亦於不同院校教授高中文憑試音樂課程。他曾獲香港作曲家聯會、香港藝術節及教育局等之邀請，於中小學作曲培訓計劃及青年作曲家工作坊擔任導師，為中小學生與老師主持講座，以及為作曲與創藝活動提供諮詢和出席評審。

Date & Time : 日期及時間

Lecture
Jul 15, 17, 19, 22, 24 & 26 (Sat, Mon & Wed)【10:00am – 1:00pm】

Composition Showcase
Aug 2 (Wed) 【10:00am – 12:00nn】

(In case of bad weather, make-up classes may be held on Jul 29 and/or Aug 5. Please refer to the latest updates by CDGT.)

講課
2023 年 7 月 15、17、19、22、24 及 26 日（週六、週一及週三）
【上午 10 時至下午 1 時】

作品展示及分享
2023 年 8 月 2 日（週三）
【上午 10 時至中午 12 時】

（倘遇惡劣天氣，補堂暫定在 7 月 29 日及／或 8 月 5 日進行，請留意本中心的最新公布。）

Language : 教學語言
Cantonese supplemented with English (lecture notes in English)
粵語輔以英語（英文課程筆記）

Requirements : 修讀條件
Secondary students with ABRSM Grade 5 Theory and/or Grade 5 Practical (or equivalent in standard). Students major in Chinese Instrument are also welcome.
考獲皇家音樂學院樂理五級及／或術科五級（或同等程度）的中學生。主修中樂的學生亦可報名。

Award : 獎勵
Students who have attained 80% attendance and completed all assessment activities with passing grades will be issued a certificate
學生出席率達 80%，並完成及通過所有評核，將獲頒發證書乙張

Course Fee : 費用
HKD 4,400
港幣 4,400 元

Remarks : 備註
(1) All EPGL summer courses will adopt face-to-face mode in 2023. Online mode may be adopted subject to the pandemic latest situation. The course instructor(s) may modify the course contents to facilitate the change of delivery mode if necessary.

(2) Students may upload music scores of your own works as one of the supporting documents of application.

(3) **Enrolled students need to prepare your own earphone/headphone with 3.5mm plug for use with computers during lessons.**

(4) In case of online teaching, students need to download the latest version of "Musescore" software from its official website (https://musescore.org/en/download) before course commencement.

(1) 本年度的優才增益暑期課程將採用面授教學模式進行。因應疫情發展，網上教學模式或會取代面授模式。如有需要，導師將調整課程內容以配合教學模式的更改。

(2) 學生可於報名時上傳個人作品之樂譜作為其中一項補充資料。

(3) **獲取錄的學生須自備 3.5mm 的耳機以連接電腦上課。**

(4) 在網上教學模式下，學生須於開課前在 "Musescore" 官方網頁下載最新版本（如有）的軟件 (https://musescore.org/en/download)。

Matrix
矩陣

(Course Code 課程編號：M104)

Description 課程簡介 : Matrix is a foundational machinery for studying advanced mathematics, which arises from solving systems of linear equations. Despite its humble origin, matrix ends up playing a profound role in both pure and applied mathematics, as well as in science and engineering, computer science, statistics, economics, mathematical biology and many other disciplines. Main topics to be covered in this course include systems of linear equations, Gaussian elimination and inverse of a matrix.

矩陣是學習高等數學的一個重要工具，最初用於線性方程組的求解。矩陣看似微不足道，但對於純數學、應用數學、科學、工程、電腦科學、統計學、經濟學、數學生物學的研究均發揮重要貢獻。本課程將以探討下列課題為主：線性方程組、高斯消去法及逆矩陣。

Instructor 導師 : **Dr. Henry Cheng ——** Dr. Cheng is currently teaching in the Department of Mathematics, HKUST. He obtained his Ph.D. in Mathematics at HKUST. He has over 10 years of experience in teaching university level pure mathematics.

鄭錦恒博士——於香港科技大學取得數學哲學博士學位，現任教於香港科技大學數學系。鄭博士教學經驗豐富，教授大學純數學課程超過十年。

Date & Time 日期及時間 : **Jul 24, 27, 31, Aug 3 & 7 (Mon & Thu)**
【2:00pm – 4:30pm】

(In case of bad weather, make-up class may be held on Aug 10. Please refer to the latest updates by CDGT.)

2023 年 7 月 24、27、31 日、 8 月 3 及 7 日（週一及週四）
【下午 2 時至 4 時 30 分】

（倘遇惡劣天氣，補堂暫定在 8 月 10 日進行，請留意本中心的最新公布。）

Language 教學語言 : English
英語

Requirements 修讀條件 : S.1 – S.5 students with some background on algebraic manipulation of symbols
對符號的代數運算有基本認識的中一至中五學生

Award 獎勵 : Students who have attained 80% attendance and completed all assessment activities with passing grade will be issued a certificate
學生出席率達 80%，並完成及通過所有評核，將獲頒發證書乙張

Course Fee 費用 : HKD 2,800
港幣 2,800 元

Remarks 備註 : (1) All EPGL summer courses will adopt face-to-face mode in 2023. Online mode may be adopted subject to the pandemic latest situation. The course instructor(s) may modify the course contents to facilitate the change of delivery mode if necessary.

(1) 本年度的優才增益暑期課程將採用面授教學模式進行。因應疫情發展，網上教學模式或會取代面授模式。如有需要，導師將調整課程內容以配合教學模式的更改。

A Mathematical Introduction to Game Theory
淺談博弈論的數學原理

(Course Code 課程編號：M204)

Description 課程簡介 : Game theory is about the interactions of decision-makers and the study of how their actions are affected by the others. Game theory is not only applied to traditional games, but can also be extended to explain different social science aspects, such as economic, political, or social phenomena.

In this course, we will introduce the fundamental concepts of game theory with various examples. Topics to be covered mainly include basic mathematical formulation of strategic games, Nash equilibrium, dominated action, best response function, and models of oligopoly. Students can learn how to predict when and how individual actions could influence others' decisions, and to maximize one's own benefits.

博弈論是一門關於決策者互動的科學，旨在分析參與者所選擇的策略如何影響其他人的決策。博弈論不只應用於遊戲，亦適用於不同的社會科學領域，例如解釋經濟、政治及社會現象。

本課程會運用不同例子講解最基本的博弈論概念。課題包括策略遊戲中的數學基礎、納殊均衡、支配性策略、均衡策略中的最佳選擇、以及寡占市場的模型。學生能了解如何能影響別人的決策，及如何以適當決策謀取最佳的自身利益。

Instructor 導師 : **Dr. Alan Chu** —— Dr. Chu is currently a lecturer in the Department of Mathematics, Statistics and Insurance of the Hang Seng University of Hong Kong (HSUHK). He received his Ph.D. in Mathematics from HKUST. He has been actively involved in teaching applied mathematics in different aspects at undergraduate level. Course topics include probability and statistics, financial mathematics, mathematics on the battlefield, solving mathematical problems using MATLAB, and applied graph theory.

Dr. Chu has received the HKUST Din-Yu Hsieh Teaching Award in 2019. His current research areas include the level set method, image processing, and numerical solution of Partial Differential Equations (PDEs).

朱冠麟博士——現任香港恒生大學數學、統計及保險學系講師。朱博士於香港科技大學數學系取得博士學位。他積極參與教學，擅長教授本科生有關不同領域上的應用數學原理。朱博士教授的課程主題包括概率與統計、金融數學、 戰場上的數學理論、運用數學軟件 MATLAB 解決生活上的問題，及應用圖論等等。

朱博士於 2019 年獲得香港科技大學謝定裕教學獎項。他目前的研究領域包括水平集方法、圖像處理及偏微分方程中的數值解。

Date & Time
日期及時間 : **Aug 16, 18, 21, 23, 25 & 28 (Wed, Fri & Mon)**
【10:00am – 1:00pm】

(In case of bad weather, make-up class may be held on Aug 30. Please refer to the latest updates by CDGT.)

2023 年 8 月 16、18、21、23、25 及 28 日（週三、週五及週一）
【上午 10 時至下午 1 時】

（倘遇惡劣天氣，補堂暫定在 8 月 30 日進行，請留意本中心的最新公布。）

Language
教學語言 : Cantonese (lecture notes in English)
粵語（英文課程筆記）

Requirements
修讀條件 : S3 or above with interest in advanced topics in Mathematic
對進階數學課題有興趣之中三或以上學生

Award
獎勵 : Students who have attained 80% attendance and completed all assessment activities with passing grade will be issued a certificate
學生出席率達 80%，並完成及通過所有評核，將獲頒發證書乙張

Course Fee
費用 : HKD 4,000
港幣 4,000 元

Remarks
備註 : (1) All EPGL summer courses will adopt face-to-face mode in 2023. Online mode may be adopted subject to the pandemic latest situation. The course instructor(s) may modify the course contents to facilitate the change of delivery mode if necessary.

(1) 本年度的優才增益暑期課程將採用面授教學模式進行。除非疫情發展並不許可，網上教學模式或會取代面授模式。如有需要，導師將調整課程內容以配合教學模式的更改。

Nobel Prizes in Physics that Shaped Our World
影響世界的諾貝爾物理學獎

(Course Code 課程編號：P103)

Description
課程簡介 : The Nobel Prize in Physics may sound somewhat strange to the general public, yet the discoveries and inventions awarded have brought about far-reaching impact on our daily lives. In this course, the selected Nobel Prizes in Physics are categorized into several fields — solid state physics, quantum physics, nuclear physics, particle physics, astrophysics, etc. The underlying concepts, theories and experiments involved will be introduced and explained in layman's terms. We hope that students would be inspired by the wonders of physics, and could also recognize how physics has changed the perspective we perceive our world and even the universe.

對於普羅大眾而言，「諾貝爾物理學獎」或許有點陌生。然而，這些獲獎的發現與發明卻為我們的日常生活帶來深遠的影響。本課程挑選了部分「諾貝爾物理學獎」項目，並將之歸納為以下範疇：固態物理、量子物理、核子物理、粒子物理、天體物理等，以深入淺出的方式來闡明當中所涉及的概念、理論和實驗。我們希望學生能夠從這些獎項所引發的奇跡中得到啟發，並認識到物理學是如何改變我們對世界，乃至宇宙的認知。

Instructor 導師	:	**Dr. Nidhi Pant ──** a Lecturer at the Department of Physics, HKUST. She received her Ph.D. in Cosmology. Before joining HKUST, she worked as a research associate at The Chinese University of Hong Kong (2021-2022). She also worked as a Claude Leon and SKA postdoctoral fellow at the University of the Western Cape, Cape Town and postdoctoral researcher at Inter University center for Astronomy and Astrophysics (IUCAA) in Pune, India. At HKUST, she has been teaching undergraduate (common core) and post graduate courses. She has been actively involved in outreach activities since the beginning of her career. She firmly believes that STEM education empowers learners to explore new academic opportunities and take control of their education. **Dr. Nidhi Pant ──** 香港科技大學物理學講師，持有宇宙學博士學位。她曾於南非開普敦的西開普大學，以及印度的薩維特里巴伊菲勒普納大學的聯校天文學和天體物理學中心，擔任博士後研究工作。在 2021 至 2022 年間，她於香港中文大學任職研究人員。其後，她加入香港科技大學，教授本科生的核心課程及研究生課程。Dr. Pant 自投身教育行業起已積極參與外展活動，深信 STEM 教育能讓學生培養自主學習，在學術領域中探索更多的機會及可能性。
Date & Time 日期及時間	:	**Aug 1, 3, 5, 8, 10 & 12 (Tue, Thu, Sat)【2:00pm – 4:30pm】** *(In case of bad weather, make-up class may be held on Aug 17. Please refer to the latest updates by CDGT.)* **2023 年 8 月 1、3、5、8、10 及 12 日（週二、週四及週六）** **【下午 2 時至 4 時 30 分】** *（倘遇惡劣天氣，補堂暫定在 8 月 17 日進行，請留意本中心的最新公布。）*
Language 教學語言	:	English (Lecture notes in English) 全英語（英文筆記）
Requirements 修讀條件	:	S.1 – S.3 students who are interested in physics 對物理學有興趣的中一至中三學生
Award 獎勵	:	Students who have attained 80% attendance and completed all assessment activities with passing grades will be issued a certificate 學生出席率達 80%，並完成及通過所有評核，將獲頒發證書乙張
Course Fee 費用	:	HKD 3,400 港幣 3,400 元
Remarks 備註	:	(1) All EPGL summer courses will adopt face-to-face mode in 2023. Online mode may be adopted subject to the pandemic latest situation. The course instructor(s) may modify the course contents to facilitate the change of delivery mode if necessary. (1) 本年度的優才增益暑期課程將採用面授教學模式進行。因應疫情發展，網上教學模式或會取代面授模式。如有需要，導師將調整課程內容以配合教學模式的更改。

An Evolution – From Classical to Modern Physics
物理學之進化：由古典到現代物理

(Course Code 課程編號：P104)

Description 課程簡介	:	The understanding of the Nature was challenged by a number of experiments performed in the late 19th century to early 20th century. To explain the outcome of these experiments and uncover the rules of the Nature, modern physics was invented. Notable branches of modern physics include relativity and quantum mechanics. Surprisingly, the rules of modern physics seem counter-intuitive. This course will introduce the development of modern physics. Through lectures and demonstrations, instructor will explain why classical physics is not sufficient to explain the Nature and introduce the concepts of modern physics, which includes the time dilation, length contraction, the distortion of space-time, the quanta of light, the Bohr model of atom, and the wave properties of particles. 十九世紀後期至二十世紀初，物理學家進行了許多實驗，實驗結果挑戰人類對大自然原有的理解。為了解釋這些實驗結果和揭示大自然的規律，物理學家發明了現代物理學，包括相對論和量子力學。出乎意料地，這些現代物理的規則與人們的預期相反。 本課程將介紹現代物理學的發展。透過講課及示範，導師將解釋為什麼古典物理學不足以解釋大自然現象和規律，並介紹多種現代物理學的概念，包括時間膨脹、長度收縮、時空變形、光量子、原子的玻爾模型和粒子的波動性。
Instructor 導師	:	**Dr. Choy Ting Pong ——** Dr. Choy is currently a Research Associate in the Department of Physics, HKUST. He has been very actively involved in physics education at different levels and is also the coach of the Hong Kong team for the International Physics Olympiad. **蔡定邦博士——**蔡博士現為香港科技大學物理系研究員，他非常積極地參與不同程度的物理教育工作，並擔任國際物理奧林匹克香港隊的教練。
Date & Time 日期及時間	:	**Jul 24, 26, 28, 31, Aug 2 & 4 (Mon, Wed & Fri)** **【10:00am – 12:30pm】** *(In case of bad weather, make-up class may be held on Aug 7. Please refer to the latest updates by CDGT.)* **2023 年 7 月 24、26、28、31 日、8 月 2 及 4 日（週一、週三及週五）** **【上午 10 時至下午 12 時 30 分】** *（倘遇惡劣天氣，補堂暫定在 8 月 7 日進行，請留意本中心的最新公布。）*
Language 教學語言	:	English supplemented with Cantonese (lecture notes in English) 英語輔以粵語（英文課程筆記）
Requirements 修讀條件	:	Secondary students with basic mathematical skills (trigonometry) and interested in physics. Knowledge in calculus is not required. 具有基本數學能力（三角幾何學）並對物理感興趣的中學生。同學不需具備微積分知識。
Award 獎勵	:	Students who have attained 80% attendance and completed all assessment activities with passing grades will be issued a certificate 學生出席率達 80%，並完成及通過所有評核，將獲頒發證書乙張
Course Fee 費用	:	HKD 3,400 港幣 3,400 元

Remarks 備註 : (1) All EPGL summer courses will adopt face-to-face mode in 2023. Online mode may be adopted subject to the pandemic latest situation. The course instructor(s) may modify the course contents to facilitate the change of delivery mode if necessary.

(2) Students should have a HKEAA permitted calculator for in-class exercises and assessment. Please click HERE for the list of permitted calculators.

(1) 本年度的優才增益暑期課程將採用面授教學模式進行。因應疫情發展，網上教學模式或會取代面授模式。如有需要，導師將調整課程內容以配合教學模式的更改。

(2) 進行課堂練習及評核時，學生需使用香港考試及評核局認可的計算機。請按此瀏覽獲認可的計算機清單。

Enquiry 查詢
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