澳門科技大學
MACAU UNIVERSITY OF SCIENCE AND TECHNOLOGY

HIGHER EDUCATION SEAMLESSLY INTEGRATED INTO OUR LIVES

FACULTY OF INNOVATION ENGINEERING

創新工程學院

Faculty of Innovation Engineering
創新工程學院

FIE

The Strategic Plan of Macau University of Science and Technology (M.U.S.T.) lays out an ambitious blueprint for the University's development objectives and priorities in the five-year period 2021-2025. It particularly calls for further strengthening of the engineering disciplines and stipulates more coherent academic planning and development of areas of excellence.

We live in a time when innovation and technological development take place at an increasingly fast pace. To prepare and cultivate future engineering talents and leaders who can succeed and thrive in such a challenging time, educators worldwide have come to the consensus that the academic approach to engineering disciplines and interdisciplinary collaborations is in need of a fundamental rethinking and strategizing. This is what inspires the University to undertake the initiative of creating Faculty of Innovation Engineering (FIE).

Innovation Engineering is about creating scientific and technological breakthroughs based on fundamental, applied and multi-disciplinary research. Innovation – a key driver of a knowledge economy – is also about an entrepreneurial mindset to explore the unknown, to imagine the unthinkable, to make use of emerging technologies and novel multi-disciplinary approaches and business models to tackle grand challenges, and to create social and economic value.

The decision to establish FIE is based on extensive deliberation by the University leadership, substantial consultation with stakeholders, careful examination of similar initiatives from universities and research institutes worldwide, and positive feedbacks from high-tech leaders. The official unveiling will take place on March 27, 2022.

The establishment of FIE brings strong but detached research clusters into a single unified structure and organization, integrates and consolidates resources for engineering disciplines, creates fertile grounds and opportunities for inter-disciplinary ideas to flourish and come to fruition, and is conducive to the internationalization effort.

The FIE will consist of the following academic units: School of Computer Science and Engineering, Department of Engineering Science, Department of Materials Science and Engineering, and Department of Environmental Science and Engineering. In addition, FIE is academic home to the following research institutes: Macao Institute of Systems Engineering; Macao Environmental Research Institute; Macao Institute of Materials Science and Engineering; Macao Institute of Smart City; International Institute of Next Generation Internet; Open Intelligent Electric Vehicles Research Center (OIEV-RC); Joint Laboratory on Medical Robotics Innovations; and Macao Centre for Mathematical Sciences. The organization structure facilitates cross-disciplinary collaboration with other units including the Faculty of Medicine, the State Key Laboratory of Quality Research in Chinese Medicine, the Dr. Neher's Biophysics Laboratory for Innovative Drug Discovery, the State Key Laboratory of Lunar and Planetary Sciences, the National Research Station of Coastal Ecological Environments in Macao and the Key Laboratory of River Basin Digital Twinning of Ministry of Water Resources.

SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

School of Computer Science and Engineering (Former Faculty of Information Technology) is one of the first four faculties established in the newly founded Macau University of Science and Technology in 2000. It offers a comprehensive suite of degrees: Bachelor of Science, Master of Science, and Doctor of Philosophy degrees. Currently, the Faculty offers three majors in the Bachelor of Science degree: (1) Computer Science, (2) Electronic and Information Engineering, and (3) Software Engineering. There are two Master's degree programs in the Faculty: Master of Science degree which includes three focus areas: (1) Computer and Information Systems, (2) Communication Engineering, and (3) Space Information Technology; and Master of Science in Applied Mathematics and Data Science. For a Doctor of Philosophy in Science degree, there are three focus areas: (1) Computer Technology and Application, (2) Electronic Information Technology, and (3) Space Information Technology.

In addition, the Faculty recently established two new PhD degree programs: Doctor of Philosophy in Advanced Networking degree, and Doctor of Philosophy in Artificial Intelligence degree. Over the years, 1339 BSc's, 425 MSc's, and 123 PhDs have graduated.

Computer Science at M.U.S.T. is ranked 101-125 world-wide by the Times Higher Education World University Rankings by Subject in 2022. For ShanghaiRanking's Global Ranking of Academic Subjects 2021, Computer Science and Engineering at M.U.S.T. is ranked at 151-200 among over 500 universities in the world.

The Faculty has made significant strides in its research programs in recent years. During the academic year 2019-2020, the Faculty's total research funding reached 70.5 million MOP for a total of 69 projects, with the funding support primarily from the Macao Science and Technology Development Fund, the National Natural Science Foundation of China, the Macao Higher Education Fund, and so forth. In the latest release of "Essential Science Indicators (ESI)" in July, 2021, by Clarivate Analytics (former Thomson Reuters), it is revealed that the Computer Science field of M.U.S.T. has for the first time joined the rank of the top 1% among universities and research institutes across the world in the relevant area. Our research accomplishments have made significant contributions to this designation. To further accelerate the research momentum, the Faculty applied and was granted over 7 million MOP by the Macao Science and Technology Development Fund and the Macao Higher Education Bureau in 2019 to establish Macao's first NVIDIA's GPU cluster server.

DEPARTMENT OF ENGINEERING SCIENCE

Corresponding to rapid advances of modern science and technology, the frontiers of engineering application are continuously expanding. While the contents of engineering disciplines are quickly increasing, cross-disciplinary training is becoming even more critical. The need for broad knowhow is also a necessity for engineering-

▲2020/2021 Graduation Photo 2020/2021 學年畢業典禮合照

▲ Ceremony of the establishment of IEEE Intelligent Manufacturing Technology Committee
IEEE 智能製造技術委員會成立儀式

related management and business practices. The Department of Engineering Science under the Faculty of Innovation Engineering is created in response to these challenges. The Department provides training that emphasizes on a solid foundation in mathematics, science, and technology whilst providing students with broad interdisciplinary exposures (with area of concentration). The foundation is a pre-requisite to build the capacity to pursue advanced work. The goal of the Department is to produce engineers who can deal with the technically multifaceted nature of projects and thus can create solutions with comprehensive considerations. Areas of concentration include applied mathematics and data science, intelligent systems engineering, biotechnology, integrated simulation, and management engineering. The Department is planning to offer bachelor degree programs in Automation and Systems Engineering and Interdisciplinary Engineering*. At present the Department is running a Master of Science degree program in Intelligent Technology and one Doctor of Philosophy degree program in Intelligent Science and Systems.

The Department has made significant research contributions on engineering science. According to the report of "Essential Science Indicators (ESI)" in May, 2019 made by Clarivate Analytics (former Thomson Reuters), the rank of the Engineering field of M.U.S.T. falls into the top 1% among universities and research institutes across the world. Also, according to the Shanghai Ranking's Global Ranking of Academic Subjects announced in 2021, Control Science and Control Engineering is ranked 51-75 of the around 500 universities in the world.

The Department of Engineering Science is composed of international high-level researchers from broad disciplines. It is developing to become a first-class research and education institute in the Greater Bay Area, to produce innovative talents in intelligent production, intelligent robotics, digital twin systems, biotechnology, and management engineering.

* Choice from three concentrations: Biotechnology, Integrated Simulation, Management Engineering.

DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING

With the aim to adapt the challenging needs of Macao Society, Department of Materials Science and Engineering at M.U.S.T. was established in March, 2022 under the leadership of Chair Prof. Shuit-Tong Lee, an academician of the Chinese Academy of Sciences and The Academy of Sciences for the Developing World.

The Department is home for understanding the fundamentals of matter, designing advanced functional materials, and building high-performance devices. The Department will act in alignment with the Greater Bay Area Strategic Development Outline of the Macao and pursue interdisciplinary curriculum toward areas, such as artificial intelligence, advanced manufacturing, biomedicine and comprehensive health. The program will prioritize nanomaterials and nanotechnology which fall in the categories of information display, organic optoelectronics, flexible electronics, wearable intelligent sensors, biomedical materials, nano-catalysis and energy materials, functional surfaces and interfaces, and materials genome. The Department aspires to establish a world-class academic program, which can nourish graduates with capabilities to contribute to Macao, mainland China and the world.

DEPARTMENT OF ENVIRONMENTAL SCIENCE AND ENGINEERING

The Department of Environmental Science and Engineering is one of the four school/departments in the Faculty of Innovation Engineering and developed from the Macao Environmental Research Institute. Environmental Science and Engineering is an important academic platform for the professional program in engineering education and research, which may lead to further development of technologies to tackle critical environmental issues, such as pollution control.

In order to achieve the goal of "Carbon Peak in 2030 and Carbon Neutrality in 2060" and to meet the demands of the ecological civilization in China, the Department of Environmental Science and Engineering has been building a system of educational training for inter-disciplinary professionals. A postgraduate degree program (M.Sc. in "Environmental Science and Management") has commenced with student admission since September 2017. Other programs on "Environmental Science and Engineering" at both Bachelor and Doctoral levels have also been proposed.

The Department of Environmental Science and Engineering is well equipped with laboratories for teaching and research in environmental analyses, such as GC-MS, AAS, ICP-OES, ICP_MS, HPLC-MS – developed in collaboration with the National Observation and Research Station of Coastal Ecological Environments in Macao; two Guangdong-Hong Kong-Macao Joint Laboratory: The Guangdong-Hong Kong-Macao Environmental and Quality, Collaborative and Innovative Joint Laboratory and The Guangdong-Hong Kong-Macao Joint Laboratory on Pollutant Exposure and Health.

Based on the research platform of the university, a research group of 20 internationally recognized scholars with various backgrounds led by President Joseph Hun-wei Lee has been formed. The research focuses are hydro-environment engineering and coastal water quality modeling, intelligent monitoring of air-land-sea continuum for Macao ecological environment, assessment and forecast technology for coastal environment, transport and transformation processes, ecological and environmental effect and control technology on key and emerging pollutants, and municipal solid waste recycling and management.

The course design and education/training at the Department of Environmental Science and Engineering concentrate on offering theoretical knowledge combining with practice in the laboratory and field work. Students are prepared to be professionals with inter-disciplinary skills and international outlook, independent scientific research ability, and with engineering technology and design training – to meets the demands for engineering talents from regional to national level. The goal of our education is to train our students to become multi-field professionals and experts in environmental science and engineering, playing important roles in enterprise, science and technology, and government sectors.

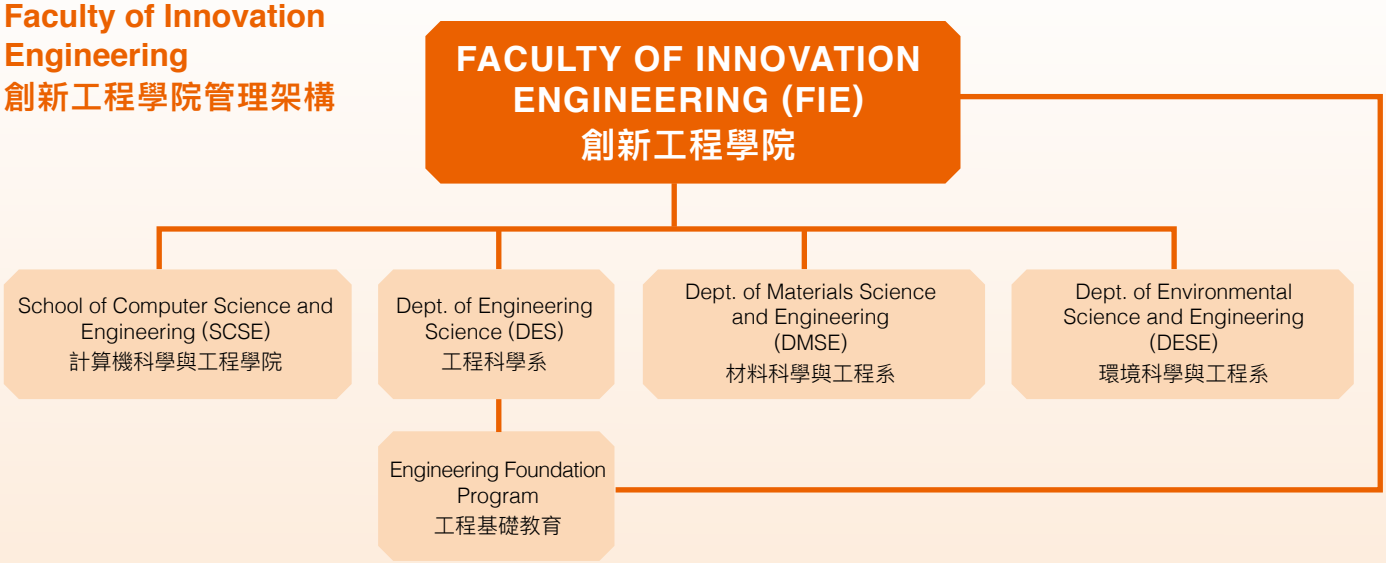
The Department of Environmental Science and Engineering welcomes students who are interested to acquire knowledge and skills in a conducive educational environment through personalized creation and innovation to understand principles and practices, and training for life-long learning.

▲MERI team led by President Lee visited Macao Water 澳門環境研究院訪問澳門自來水公司

▲Students won Project Innovation Award in the 2020 9th "Winning in Guangzhou" College Students' Entrepreneurship Contest
學生獲得 2020 第九屆「贏在廣州」暨粵港澳大灣區大學生創業大賽港澳賽區初賽創新獎

◀ More than 100 patents from faculty members
學院人員獲得超過 100 項專利

Management Structure of Faculty of Innovation Engineering
創新工程學院管理架構



Academic Units / Departments 學術單位 / 學系	Program 課程	Major 專業	Duration of Study (Year) 修讀年期	Medium of Instruction 授課語言
School of Computer Science and Engineering 計算機科學與工程學院	Doctor of Philosophy in Science 理學博士	Computer Technology and Application / Electronic Information Technology / Space Information Technology 計算機技術及其應用 / 電子資訊科技 / 太空資訊技術	3	English / Chinese 英 / 中
	Doctor of Philosophy in Advanced Networking 先進網絡博士		3	English / Chinese 英 / 中
	Doctor of Philosophy in Artificial Intelligence 人工智能博士		3	English / Chinese 英 / 中
	Master of Science (Information Technology) 理學碩士 (資訊科技)	Computer and Information Systems / Communication Engineering / Space Information Technology 計算機與資訊系統 / 通訊工程 / 太空資訊技術	2	English / Chinese 英 / 中
	Master in Applied Mathematics and Data Science 應用數學與數據科學碩士		2	English / Chinese 英 / 中
	Bachelor of Science 理學學士	Computer Science* / Electronic and Information Engineering / Software Engineering* 計算機科學 * / 電子與信息工程 / 軟件工程 *	4	English / Chinese 英 / 中
Department of Engineering Science 工程科學系	Doctor of Philosophy in Intelligent Science and Systems 智能科學與系統博士		3	English / Chinese 英 / 中
	Master of Science in Intelligent Technology 智能技術碩士		2	English / Chinese 英 / 中
Department of Environmental Science and Engineering 環境科學與工程系	Master of Environmental Science and Management 環境科學與管理碩士		2	English / Chinese 英 / 中

* Major in "Computer Science" or "Software Engineering" has an "Artificial Intelligence" direction. "計算機科學" 及 "軟件工程" 專業範疇設有 "人工智能" 方向。

澳門科技大學的五年策略規劃（2021-2025 年）為大學的發展目標和重點發展方向制定了宏偉的藍圖。在重點發展方向中特別提出進一步加強工程學科建設以及鞏固優勢學科發展。

我們生活在一個創新和技術高速發展的時代。在如此充滿挑戰的年代，為了成功培養未來的科技人才和領導者，重新調整學術和教育的目標，鞏固多學科、跨學科研發和教育的基石，已經成為全球教育工作者達成的共識。為適應時代的發展和社會的需求，大學創新工程學院（FIE）由此而生。

創新工程是在基礎研究、應用研究和多學科交叉研究中科學和技術上的突破。創新不僅是知識經濟的關鍵驅動力，也是探索未知世界的進取心態，是對看上去似乎不能實現的事物的創新探索和展望，是將能夠創造巨大社會和經濟價值的跨學科新技術、新方法和新商業模式應用的能力。

成立創新工程學院是在大學領導層深思熟慮，與持份者充分磋商，對全球大學和研究機構類似舉措認真研究，以及參考了來自科技界翹楚的積極反饋而做出的重大決定。澳門科技大學創新工程學院於 2022 年 3 月 27 日正式成立。

創新工程學院把具實力但分散的重點研究方向集中到統一的結構和組織中，從而鞏固了工程學科間的協作而提升了資源的效用，為跨學科的創建、發展、和開花結果提供肥沃的土壤，且為大學國際化集中了力度。

創新工程學院的初步組織和結構將包含以下學術單位：計算機科學與工程學院、工程科學系、材料科學與工程系以及環境科學與工程系。創新工程學院中各院系將成為以下相應研究機構依附的教學單位：澳門系統工程研究所、澳門環境研究院、澳門材料科學與工程研究院、澳門智慧城市研究院、下一代互聯網國際研究院、開放智能電動車研究中心、智能機械人技術創新中心以及澳門數學研究中心。這個結構更促進了與校內其他單位的跨部門合作，包括醫學院，中藥質量研究國家重點實驗室，埃爾文內爾博士生物物理與創新藥物實驗室，月球與行星科學國家重點實驗室，澳門海岸帶生態環境國家野外科學觀測研究站和水利部數字孿生流域重點實驗室。

計算機科學與工程學院

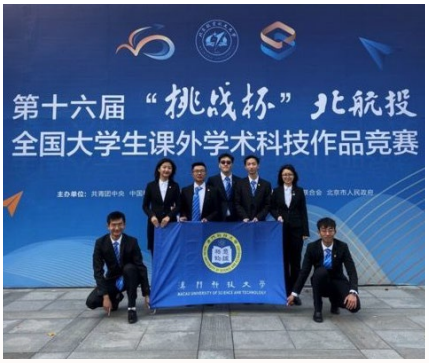
計算機科學與工程學院（原資訊科技學院）創建於 2000 年，是大學最早的四個學院之一，擁有從學士、碩士到博士的完整人才培養體系。目前理學學士學位課程設有：計算機科學、電子與信息工程和軟件工程三個專業；理學碩士（資訊科技）學位課程設有：計算機與資訊系統、通訊工程和太空資訊技術三個專業，以及應用數學與數據科學碩士課程；而理學博士學位課程設有：計算機技術及其應用、電子資訊科技和太空資訊技術三個專業，先進網絡博士學位課程，以及人工智能博士學位課程。歷年來，學院已培養了近 1339 名理學學士，425 名理學碩士，以及 123 名理學博士。

2021 年，澳門科技大學的計算機科學專業，在泰晤士高等教育（Times Higher Education）發佈的 2022 年世界大學學科排行榜中，位列世界 101-125 區間；以及在上海軟科於 2021 年發佈 2021「軟科世界一流學科排名」（ShanghaiRanking's Global Ranking of Academic Subjects）中，位列世界 151-200 區間，此次排名的對象為全球 500 餘所大學。

近年來，學院的研究取得長足進步。2019-2020 學年，學院的研究經費為七千五百萬澳門元（69 個項目），經費來源包括：澳門特別行政區科學技術發展基金、國家自然科學基金、澳門高等教育基金等。 科睿唯安（原湯森路透）於 2021 年 7 月發佈的「基本科學指標資料庫」（Essential Science Indicators，簡稱 ESI）統計數據顯示，澳門科技大學的計算機科學首次進入相關學科領域全球高校及科研機構排名前 1%。學院的科研成果為此做出了重要貢獻。為了進一步推動研究項目的開展，學院還申請獲得七百多萬澳門元的經費，並於 2019 年建立了澳門最先進的 GPU 族服務器。

工程科學系

由於現代科技的快速發展，工程科學應用的前沿不斷擴張，其涵蓋的範圍日趨多元而相



▲ Students won the Second Prize of the 16th "TIAO ZHAN BEI"
學生在第十六屆 「挑戰杯」獲得全國二等獎

互交叉，甚至對有關商務的精準管理亦提出了新的要求。澳門科技大學創新工程學院的工程科學系正是因應這些挑戰而設，特色是強調學生數、理、工的根基，使其有能力緊貼科技的前沿，與時俱進。學系的學科將集成應用數學與數據科學，自動化，系統工程，生物科技，綜合模擬和管理工程等，對應計劃設立自動化與系統工程學士和 * 跨學科工程學士兩本科課程，目前開設課程有智能技術碩士和智能科學與系統博士課程。

工程科學系已有矚目的研究成果。按照科睿唯安（原湯森路透）於 2019 年 5 月發佈的「基本科學指標資料庫」（Essential Science Indicators，簡稱 ESI）統計數據，澳門科技大學的工程科學首次進入相關學科領域全球高校及科研機構排名前 1%。上海軟科於 2021 年發佈 2021「軟科世界一流學科排名」（ShanghaiRanking's Global Ranking of Academic Subjects）中，澳門科技大學控制科學與控制工程學科位列世界 51-75 區間。

本學系聚集多領域國際高水準教師，正發展成為創新型國際認可的一流學術和人才培育機構，為大灣區智能製造、智能機器人、數位孿生、生物科技、管理工程等領域培養高素質的創新型科技人才。

* 將開設 3 大專業包括：生物科技、綜合仿真、管理工程。

材料科學與工程系

為適應澳門社會不斷變化的需求，2022 年 3 月，澳門科技大學材料科學與工程系在澳門材料科學與工程研究院的全力支持下，由中國科學院院士、發展中國家科學院院士李述湯教授領銜組建。

◀ Create a new generation of artificial intelligence super-computer platform 澳打造新一代人工智能超算平台

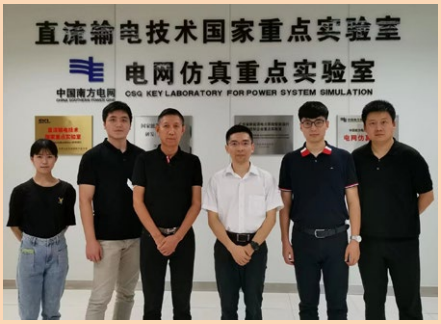
▲ Semiconductor wafer manufacturing intelligent system 半導體晶圓製造智能系統

▲ Macao Environmental Research Institute visit the Cotai Ecological Reserve
澳門環境研究院率團參觀路氹城生態保護區

材料科學與工程系將以澳門特區政府的粵港澳大灣區戰略發展綱要以及澳門科技大學的科研發展規劃為指引。學系主要面向人工智能、先進製造、生物醫用與大健康領域，以先進功能材料為核心，重點開展資訊顯示、有機光電器件、柔性電子、可穿戴智能傳感、生物醫用材料、納米催化與能源材料、功能表面與界面、材料基因組等方向的前沿交叉融合創新，逐步建立國內外的學術地位。

環境科學與工程系

環境科學與工程系是依託澳門環境研究院而成立的，是創新工程學院的四個院系之一。環境科學與工程系是致力於環境專業人才培養以及環境污染控制技術研發的重要教學和科研機構。



▲ MISE research team visit the Key Laboratory for Power System Simulation
系統工程研究所研究團隊訪問國家電網仿真重點實驗室

面向“2030 碳達峰 2060 碳中和”雙碳目標和國家生態文明建設的需求，環境科學與工程系正在建設從本科教學到博士研究生培養的全方位人才培養體系。“環境科學與管理碩士學位課程”，自 2017 年 9 月已經開始招生，計劃開設“環境科學與工程”學士學位課程及博士學位課程。

環境科學與工程系依託澳門海岸帶生態環境國家野外科學觀測研究站（澳門野外站），兩個粵港澳大灣區聯合實驗室包括粵港澳環境質量協同創新聯合實驗室和粵港澳污染物暴露與健康聯合實驗室，配備有用於環境分析的精密儀器設備如氣象色譜高解析度質譜儀精密電子天平離子色譜儀，原子吸收光譜儀、ICP-OES、ICP-MS、HPLC 等大型化學分析儀器，可滿足教學和研究需求。

依託大學及相關研究平臺，環境科學與工程系已經組建了一支由李行偉校長領銜的近 20 人具多學科背景和能力的國際化高水平團隊，研究方向集中於環境水力學和近海水質模擬技術、澳門生態環境天空地海一體化智能監測技術、海岸帶生態環境風險評價與預報預警技術、環境質量演化過程和調控機制、典型污染物的生態環境效應及控制技術、城市固體廢物循環和管理等方面。

環境科學與工程系課程設置和人才培養兼顧紮實的基礎理論知識和科學實踐，定位於培養具有多學科交叉背景和國際視野，能夠獨立開展科學研究、工程技術方案設計，服務國家社會發展的國際化高質量科學研究、管理和工程技術人才，努力將學生培養成為未來產業界、科技界以及政府管理層所倚重的綜合性環境科學與工程專業人才。

環境科學與工程系熱切希望，青年學子在這裡不僅能夠獲取知識，增長智慧，更能夠創造知識，領會到終身學習的原則及重要性。

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