Department of Computer Science and Engineering

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Undergraduate Prospectus 2015-16
Mission
To push forward the frontiers of computer science and engineering, and to advance the information technology (IT) industry in Hong Kong and mainland China through quality education and high-impact, world-class research.

Illustrious History
The Department of Computer Science and Engineering at CUHK was the first computer science department to be established in Hong Kong. Our long history bears witness not only to the Department's pioneering role in the computer science and engineering education fields, but also to our sustained passion for nurturing society's computer science and engineering elite. Since its founding in 1973, the Department has expanded rapidly in terms of both the quality and quantity of its enrolment, curriculum, staff, equipment, research and service to the community.

World-Class Faculty

Emeritus Professors
CHEN Tien Chi
WONG Chak Kuen

Distinguished Professor-at-Large
YAO Andrew Chi Chih

Teaching Staff
Andrei BOGDANOV
CAI Leizhen
CHAN Lai Wan
CHAN Siu On
CHEUNG James
CHEONG Chi Hong
FU Ada Wai Choe
FUNG Ping Fu
HENG Pheng Ann
JIA Leo Jiaya
KING Irwin Kuo Chin
LAM Tak Kei
LAW Yat Chiu
LEE Jimmy Ho Man
LEE Pak Ching Patrick
LEUNG Ho Fung
LEUNG Kwong Sak
LUI John Chi Shing
LYU Michael Rung Tsong
MA Wai Man Eden
OR Siu Hang
SUN Hanqiu
TAO Yufei

Associate Professor
Professor
Assistant Professor
Assistant Professor
Lecturer
Associate Professor
Senior Lecturer
Chairman and Professor
Professor
Professor
Lecturer
Professor
Associate Professor
Professor
Professor
Associate Professor
Professor
Lecturer
Assistant Professor
Professor
Lecturer
Associate Professor
Professor

Provost, Wei Lun Professor of Computer Science and Engineering
Associate Professor
Associate Professor
Professor
Senior Lecturer
Professor of Computer Science and Engineering
Associate Professor
Assistant Professor
Professor
Assistant Professor
Lecturer
Associate Professor

THE DEPARTMENT
A Pioneer of Computer Science and Engineering in Hong Kong since 1973
Information Technology (IT) refers to the computer technology used in coding, data storage, communications and rendering, and is a major area for future development in Hong Kong. The most common forms of IT include the Internet, databases, virtual libraries, e-commerce, network security, and machine learning. The rapid development of the Internet in recent years has made it an indispensable part of our daily lives. Like the computer science departments in most technologically advanced countries, the Department of Computer Science and Engineering (CSE) at the Chinese University of Hong Kong (CUHK) has the dual mission of teaching and developing IT.

**World-Class CS /CE Programmes**

Our Department was the first such academic department in Hong Kong. Our undergraduate curricula provide a solid IT foundation in conjunction with training in practical IT applications through projects and laboratory work. The Computer Science (CS) programme covers software engineering, computer networking, the Internet, databases and multi-media technology. The Computer Engineering (CE) programme offers courses in the areas of computer interfacing, embedded systems, very large-scale integration circuit design (VLSI), computer-aided design and microprocessor systems. Students can also choose from a range of courses on such subjects as artificial intelligence, computer animation technology, virtual reality and data mining.

**An Enviable Reputation**

The rapid development of IT in recent years has created many job opportunities in software development. Our Department has provided a comprehensive curriculum to students for many years, and our ongoing efforts mean that many of our graduates now hold important positions in the IT departments of a wide range of companies and organizations. As a result, new graduates have an invaluable alumni network on which to draw. Graduates of our department are well prepared to take up jobs in software development, system design and analysis, information engineering management, and related fields. Some also choose to pursue advanced IT research.

**Superior Alumni Network**

Our Department has an enviable reputation for world-class CS/CE programmes. Our graduates are well-prepared for jobs in software development, system design and analysis, information engineering management, and related fields. Some also choose to pursue advanced IT research.
The Computer Engineering (CE) Programme was established when the Faculty of Engineering was inaugurated in 1991. The CE programme emphasizes both computer hardware and software. Our programme distinguishes itself from others by offering specialized training for students in computer design, mobile embedded systems, microprocessors and very large-scale integrated circuit (VLSI) design. It is accredited by the Hong Kong Institution of Engineers (HKIE).

With the advances in VLSI and microprocessors, innovative products such as smart phones, 3D TVs, digital cameras, supercomputers, computer games, etc., are invented continuously. Given the new challenges and opportunities ahead, our CE programme is designed to equip our graduates to meet those demands.

The Computer Science programme (CS) was launched by the Department of Computer Science and Engineering more than 30 years ago. It is accredited by the Hong Kong Institution of Engineers (HKIE) and has gained international reputation for excellence in research and teaching.

The primary goal of the Computer Science programme is to prepare graduates to understand the field of computing and engineering with a global view of both the academic discipline and profession. The programme strives to achieve this through broad and coherent coverage of the computer science disciplines by exposing our students to the basic theories as well as to advanced high-level concepts and system integration skills. We also expect our students to be sympathetic to ethical, professional and societal issues associated with information technologies. The programme prepares our students to be independent thinkers who possess good problem-solving skills, the ability to learn independently and the desire for life-long learning.

The CE covers the following areas:

- **APPLICATIONS**
  - Mobile embedded devices, computer graphics, multimedia processing.

- **COMPUTER HARDWARE**
  - Circuity theory, logic system design, computer architecture and interfacing, computer arithmetic; Field Programmable Gate Array (FPGA) Applications.

- **COMPUTER SOFTWARE**
  - Programming, data structure, operating systems, algorithm, software engineering.

- **VLSI**
  - Very large-scale integrated circuit (VLSI) design; Computer-aided design and applications.

- **SYSTEM CONNECTIVITY**
  - Computer network

Other advanced topics
- Hardware-accelerated bio-related processing
- Hardware-aided security
- Multi-core systems and architecture
- Reconfigurable computing
- Super-computing

Computer Engineering Streams
- Embedded Systems
- VLSI Design and EDA

Details of the Computer Engineering Programme can be viewed at: http://www.cse.cuhk.edu.hk/ce/

The CS programme covers the following areas:

- **ARTIFICIAL INTELLIGENCE**
- **COMPUTER AND NETWORK SECURITY**
- **COMPUTER NETWORKING**
- **COMPUTER-AIDED DESIGN**
- **DATABASES**
- **DIGITAL HARDWARE TECHNOLOGIES**
- **INFORMATION SYSTEMS**
- **INTERNET**
- **MULTIMEDIA TECHNOLOGY**
- **PROGRAMMING LANGUAGES**
- **SOFTWARE ENGINEERING**
- **THEORETICAL COMPUTER SCIENCE**

Computer Science Streams
- Intelligence Science
- Database and Information Systems
- Rich Media
- Distributed Systems, Networks and Security
- Theoretical Computer Science
- Data Analytics

Details of the Computer Science Programme can be viewed at: http://www.cse.cuhk.edu.hk/cs/
The curriculum is built on a credit-unit system, and the normative period of study is four years. Students have to complete 123 units and satisfy requirements under separate categories. Students with an Associate Degree / Higher Diploma / GCE AL/ IB can apply for the programme through non-JUPAS admission. They may be admitted with advanced standing and could be exempted from up to 24 units. We also provide a 2-year curriculum for outstanding Associate Degree / Higher Diploma holders. Students admitted to the 2-year curriculum are required to complete at least 69 units for graduation. The overall curriculum structure is as follows:

**4-year curriculum**

Secondary school students taking the HKDSE should apply for admission through JUPAS. (JUPAS code: JS4401)

Students with other qualifications can apply through the non-JUPAS admission scheme. These qualifications include Associate Degree/Higher Diploma, HKALE, GCE, IB, SAT/AP and other overseas qualifications for university admission. Applications will be assessed on a case-by-case basis.

Please refer to the website of the Office of Admissions and Financial Aid (www.cuhk.edu.hk/adm/nonjupas) for further information.

A non-JUPAS or international applicant may apply for “Admission with Advanced Standing” if they meet specific requirements on specific qualifications (including GCE-AL, IB, Cambridge Pre-U, HKALE, Associate Degree/Higher Diploma). For students admitted with Advanced Standing, the minimum number of units for graduation may be reduced by up to 24 (the normative period of study may be reduced by up to one year). Applicants will be required to indicate in the application form whether they would like to be considered for “Admission with Advanced Standing”.

**2-year curriculum**

Students with a Higher Diploma / Associate Degree from local institutions can apply for the senior year admission in Computer Science or Computer Engineering. Please refer to the website of the Office of Admissions and Financial Aid (www.cuhk.edu.hk/adm/subdegree) for further information.

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<tr>
<th>Components</th>
<th>Units</th>
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<td>University Common Core</td>
<td>16-22</td>
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<tr>
<td>English</td>
<td>9</td>
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<tr>
<td>Chinese</td>
<td>6</td>
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<td>Physical Education</td>
<td>2</td>
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<tr>
<td>Major Programme</td>
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<tr>
<td>Faculty package</td>
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<tr>
<td>Foundation Science courses</td>
<td>12</td>
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<tr>
<td>Foundation Mathematics courses</td>
<td>45</td>
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<th>Free Electives</th>
<th>Remaining units</th>
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<tr>
<td>Total units requirements</td>
<td>At least 123 units</td>
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<tr>
<td>At least 99-105 units</td>
<td>At least 69 units</td>
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* The 1-unit course will be exempted for Engineering students who have successfully completed the Faculty package.
**Study Timeline**

**4 YEAR CURRICULUM**

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**Major courses**
75 UNITS

**University Common Core**
39 UNITS

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<tr>
<th>Year 1</th>
<th>Faculty package + Foundation Mathematics courses + Foundation Science courses</th>
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<td>Year 2</td>
<td>Major required courses</td>
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<td>Year 3</td>
<td>Stream courses</td>
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<td>Year 4</td>
<td>Stream courses + Final Year Project</td>
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**Professional Career Development**

**CAREER PROSPECT**

Over the years, the Department of Computer Science and Engineering has built up a large alumni network in the computer industry not only in Hong Kong, but also in the USA and Mainland China. Many of our graduates have taken up important positions in various organizations and companies, such as the HKSAR government, HSBC, Intel, Microsoft, IBM and Google. Through this network, our graduates can enjoy comparative advantages in professional career development. Quite a number of our graduates have started their own businesses and become successful entrepreneurs. Others have continued their postgraduate studies and taken up the teaching and research work in prestigious institutions both locally and overseas.

Chief Information Officer / Chief Executive Officer / Entrepreneur

IT Project Manager / IT Consultant / IT Security Specialist

Software Engineer / Computer Hardware Engineer / System Engineer / Mobile Application Developer / Programmer / Game Designer / IT Trainees

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* The 1-unit course will be exempted for Engineering students who have successfully completed the Faculty package.
Engineering Leadership, Innovation, Technology and Entrepreneurship Stream (ELITE Stream)

The ELITE Stream is offered by the Faculty to students with excellent academic performance. Its aim is to nurture outstanding engineering students and to develop their potential through challenging additional coursework and invaluable extracurricular activities. Any student who is admitted under the 4-year curriculum and who meets the entrance requirements is eligible for the Stream. The award of the ELITE Stream to qualified students will be officially recorded on the academic transcript.

A series of stimulating and inspiring courses will be offered exclusively for ELITE students. There is a student society as well as special exchange opportunities, social and scholarly events specially organized for ELITE students.

Details of the entrance and coursework requirements and the declaration procedures for the ELITE Stream can be viewed at: www.erg.cuhk.edu.hk/elite

Undergraduate Summer Research Internship

The Faculty has launched the Undergraduate Summer Research Internship Programme to support students who wish to undertake a research project under the supervision of professors in summer. This programme gives students exposure to the research environment, and grooms them for graduate studies and summer research schemes overseas.

International Exchange

The University has exchange agreements with over 203 higher education institutions in nearly 30 countries/regions covering Asia, Australia, Europe and the Americas, including the world’s top universities: the Massachusetts Institute of Technology (MIT) (USA), Stanford University (USA), the California Institute of Technology (Cal Tech) (USA), the University of Toronto (Canada), the University of Liverpool (UK), the Technical University of Denmark (Denmark), the National University of Singapore (Singapore), the Nanyang Technological University (Singapore), the University of New South Wales (Australia), Osaka University (Japan), Seoul National University (Korea), Tsinghua University (China), Peking University (China), etc.

Professor Charles K. Kao Research Exchange Scholarship

To pay tribute to Professor Charles K. Kao for his achievements in science and technologies and to commemorate his being awarded the Nobel Prize in Physics 2009, the University has set up the Charles K. Kao Scholarship Endowment Fund through private donations. Part of the Fund will be used to award scholarships for summer research exchange programmes for undergraduate students for the Faculty of Engineering and the Department of Physics.

Placement and Internship Programme (PIP)

To enhance their future career development, students are encouraged to participate in the Placement and Internship Programme (PIP). It provides opportunities for students to apply what they learnt in university to the workplace. Students gain better understanding of the operation of business and the nature of the job. Under the PIP, students may apply to work in a corporate or selected commercial industry for either a term or a year, and then return to campus to study for the final year. The work experience obtained from the PIP has been approved by the Hong Kong Institute of Engineers as one of the requirements for membership application. Also, students generally have a good chance of being hired by their internship companies after graduation. Details of the Placement and Internship Programme (PIP) can be viewed at: http://pip.cintec.cuhk.edu.hk/

Double Degree Options

The Faculty of Engineering, in collaboration with the Faculty of Business Administration here at the Chinese University of Hong Kong, is offering double degree options in Engineering and Business Administration starting from the 2007 entry.

Entrants to this double degree programme would pursue their first bachelor degree in Computer Engineering/Computer Science and upon completion of the first degree, pursue the second bachelor degree in Integrated Business Administration (IBBA) in the Faculty of Business Administration. Upon successful completion of their studies, students are awarded a Bachelor of Engineering in Computer Engineering (B.Eng.) or a Bachelor of Science in Computer Science (B.Sc.), and Bachelor of Business Administration (IBBA) with a major in Integrated Business Administration (IBBA). Details of Double degree Options: http://www3.erg.cuhk.edu.hk/erg/ergbba
The Department not only encourages students to excel academically, but also to enjoy their University life. Social skills and networking are important parts of personal development. Some of the activities available to students are listed here.

**STUDENT ACTIVITIES**

*International Competitions*
Students have opportunities to join international or regional competitions, including the ACM-ICPC International Collegiate Programming Contest; the Intel Cup Undergraduate Electronic Design Contest – Embedded System Design Invitational Contest; the "Challenge Cup" Extracurricular Academic Science and Technology Works Competition; the Asia Student Supercomputer Challenge (ASC); and the Robocon Hong Kong Contest.

*Engineering Concert*
Many of our students enjoy playing musical instruments. The Faculty of Engineering Concert is held annually, and staff and students are encouraged to participate. All types of music, including classical, rock, Western and Chinese, are included in the programme, and the concert is normally held in the University’s Lee Hysan Concert Hall.

*CS Cup*
The annual ‘CS Cup’ organized by the Computer Science Society to encourage social interaction between students and staff has become a departmental tradition. The event, which includes a variety of games and activities played after hours, spans several weeks and provides enjoyment for all. Five teams, one from each of the four Computer Science undergraduate years and another comprising the Department’s tutors and professors, compete in such friendly events as tug of war, skipping, football, Chinese chess, table tennis, Monopoly, UNO, basketball, cards, computer games, badminton and singing.

Recalling my life as a CSE student at CUHK, I can’t help but appreciate how nice and inspiring the place is. CSE is a place full of humanity, fun and collaboration. It brings together many talented students and passionate professors. I feel grateful that I met some of my best friends there who had gone through many obstacles with me. After we finished school, we continued to inspire each other with interesting insights. I was challenged by many difficult goals, which I used to think were impossible to achieve. But again and again, this kind of thoughts was proven inaccurate.

With great help from professors, our limits were always pushed and exploited. The sense of achievement was incredible and I couldn’t be more thankful for everything I learnt during the process.

Lee Wai Tong
BSc in Computer Science 2012
Software Engineer at Apple Inc.

Hung Ka Wai
BSc in Computer Science 2015

I am pleased to have completed my Bachelor’s degree in the Computer Science Department at CUHK. During my time in the department I gained versatile knowledge of computer science, ranging from basic skills such as algorithms, to practical applications such as programming. Apart from regular courses, I also joined a research program held by the engineering faculty, where I learned how to carry out research, and gained some insight on postgraduate life in academia. Other than academics, CUHK offers many different student clubs and activities I participated in the Dance Society, and was also responsible for holding orientation camp for two years. Through these activities I have met a lot of friends from other departments. Moreover, I lived in the New Asia College dormitory for three years, where I also had a great experience. During my final year, I decided to travel to Japan for a year-long exchange. The exchange broadened my horizons and helped me become more open-minded towards different cultures. It has truly been an important and life-changing experience, and was an exceptional way to end my last year of undergraduate study. Thank you to the Chinese University of Hong Kong and Computer Science department for the amazing education and opportunities that I have had the privilege to enjoy for the past four years.

Hung Ka Wai
BSc in Computer Science 2015
During my studies in the Computer Engineering program, I really learnt a lot of interesting things, varying from software engineering skills to hardware development skills. The cyber-world is no longer a mystery to me. Those bits and bytes become meaningful and now it’s possible to see through the monitor and know what’s happening behind the screen. It’s really good to know, understand and even master the tricks of the geeks who have developed the apps on your smart phone, and have built those tiny chips that are essential in your daily life.

In CENG4480 Embedded System Development and Applications, I first encountered and put my hands on an embedded system, and then was fascinated by embedded technology. An embedded system is the technology that makes the world ‘smart’. I spent one a summer on Summer Research Internship provided by the Faculty of Engineering to build a Quadcopter with my partner Tony, and we together delved deeper into Multi-Quadcopter Formation in our final Year project. It’s great fun to see what you have built act in response to your command, and even react faster smarter than a human could by using the algorithm you came up with. I’m so fascinated by Embedded System that I also took part in the Intel Cup in my final year, trying to build a robot that can automatically take photos for users.

Computer Engineering really provides you with many chances to build your own device. It teaches you how to program, and also how to construct an electronic system. The sense of achievement when you power up your own invention and watch it working as you have expected is fabulous. And there are many knowledgeable professors, PhD and Mphil students willing to provide assistance when you meet difficulties. Thanks to Computer Engineering, I acquired both Software and hardware skills, and I’m now ready for the challenge in the future. You will also learn a great deal if you join the Computer Engineering programme!

HUANG, Zilong Edward
BEng in Computer Engineering 2014
Master of Science student in Electrical and Computer Engineering in Carnegie Mellon University, Silicon Valley

Choosing CUHK CSE

WORDS FROM ALUMNI