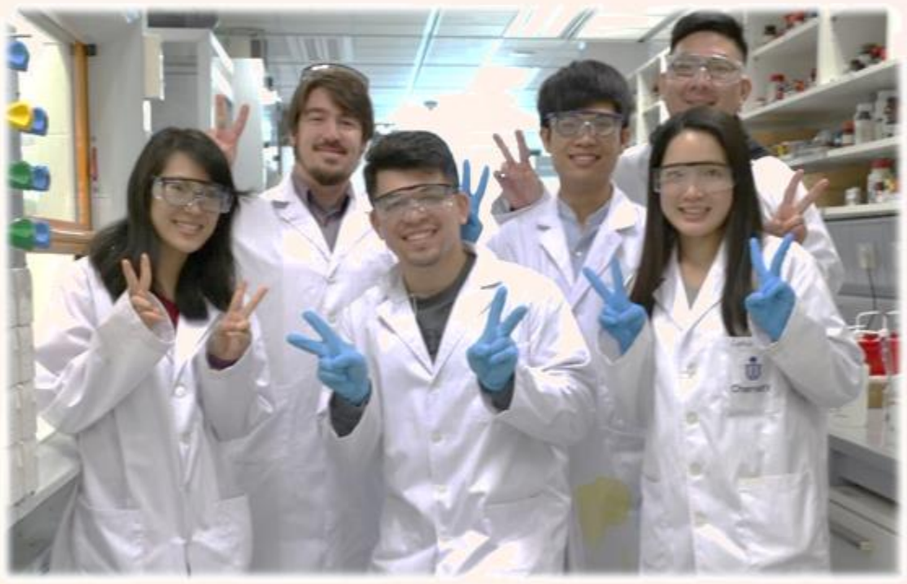
Master of Science in Analytical Chemistry

Department of Chemistry
The Hong Kong University of Science and Technology

Prospectus for 2025-2026 Admission



Admissions and Fees

Admission Deadlines:

	Fall Term, 2025	Spring Term, 2026
Non-local student	30 Jun 2025	01 Nov 2025
Local student	15 Jul 2025	15 Dec 2025

Inquiries:

Program Lecturer: Dr. Wenting QIU

Contact: Email: chms@ust.hk

Phone: (852) 3469 2632

FAX: (852) 2358 1594

Program Website: https://chem-msc.hkust.edu.hk/

Fall 2025 / Spring 2026 Fees and Schedule:

Tuition Fees: HK$160,000

Fees should normally be paid at start of each term

Non-Local FT Mode*: Term 1: HK$ 80,000 Term 2: HK$ 80,000

*Only FT mode available for non-local applicants

Additional credits for additional electives can be taken at the rate of HK$5,300 per credit.

Local FT Mode: Term 1: HK$ 80,000 Term 2: HK$ 80,000

Local PT Mode: Term 1: HK$ 40,000 Term 2: HK$ 40,000

Term 3: HK$ 40,000 Term 4: HK$ 40,000

Additional credits for additional electives can be taken at the rate of HK$5,300 per credit. One to two additional terms for PT mode are possible.

Aims of the Program

Program Requirements and Who should take it ?

The M.Sc. in Analytical Chemistry is a **taught** 1-year (Full-time) or 2-year (Part-time) degree. Applications will be considered from graduates with a good B.Sc. in science, engineering or a related discipline, and with *some prior knowledge of Chemistry*. The **language of instruction is English** and students must also meet the university requirements for admission.

HKUST has one of the most **diverse student bodies** in the world, and applicants both from within and **outside Hong Kong** will be considered. Details of student visa regulations may be obtained from the university Admissions office and the Hong Kong Immigration Department.

Aims of the Program:

- ✓ **Professional Training**
- ✓ **Employment-orientated Education**
- ✓ **Knowledge for Accreditation**
- ✓ **Lab Management Training**
- ✓ **Practical and Research Experience**

Aims of the Program

Modern UG programs typically cannot provide the level of background expertise that would be directly useful to the modern analytical industry, which requires a higher concentration of Chemistry courses and laboratory training and hands-on experience.

This taught M.Sc. Program was launched around 10 years ago partly to address this perceived shortfall in the ever-increasingly competitive job market. It will prepare graduates to be successful and rise to leadership positions within the areas of analytical testing and laboratory management careers. The availability of an additional one-year program may be attractive to those who wish to pursue a scientific or technical career but are not prepared to spend longer time needed for a M. Phil or Ph. D. research degree.

The placement of well-trained graduates in industry within Hong Kong and greater China is a major goal of this program. The one-year Full-time program can also serve as excellent preparatory training for a Ph.D. research degree in Chemistry or related sciences, and for some students an attractive alternative to carrying out a two-year M.Phil. Degree prior to a Ph.D. placement.

Program Curriculum

Program Curriculum (Total: 30 credits)

The program is designed to cover all important aspects of modern laboratory analysis, whilst offering maximum flexibility for students to adapt the program to their own needs. For those seeking more practical hands-on experience, up to 9 credits of laboratory work, including a research project, can be taken.

Core Courses: (15 credits)

CHMS 5010	Chemical Data Analysis
CHMS 5020	Elemental Analysis
CHMS 5030	Molecular Analysis
CHMS 5040	Separation Methods
CHMS 5050	Optical and Electrical Methods

Elective Courses: (6-12 credits)

CHMS 5110	Environmental and Food Analysis*
CHMS 5111	Environmental Analysis*
CHMS 5112	Food and Drug Analysis*
CHMS 5120	Macromolecular Analysis
CHMS 5130	Materials Analysis
CHMS 5140	Laboratory Management

*Not all elective courses are offered every year. A list of electives offered in a particular year will be announced at the beginning of each intake.

Program Curriculum

Experimental /Practical Courses: (3-9 credits)

CHMS 5201	Analytical Instrumentation Laboratory I	(required)
CHMS 5202	Analytical Instrumentation Laboratory II	(elective)
CHMS 6980	Analytical Research Project	(elective)

There are a wide range of other courses offered at Masters level in other taught MSc programs in related disciplines within our university, such as Biotechnology and Chemical & Biomolecular Engineering. These may be substituted and used for credits towards the requirement of the MSc in Analytical Chemistry upon the approval from the appropriate course instructors and the Program Director.

Lecture Course Synopses

CHMS 5010 Chemical Data Analysis

Measurements; Statistical treatment and analysis of Data; Uncertainties; Calibrations; Detection limits; Interferences; Use of Standards and Control Charts; Quality control and assurance; Presentation of data.

CHMS 5020 Elemental Analysis

Atomic spectroscopies; Atomic absorption (AA) atomic emission (AE); Elemental analysis by ICP-MS; Isotope analysis. Elemental analysis using X-rays; X-ray Fluorescence (XRF); X-ray Photo-electron Spectroscopy (XPS); Secondary Ion Mass Spectrometry; Energy Dispersive Analysis of X-rays (EDAX); Combustion analysis.

CHMS 5030 Molecular Analysis

Characterization of organic molecules; Mass Spectrometry; Ionization techniques; Mass analysis; Protein MS; NMR Spectroscopy; 1H and 13C NMR; Multinuclear experiments; 2D and pulse techniques; Solid state NMR

CHMS 5040 Separation Methods

Chromatography; Gas chromatography; GC-MS; Liquid chromatography; HPLC; Choice of stationary and mobile phases; Chiral separations; Affinity chromatography; Ion chromatography; Capillary zone electrophoresis; Micro-fluidics.

CHMS 5050 Optical and Electrical Methods

Molecular spectroscopies; Vibrational (IR and Raman) and Electronic (UV-vis) spectroscopy; Fluorescence; Electrochemical analysis; REDOX chemistry and bio-chemistry; Electrochemical measurements; pH measurements; Design and use of sensors.

Lecture Course Synopses

CHMS 5110 Environmental and Food Analysis

Environmental sampling; Trace analysis; Water analysis; Toxins and pesticides; Aerosols and particulates. Food safety and analysis; Calorimetry.

CHMS 5111 Environmental Analysis

Environmental sampling; Trace analysis; Air analysis; Water analysis; Soils analysis; Gas-phase components and major air pollutants; Toxins and pesticides; Aerosols and particulates; Assessing general health of water and soil systems ; Recent advances in environmental techniques; Numerical analysis of environmental problems.

CHMS 5112 Food and Drug Analysis

Chemical Analysis of Food and Beverages; Food composition; Food contaminants; Food Preservation; Analytical Methods in Food Analysis; Food Safety and Labeling; Drug and Pharmaceutical Analysis; Physio-chemical Properties of Drugs; Analytical Methods in Pharmaceutical Analysis; Biomedical and Forensic analysis of Drugs; Analysis of Traditional Chinese Medicine; Drug formulation.

CHMS 5120 Macromolecular Analysis

Polymer and Bio-molecular Techniques; Polymer separation; Gel permeation chromatography; Affinity chromatography; Polymer characterization; Molecular weight and distribution; DNA and protein analysis.

CHMS 5130 Materials Analysis

Electron Microscopies: TEM; Electron diffraction; SEM; STEM; STM; AFM. Nano-materials characterization. Thin film characterization. X-ray diffraction; powder XRD; Single crystal structure determination; SAXS.

CHMS 5140 Laboratory Management

Good lab practices (GLP); Laboratory Safety; Risk assessment; Lab waste management; Computer-assisted Lab Info Systems; Professional development case studies: Safety officer; Lab Manager.

Practical / Experimental Courses

Practical/Experimental Course Details:

CHMS 5201 Analytical Instrumentation Laboratory I (required)

Students will choose from an array of experiments involving modern analytical techniques that have been introduced in the core lecture courses. These will include, but not be limited to, separation of mixtures, GC-MS, LC-MS, atomic spectroscopy and elemental analysis, IR and UV spectroscopy, electrochemistry and sensors, NMR, powder and single crystal XRD.

CHMS 5202 Analytical Instrumentation Laboratory II (elective)

Students will choose from a further array of experiments, complementary to CHMS 5201 involving analytical techniques that have been introduced in either the core and the elective lecture courses.

Lab sessions will be offered in each term during weekdays or Saturday mornings (10 sessions offered per term). A number of Saturday lab sessions will be run over the two years especially for part-time students (3-6 sessions per term depending on enrolment numbers). Students should attend and write up experimental reports for a minimum of 8 lab sessions in total, which are needed for the 3-credit required lab course over 1 (Full-time) or 2 years (Part-time).

CHMS 6980 Analytical Research Project (elective)

For full-time students, analytical project(s) may be commenced in the first term and conducted with a faculty member of the MSc program, or with a faculty member outside of the MSc program upon the approval of the Program Director.

The analytical project for part-time students may be commenced in Year 1 and conducted over a period of time as students' schedule permits. The expected time spent on the 3-credit project (background, planning, execution and write-up/presentation) is 100 hours in minimum. The results should be written up in a report which will be orally presented upon completion of the project.

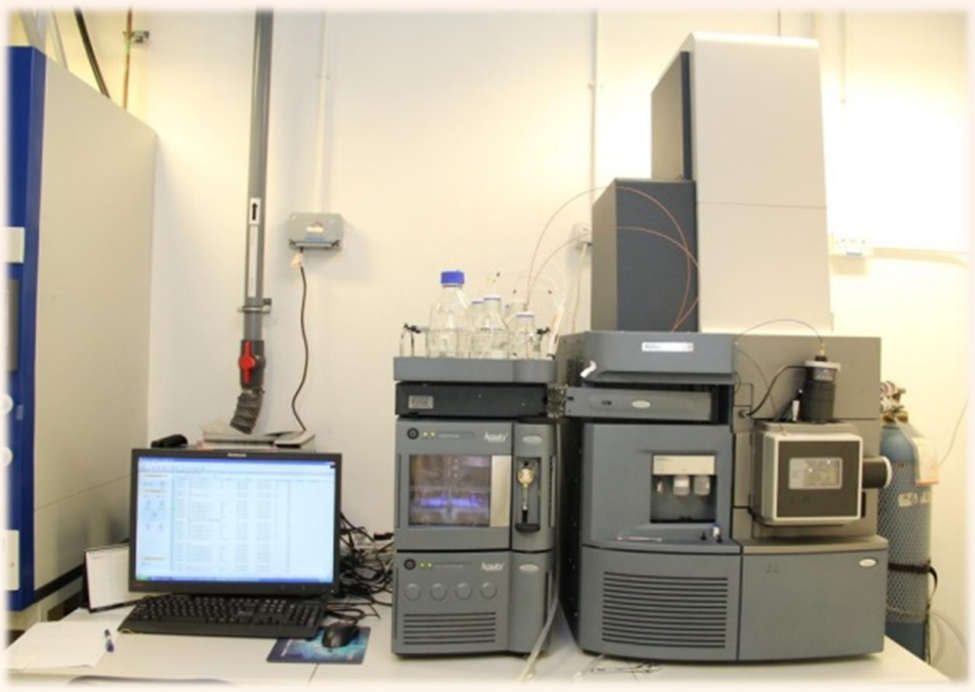
Instrumentation

Instrumentation

A wide variety of state-of-the-art equipment is available for the Analytical Laboratory classes, as well as the research projects. Some of the major items are illustrated below.

LC-Mass Spectrometers:

Waters UPLC-QTOF MS/MS and UPLC - ion trap MS

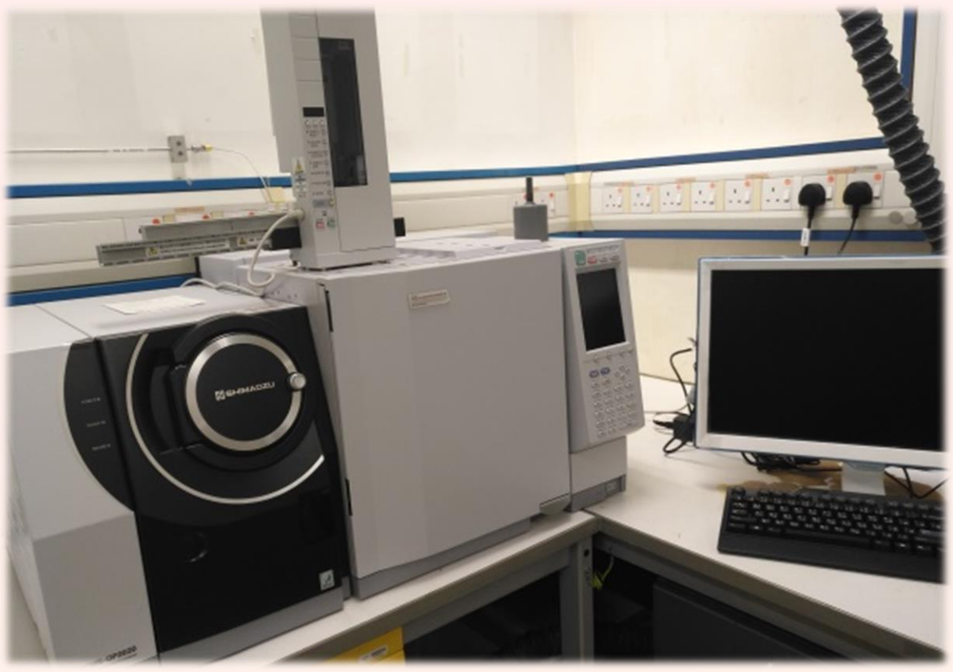


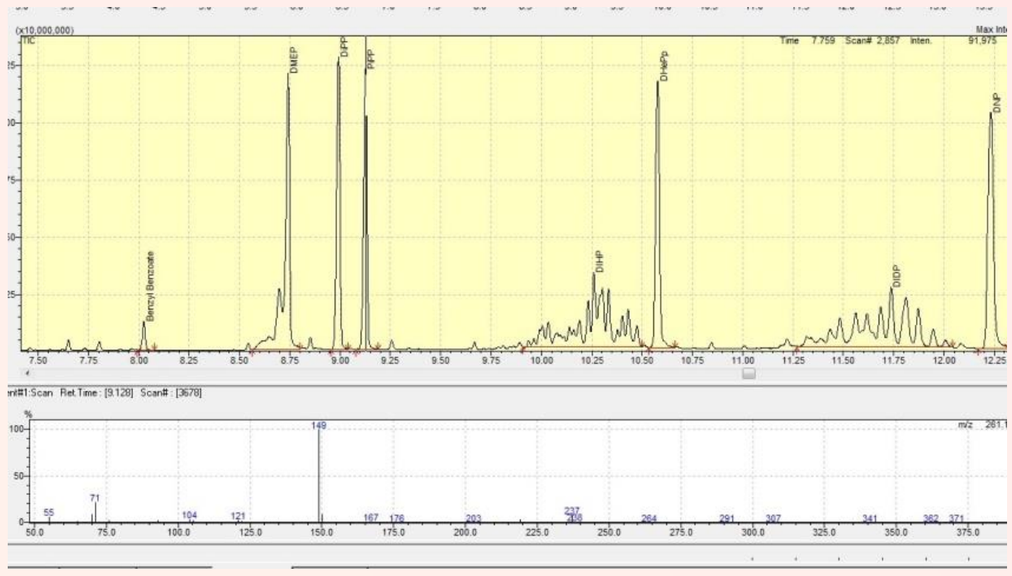
GC-Mass Spectrometer

Agilent 5975C GC-MSD

Instrumentation

Shimadzu QP-2020



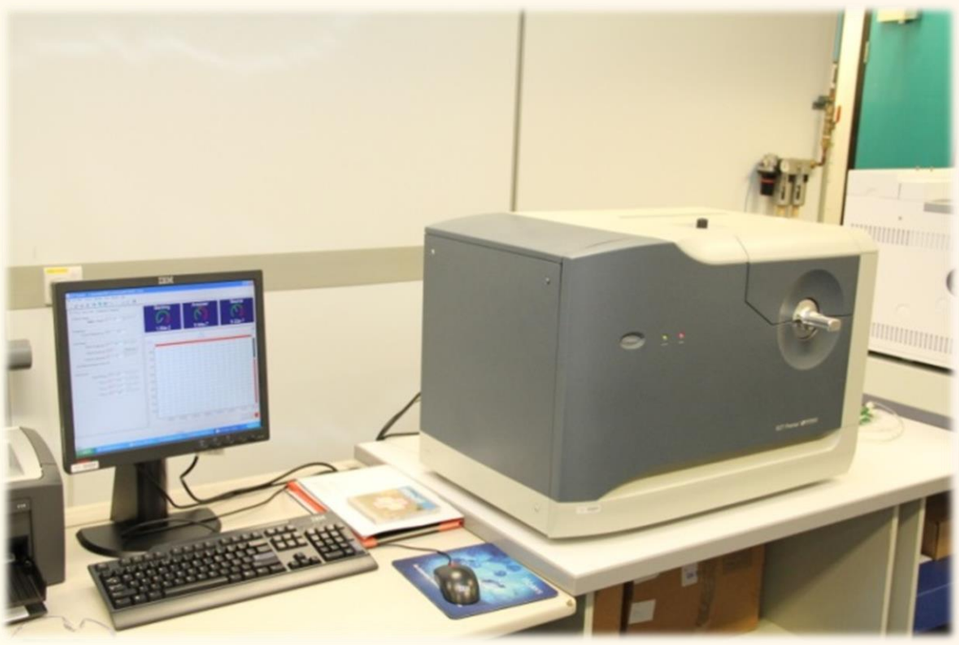


Phthalates in toy sample

ICP-Mass Spectrometer

Other MS Spectrometers

Waters MS, with GC-TOF module and MALDI-TOF Micro MX module

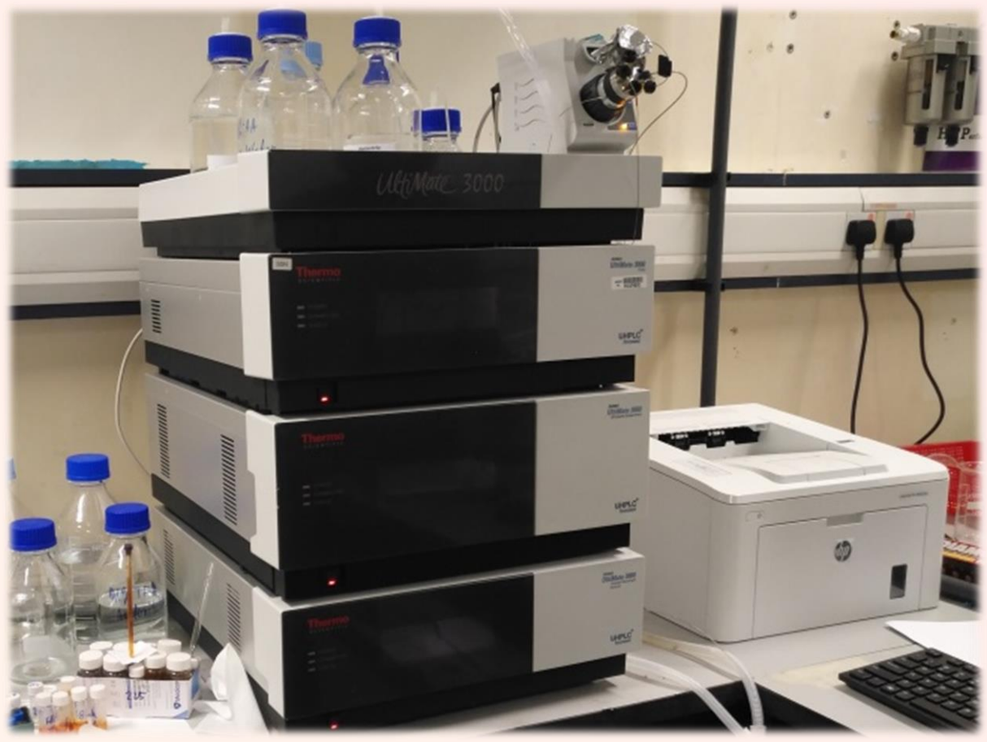


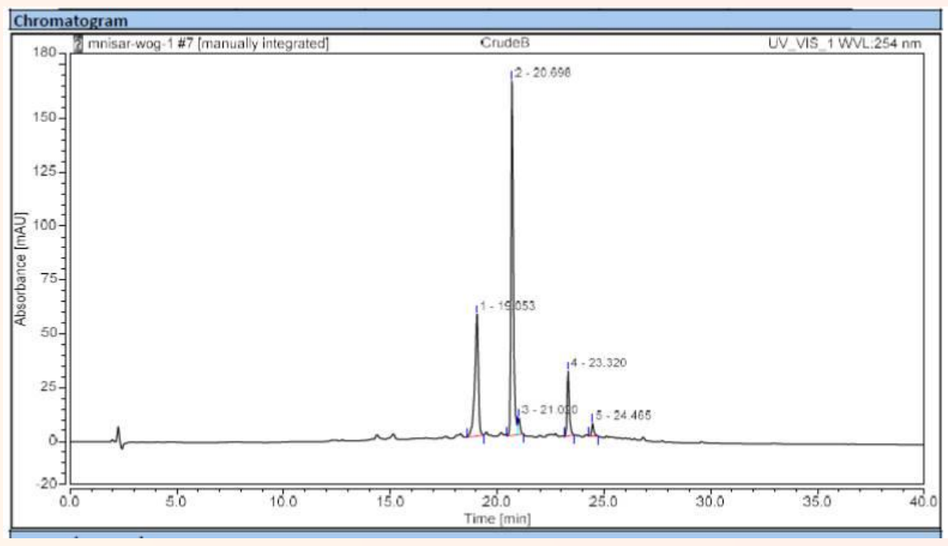
Instrumentation

High Performance Liquid Chromatography

Waters HPLC with DAD and FLD

Thermo HPLC-VWD





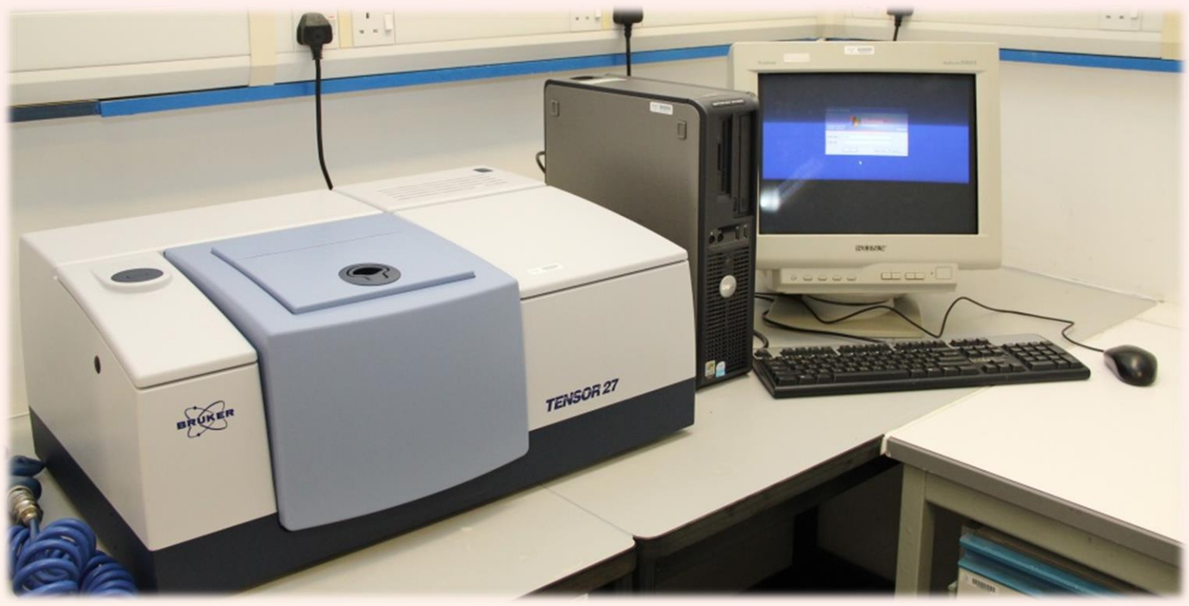
Synthesized Product Intermediate Analysis

Gas Chromatography-FID

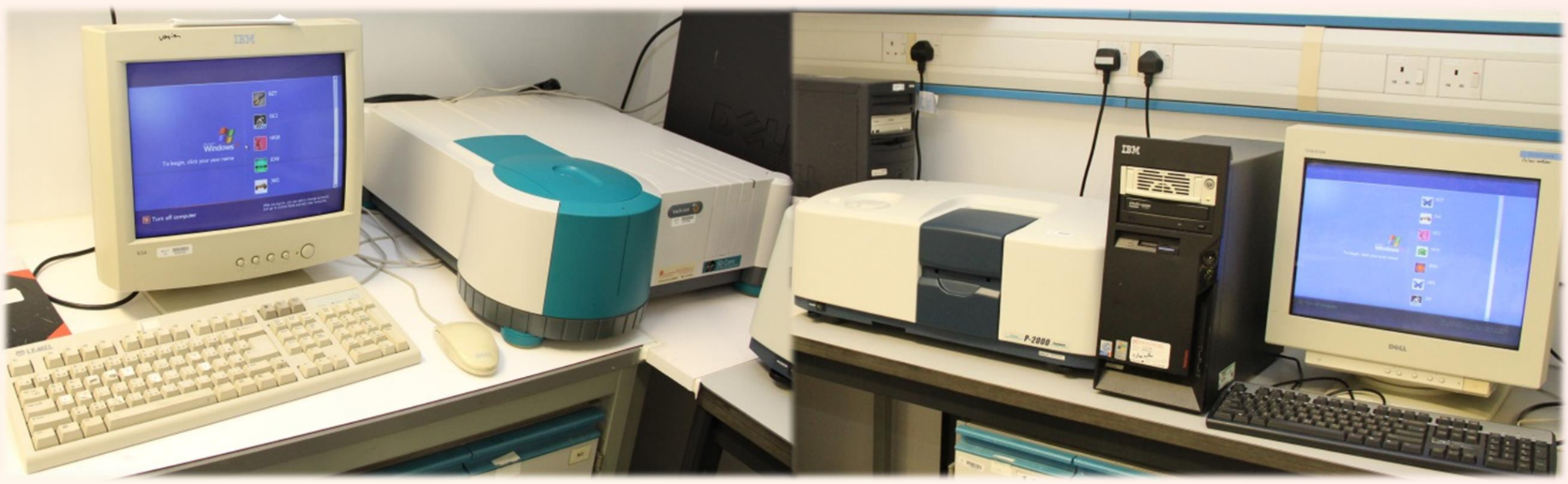
Instrumentation

Fourier Transform Infrared Spectrometer

Bruker Tensor 27



UV-visible Spectrophotometer and Polarimeter

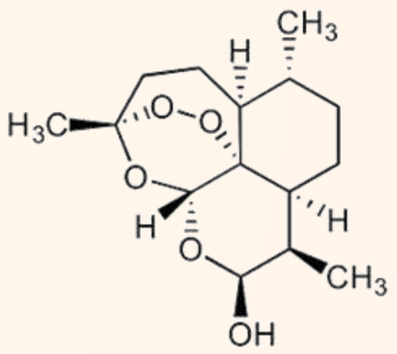


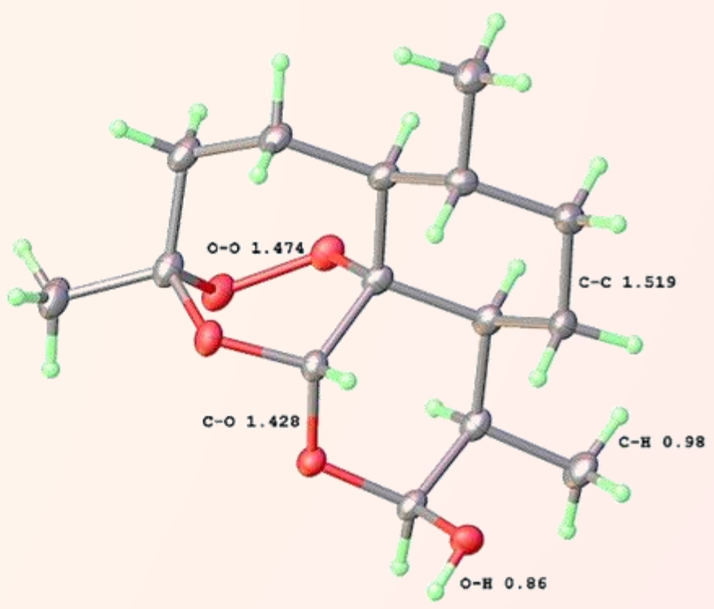
Circular dichroism spectrometer, with ORD attachment on order

Single crystal X-Ray Diffractometers:

Bruker D8 Venture: Ag-Diamond and Metal-Jet Ga-sources;

Rigaku OD Supernova: Dual wavelength Mo and Cu-sources



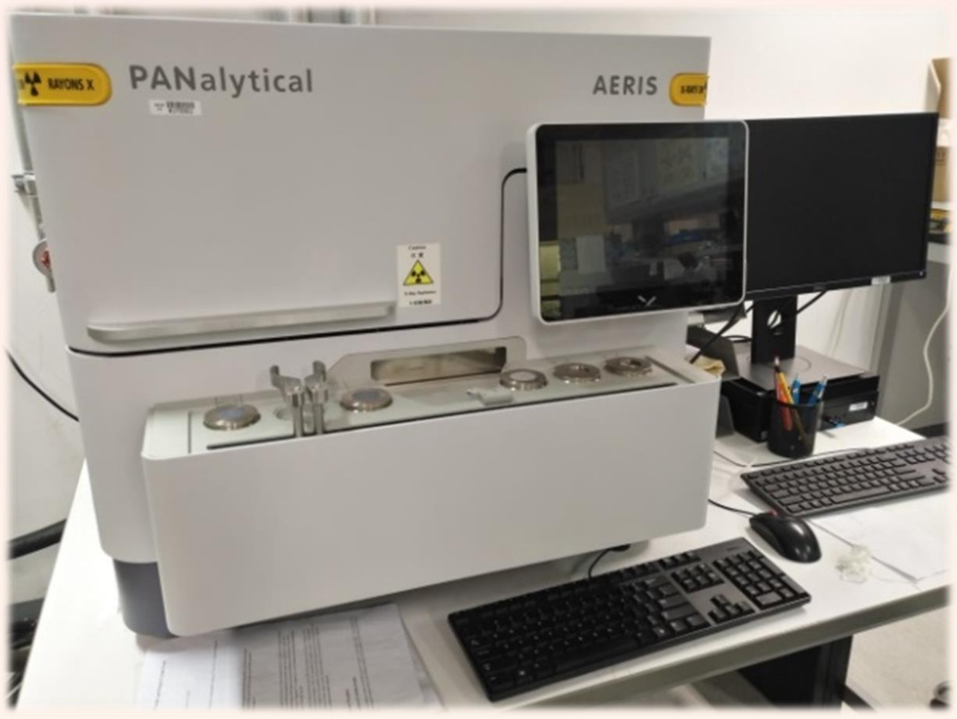


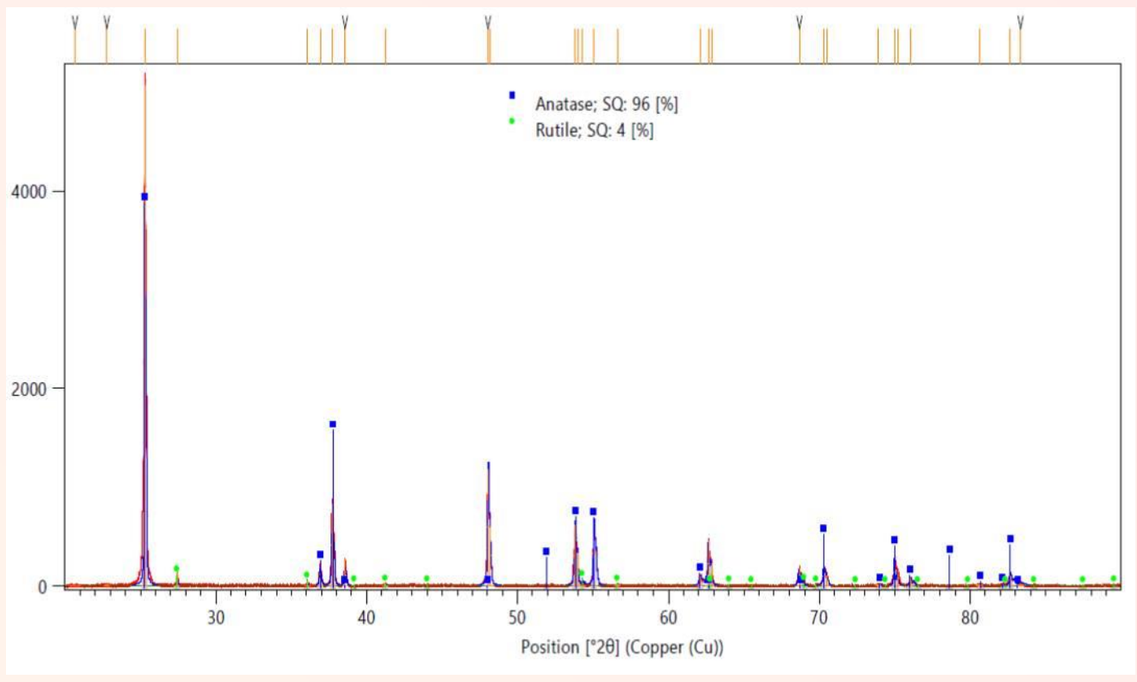
Structural Determination of Dihydroartemisinin, an anti-malarial compound by single XRD

Instrumentation

Powder X-Ray Diffractometer:

Panalytical Aeris powder-X-Ray Diffractometer

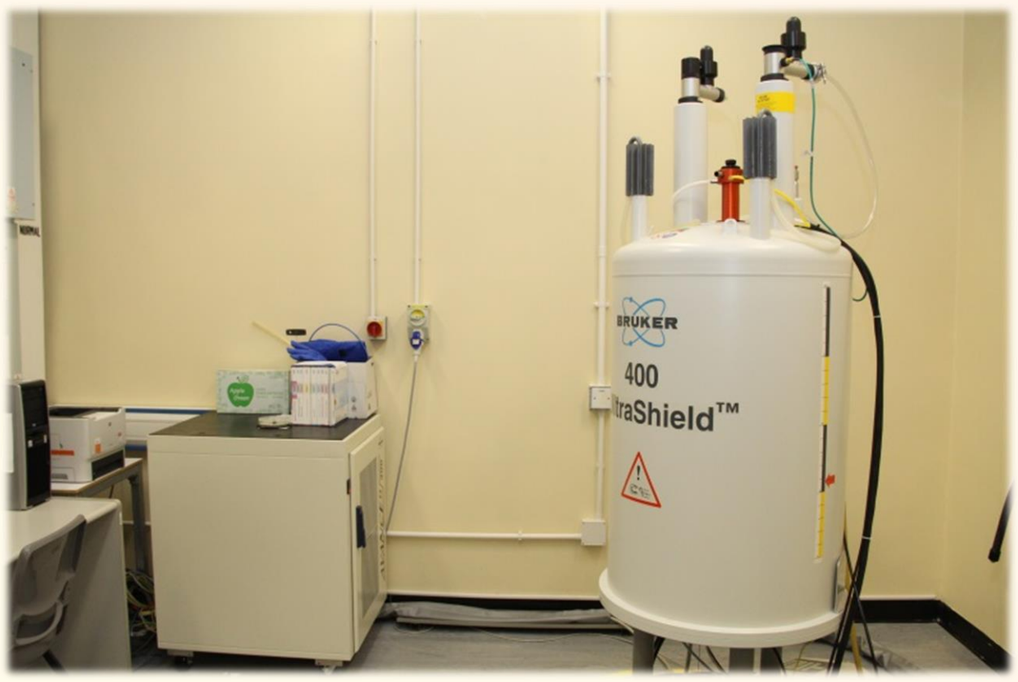


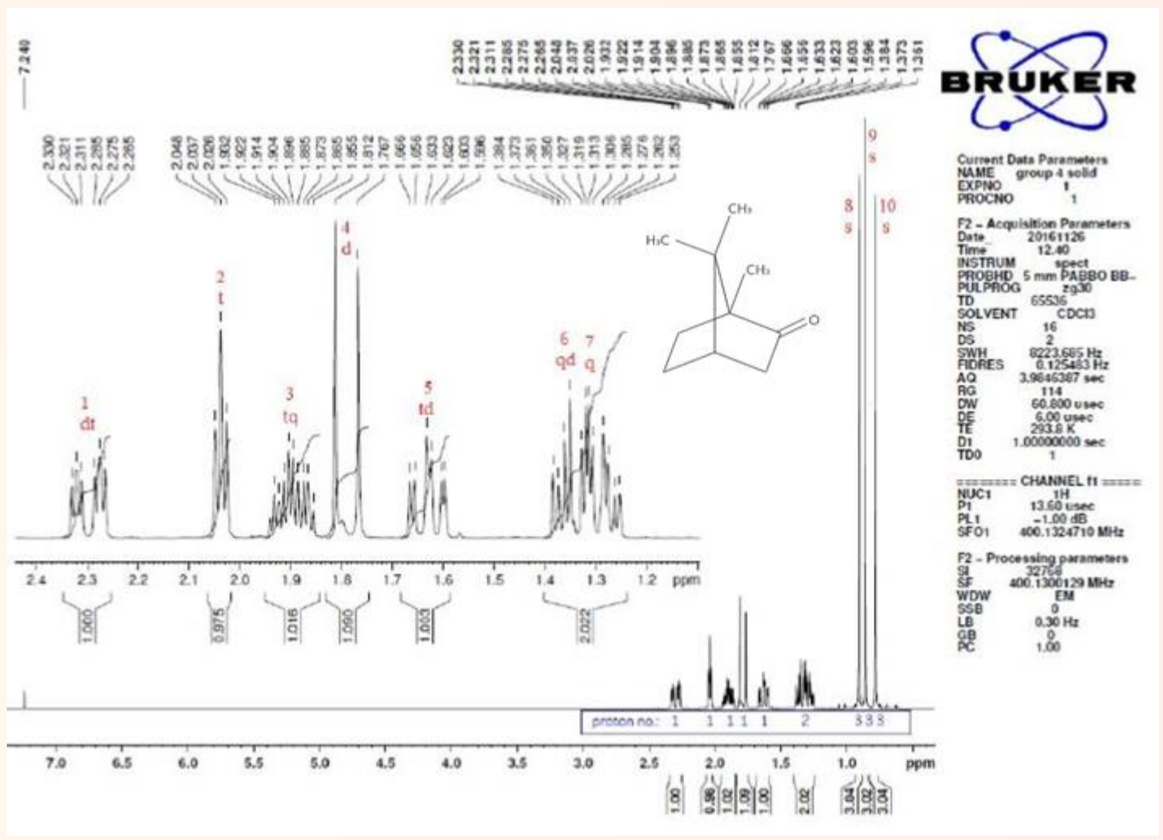


TiO_2 Shelf Sample

***Nuclear Magnetic Resonance (NMR) Spectrometers*:**

2 x Bruker 400 MHz NMR; JEOL 600 MHz NMR Spectrometer





NMR Spectrum of Camphor, a Monoterpene

About the Department of Chemistry

Chemistry M.Sc. Laboratory:

The Cheng Yu Tung Building houses the state-of-the-art teaching laboratory for the M.Sc. program, along with some of the instruments used for the Analytical Laboratory courses.

Cheng Yu Tung Building (Research Academic Building)

Department of Chemistry, HKUST:

The Department of Chemistry at HKUST has achieved notable global recognition of its excellence based primarily on its research record (Department is ranked **2nd in Hong Kong**, **17th in Asia**, **49th Globally** by QS 2025 World University Rankings by subject).

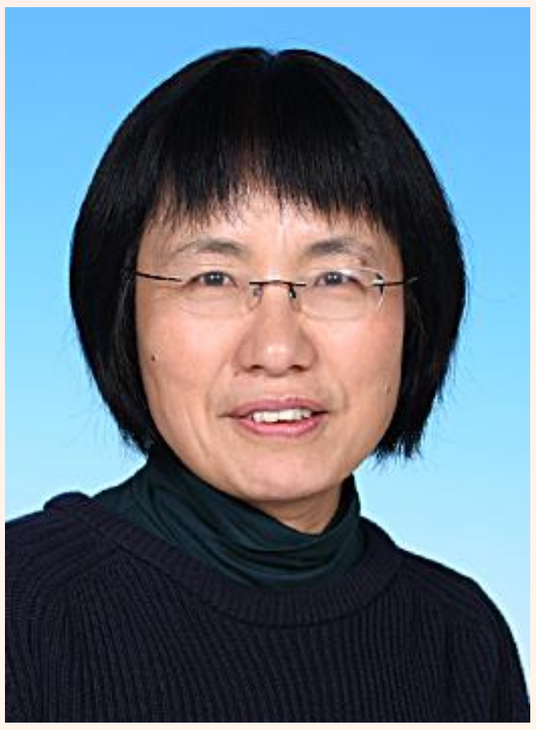
Since the change to 4-year UG degree program in Hong Kong in 2012, the Department has adopted a careful review and overhaul of its UG program. We now offer **B.Sc. in Chemistry** with various Options (Biomolecular Chemistry, Environmental and Analytical Chemistry, Materials Chemistry, and Pure Chemistry).

This has proven to be a successful approach, and Chemistry remains one of the most popular B.Sc. program choices among School of Science students. The Department has about 150 research post-graduate students. Places on the taught M.Sc. program in **Analytical Chemistry** are **limited** and **early application** is advised.

Faculty Profiles

Department Head:

Prof. Jianzhen YU



Program Director:

Prof. Zhenyang LIN

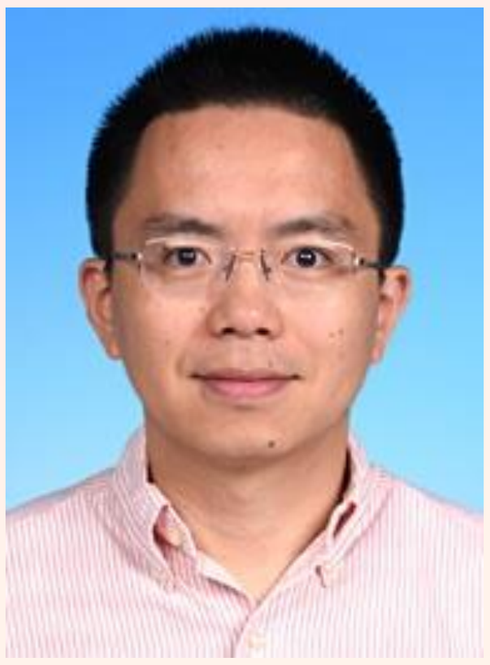
Program Lecturer:

Dr. Wenting QIU

Faculty Profiles

Other Course Instructors

Prof. Henry He YAN



Prof. Simon Wan CHAN

Prof. Rongbiao TONG

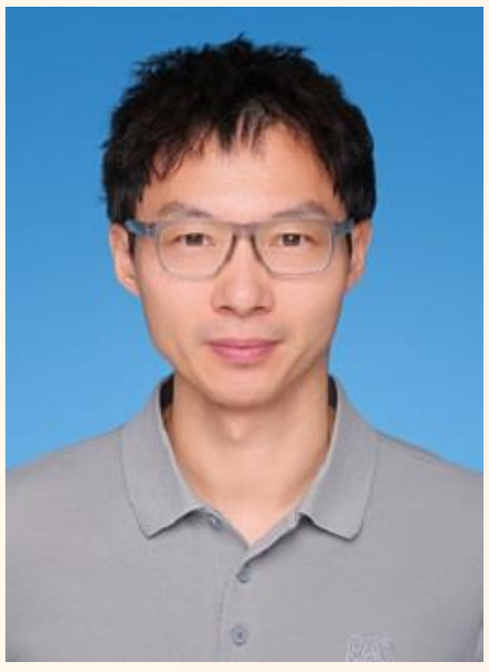
Prof. Ian D. WILLIAMS

Prof. Hongkai WU

Prof. Zhihong GUO

Prof. Jonathan HALPERT

Prof. Xiaojiang XIE



Dr. Emily TSANG

Useful Links

The Hong Kong University of Science and Technology:

Some useful links and websites relating to the university and procedures.

HKUST website: https://hkust.edu.hk

Accommodation:

On-campus accommodation **is not provided**. Single or shared off-campus accommodations can easily be found in Hong Kong. Some details may be obtained from the self-arranged housing information on the Student Housing & Residential Life website.

HKUST SHRL webpage: https://offcamphouse.ust.hk

Immigration:

For non-local applicants details of immigration requirements for post-graduate students can be found on the Post-graduate Studies Office (PGSO) webpage as well as the website of the Hong Kong Immigration Department.

HK Immigration webpage: https://www.immd.gov.hk/eng/index.html

The HKUST campus, view from the sea

Application

Application and Student Information:

Application procedure and deadlines can be found on the Fok Ying Tung Graduate School (FYTGS) website https://fytgs.hkust.edu.hk/. All applications must now be made via the ***online application system*** which can be accessed through that website.

To qualify for admission to the University, applicants must meet:

i. the general admission requirements of the University;

ii. the specific admission requirements of the program applied for; and

iii. the English Language requirement

The University and program admission requirements are minimum requirements for admission. Meeting these minimum requirements does not guarantee admission. Applicants who possess other qualifications equivalent to the University requirements for admission may submit applications for consideration on the basis of individual merit.

English Language Requirement:

Applicants whose first language is not English, and whose bachelor's degree or equivalent qualification* was awarded by an institution where the medium of instruction was not English, are required to fulfill one of the following minimum English Language requirements:

- Test of English as a Foreign Language (TOEFL):
  - TOFEL-iBT (internet-based test): 80*
  - TOFEL-pBT (paper-based test): 550
  - TOFEL-Revised paper-delivered test: 60 (total scores for Reading, Listening and Writing Sections)

**refers to the total score in one single attempt*

- International English Language Testing System (IELTS Academic Module) - an overall score of 6.5 with no sub-score lower than 5.5.

N.B. TOEFL and IELTS scores are valid for two years from the test date.

**Qualification with duration equivalent to a full-time bachelor's degree (i.e. at least 3 years).*

Last modified in July 2025

For the most up-to-date information, please refer to https://chem-msc.hkust.edu.hk/