

# FACULTY OF ENGINEERING



The Faculty of Engineering has five departments offering the following undergraduate major programmes.

- ❖ Biomedical Engineering
- ❖ Computer Engineering
- ❖ Computer Science
- ❖ Electronic Engineering
- ❖ Information Engineering
- ❖ Mathematics and Information Engineering\*
- ❖ Mechanical and Automation Engineering
- ❖ Systems Engineering and Engineering Management

\* *Mathematics and Information Engineering is a double-degree programme offered jointly by the Department of Mathematics and the Department of Information Engineering.*

Since the 2007-08 academic year, a double-degree option has been available to students admitted to any of the engineering programmes (with the exception of the Mathematics and Information Engineering double-degree programme). Students may apply for a second degree in Integrated Business Administration, which is offered by the Faculty of Business Administration on a self-financing basis.

Students who pursue this option will be awarded a Bachelor's degree in Engineering (BEng) (or a Bachelor's degree in Science [BSc] if they opt for the Computer Science programme) and a Bachelor's degree in Business Administration (BBA) upon satisfactory completion of their studies. This double-degree option has been designed to provide students with maximum flexibility. They can:

- (i) complete a BEng or BSc degree in their normative study period;
- (ii) complete a BEng or BSc degree with an IBBA minor if they fulfill relevant academic requirements; or
- (iii) complete a BEng or BSc and, with one extra year of study, be awarded a BBA degree.

Details of this double-degree option can be found at [www.erg.cuhk.edu.hk/ergbba](http://www.erg.cuhk.edu.hk/ergbba).

Starting from the 2010-11 academic year, the Faculty will also offer a new undergraduate programme in Biomedical Engineering in response to increasing demand from the medical and health care sectors for well-trained biomedical engineering professionals.

With our focus on nurturing leaders in engineering and technology, the Faculty regularly updates its professional study programmes and continuously upgrades its facilities, particularly its computing equipment and electronics and information systems. The Faculty also offers a range of enhancement programmes, such as:

- **non-engineering minors**, including minors in business administration, economics, journalism, music and psychology;
- **a work-study scheme**, under which one term or year is spent working as a full-time employee in a course-related company to provide practical experience;
- **an engineering student exchange programme**, which offers engineering students opportunities for overseas exchange study with the aim of widening their horizons, enhancing their language ability and training them to become more independent; and
- **an enrichment scheme**, which offers early training in research skills and is particularly targeted at students who plan to pursue postgraduate studies.

The Faculty's professors are highly qualified academics with a strong commitment to educating engineering professionals. Equally important, they are also active in basic and applied research and have made significant contributions to the advancement of modern technology. The Faculty is equipped with state-of-the-art computing and laboratory facilities to achieve its mission of nurturing innovation and technology among both students and staff.

## MECHANICAL AND AUTOMATION ENGINEERING

The Mechanical and Automation Engineering (MAE) programme emphasises the impact of modern automation technologies on current and future developments in the field of mechanical engineering. The programme is interdisciplinary, covering the integrated areas of mechanics and robotics, dynamics and control, electronics, and computing and design. It stresses a balanced curriculum in both basic theory and hands-on practice, with the goal of producing engineers who are innovative in solving problems and adaptive to changing environments and technological evolution.

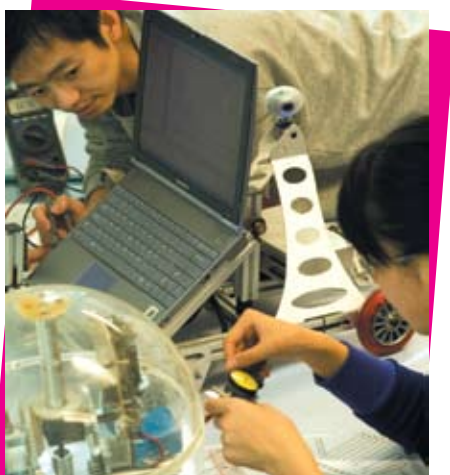
The MAE curriculum covers fundamental knowledge in the areas of mechanical and automation engineering, including mechanics, materials, CAD, thermal fluids, robotics and control, manufacturing, basic electronics and computing, and their interrelations and integration. A Professional Engineering Training Module comprising courses in business, technical communications, engineering ethics, design application and final year projects is embedded within the programme to enhance students' training as professional practitioners. The Department also provides summer internships, work-study programmes and international exchange opportunities for its undergraduate students.

Upon graduation, MAE students find career opportunities as mechanical engineers, production engineers, control engineers and design engineers, among other professions. They can also pursue graduate studies in their specialised areas of interest in Hong Kong or overseas.

Since 2007, students have been able to choose a double-degree option that combines the MAE and Integrated Bachelor of Business Administration (BBA) degrees, thus providing them with further opportunities in the area of technology management. After completion of the MAE programme as a first degree, MAE students can opt to continue for an extra year to attain a BBA degree. Both S6 and S7 entrants are restricted to four years in which to earn the two degrees (BEng and BBA).

The Department also offers a Minor programme in Energy Technology due to the great implications that automation technology has for addressing energy and environmental issues.

For more information, please visit the Department's website at [www.mae.cuhk.edu.hk](http://www.mae.cuhk.edu.hk).



## COMPUTER ENGINEERING

The Department of Computer Science and Engineering was launched more than 30 years ago and is the oldest and best established in the territory. Its syllabus provides a solid foundation in information technology, which is linked with training in practical applications through projects and laboratories. In keeping with the practices of the computer science and engineering departments of major universities around the world, the Department is responsible for the dual roles of education and pioneering in computer technology. Our degree programmes are well established and have gained global recognition. They are currently accredited by the HKIE. We provide comprehensive work-study and exchange programmes for our students, and newly admitted students with outstanding academic results are awarded departmental scholarships.

A good computer system requires not only speed and function, but also software and hardware that are synchronised and operate compatibly with other systems. In response to the demand for knowledge and know-how in computer design technology, CUHK has taken the lead in providing students with a solid foundation in both hardware and software, thus turning out a steady stream of experts in the field.

The Computer Engineering Programme offers courses in such areas as mobile devices, computer interfacing, very large-scale integrated circuit design (VLSI), computer-aided design and microprocessor systems.

Thanks to the Department's long history, many of our early graduates have taken up important positions in the computer departments of various companies and organisations, and they now provide a valuable alumni network for new graduates. Some of our graduates have chosen to pursue engineering work in such international companies as Intel, Microsoft, IBM and Google, and others have been recruited by financial service firms, including HSBC and Morgan Stanley. Many of them have also chosen to pursue further studies at CUHK and other world-renowned universities, including UCLA and Stanford.

Since 2007, a double-degree Computer Engineering/Integrated Business Administration option is open to students who have qualified for admission to both programmes. Following the successful completion of a BEng degree within a three-year period, students continue their studies for one additional year to gain a BBA degree.

## COMPUTER SCIENCE

The Computer Science programme offered by the Department of Computer Science and Engineering covers the following areas:

- Software Engineering
- Computer Networking
- Internet
- Databases
- Computer and Network Security
- Information Systems
- Multimedia Technology

- Programming Languages
- Theoretical Computer Science
- Artificial Intelligence
- Computer-aided Design
- Digital Hardware Technologies

Our degree programmes are well-established, internationally recognised and accredited by the HKIE. We offer comprehensive work-study and exchange programmes for students, and newly admitted students with outstanding academic results are awarded departmental scholarships.

A career in computer technology remains an attractive option despite the bursting of the dotcom bubble in 2000. The employment opportunities for our graduates are especially stable and have been little affected by global or local economic changes, as reflected by the speed with which they are snapped up by industry. Most of our students secure job offers immediately upon graduation.

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Since 2007, a double-degree Computer Science/Integrated Business Administration option is open to students who have qualified for admission to both programmes. Following the successful completion of their BSc degree within a three-year period, students continue their studies for one additional year to gain a BBA degree.

## ELECTRONIC ENGINEERING

Technological advances in electronic engineering are incorporated everywhere in our daily lives: in computers, fibre networks, mobile phones, smart cards, digital cameras, medical and security systems, etc. The work of electronic engineers includes the invention, design, development and manufacture of all kinds of analogue and digital electronic systems, and the development of the software needed to make these systems function. Our graduates pursue careers in a wide range of hi-tech industrial and business sectors, including telecommunications, computer hardware, information technology (IT), technology services, industrial manufacturing, and product design and development.



The Department of Electronic Engineering was established in 1970 by Professor Charles Kao, the former Vice-Chancellor of CUHK and 2009 Nobel Laureate who pioneered the use of optical fibres in communications. The Department currently provides a three-year undergraduate programme with a dynamic and adaptive curriculum that covers five major areas of specialisation: Biomedical Engineering, Multimedia and Signal Processing, Integrated Circuit (IC) Technology, Wireless Communications, and Microelectronics and Photonics. The courses offered are designed to convey both theoretical and practical knowledge and to provide balanced training in both hardware and software skills. Since 1975, the Department has offered an undergraduate work-study programme (the first in Hong Kong), which allows students to spend one year working full-time in selected electronics or IT companies. This programme has proved extremely useful in providing students with practical experience. In addition to students' academic performance, we also care about their personal growth. Under the Personal Tutor Scheme, teachers meet regularly with students to provide general counselling on their academic and personal development.

The Department currently has 300 undergraduate students, 110 postgraduate students and 21 professors. Its undergraduate programme is accredited by the Hong Kong Institution of Engineers (HKIE). The generous support and patronage of professional societies, industry and distinguished alumni allows the Department to offer scholarships that are available exclusively to EE students with excellent academic performance. In the 2009-10 academic year, 28 scholarships amounting to more than HK\$500,000 were awarded to our students.

For more information, please visit the Department's website at [www.ee.cuhk.edu.hk](http://www.ee.cuhk.edu.hk).

## INFORMATION ENGINEERING

Information engineering encompasses telecommunications, networking and information processing — three important and fast-growing industries in today's Information Age. 'Tele' is the key to achieving something once considered impossible — we now have teleconferencing, telemedicine and tele-education. Networking is transforming modern society, and the ability to connect computers, people and businesses is generating new business opportunities, such as eCommerce, eLogistics and eLearning. Information processing helps us to understand content, text, speech and even multimedia and virtual reality.

The mission of the Information Engineering Department is to nurture and educate engineering leaders for the information worlds of today and tomorrow. We believe that such leaders should have (1) solid engineering knowledge and skills, (2) passion and talent in specific areas, (3) good communication and interpersonal skills, and (4) a broad vision and exposure to other disciplines. Successful information engineers understand people's needs and work with them to develop technological solutions.

Since its inception, the Department has become widely known and has been highly commended for its quality research and teaching programmes. Our graduates have embarked on successful careers as IT consultants, telecommunications and network engineers, and systems developers, and have been admitted to the Master and PhD programmes of top universities worldwide, including MIT, Stanford and Cambridge. With their competitive problem-solving and project skills, many have also embarked on non-engineering careers and applied their technical expertise to helping other industries make better use of information technologies.

The Information Engineering programme has several unique features that continue to ensure its popularity and success.

- Focusing on fundamentals — we design and teach foundation courses (in engineering mathematics, computing and electronics), laboratory work and engineering projects that educate students in fundamental principles and develop their logical thinking and problem-solving skills.
- Flexibility in study planning — many major courses are offered as electives to allow students the flexibility to develop their varied interests and abilities. The Department also provides 13 units of free electives to allow students the freedom to take minor programme(s) for interdisciplinary learning.
- Streaming for specialisations — we group our major courses into three streams (Telecommunications, Internet Engineering and Information Processing) and encourage students to opt for one or more streams to achieve a good depth and breadth of study.
- Work Study Programme — Our Work Study Programme (WSP) commences in the summer of each year and reflects our belief that combining course work and industrial training will narrow the gap between academic and practical training. Students participate in the WSP on a voluntary basis one year before their final year of study. Each participant is required to spend about one year as a full-time employee of a selected local company, engaging in work related to information technology, telecommunications or application services. The student continues his or her final year of study after the internship period.
- Workshops and industrial visits — we offer summer workshops to allow students to gain practical training in IT, on such topics as network administration and security, Linux, web databases, etc. We also arrange industry visits to ensure that students gain more exposure to the IT industry in Hong Kong and mainland China.
- A double-degree option with the Faculty of Business Administration — Hong Kong is a business and financial centre in which the market is extremely eager for technology professionals with sound managerial and business skills. Students opting for this double-degree track obtain their first degree (BEng) in Information Engineering after three years and a second degree (BBA) in Integrated Business Administration upon completion of a fourth year.

## SYSTEMS ENGINEERING AND ENGINEERING MANAGEMENT

### Bachelor of Engineering Programme in Systems Engineering and Engineering Management

The objective of the undergraduate programme in Systems Engineering and Engineering Management is to offer students a well-rounded education that equips them with both a range of useful technical skills and a broad perspective on engineering and management. In support of Hong Kong's position as a major centre for finance and global logistics, our undergraduate programme offers the following three specialisation streams to provide our graduates with the knowledge and skill sets required to compete in the knowledge-based global economy of the 21st century:

- Business Information Systems
- Financial Engineering
- Logistics and Supply Chain Management

**Business Information Systems.** In today's knowledge-based economy, business information systems lie at the core of every enterprise. The Business Information Systems stream offers courses on the fundamentals of information systems analysis, design and management. Students also explore the latest advances in multilingual speech processing, artificial intelligence, data-mining and knowledge engineering. Graduates are equipped with useful concepts and techniques that allow them to analyse, design and develop information systems for business management and industrial applications.

**Financial Engineering.** Hong Kong is one of the world's major financial centres. With the advent of merging markets and round-the-clock trading, financial markets have become increasingly complex, which has forced investment and risk analysts to rely heavily on quantitative methods and information technology. In the Financial Engineering stream, students learn the fundamental concepts of finance and obtain advanced training in quantitative techniques, decision models and information systems technologies.

**Logistics and Supply Chain Management.** This stream focuses on the coordination, sharing and management of the material, financial and information flows of an enterprise's operations. Students gain comprehensive knowledge of the operations and management of the supply chain, which spans from order acceptance, material sourcing, resource allocation, production planning and manufacturing to product delivery and marketing. The Logistics and Supply Chain Management specialisation is particularly suited to Hong Kong, which has emerged as a regional centre for industrial investment and management and is a major international hub for logistics and transportation.

To help our students to broaden their horizons and develop varied interests and abilities, we encourage them to actively participate in the University/Faculty non-major enrichment programmes, including non-engineering minor programmes, work-study programmes and exchange programmes. The Department

also offers a specially created internship programme that allows undergraduate students to gain practical work experience by participating in research projects with faculty members.

Our graduates typically take up positions in logistics management, financial analysis and financial systems management, information systems design, development and support, and related fields. Many of them are currently enjoying very successful careers in such organisations as HSBC, PCCW, IBM, P&G, Kelly Logistics and the Hong Kong SAR Government.

## Double-Degree Option in SE&EM and BBA

Since 2007, students have been able to opt for a double-degree programme. They can apply to pursue a second degree in Integrated Business Administration, which is offered by the Faculty of Business Administration on a self-financing basis.

Upon completion of their studies, students are awarded a Bachelor of Engineering degree in Systems Engineering and Engineering Management (BEng-SE&EM) and a Bachelor's degree in Business Administration (BBA). This double-degree option has been designed to provide students with maximum flexibility. They may:

- (i) complete the BEng in SE&EM degree in their normative study period;
- (ii) complete the BEng in SE&EM degree with a minor offered by the Faculty of Business Administration; or
- (iii) complete the BEng in SE&EM degree and, with one extra year of study, be awarded a BBA degree.

Details of this double-degree option can be found at [www.erg.cuhk.edu.hk/ergbba](http://www.erg.cuhk.edu.hk/ergbba).

## BIOMEDICAL ENGINEERING

Biomedical engineering is an interdisciplinary field in which engineering and technology are applied innovatively to solve biological and medical problems for the benefit and welfare of mankind. The Biomedical Engineering programme is a joint venture among the engineering departments with strong support from the Faculty of Medicine in medicine-related courses and practical training. It aims to educate the next generation of biomedical engineers with aspirations of serving society and advancing healthcare at the interface of engineering, science and medicine. Students enjoy flexibility not only in learning at the forefront of engineering and medicine from core courses, but also in the variety of electives that allow them to focus on areas critical to their careers.



Biomedical engineering is a growing industry with a strong career outlook. According to the US Department of Labor, the biomedical engineering industry will grow by about 26% per year through to 2012, one of the few industries expected to register growth over the period. The demand for skilled local biomedical engineers, working alongside physicians and therapists, is projected to rise as the healthcare field continues its rapid growth and the role of technology in diagnostic, therapeutic and research activities continues to expand.

Biomedical engineering is pushing the frontiers of science and technology by using electronics, photonics principles and information technology to solve imminent problems in biology and medicine. Examples include medical instruments such as MRI, electrocardiography, cardiac pacemakers and non-invasive endoscopes. Minimally invasive bio-devices are also being developed on the micro- and nano-scale to enable the measurement of physiological phenomena at the cellular level. Students can take advantage of the breadth of cutting-edge biomedical engineering research on campus that is available through collaboration with the Faculty of Medicine.

The specialty areas in this programme are:

- Medical devices and instrumentation
- Medical imaging
- Information technology in healthcare
- Biomedical sensor technologies

Students are expected to apply their engineering and biological knowledge, in conjunction with the expertise of clinical collaborators, to analyse biomedical problems and design solutions that help medical doctors and scientists to better cure diseases, treat patients and provide preventive medicine/services to the general public. The career paths of graduates from this programme range from practicing engineer, entrepreneur in biotechnology/biomedical engineering business and health care professional to further studies in biomedical engineering, medicine and the medical sciences.

Please visit our website at [www.bme.cuhk.edu.hk](http://www.bme.cuhk.edu.hk) for more information.

## MATHEMATICS AND INFORMATION ENGINEERING

[Please click here.](#)