Postgraduate Programs and Research

Postgraduate Programs

The Department offers postgraduate programs leading to the degrees of Master of Science (MSc), Master of Philosophy (MPhil), and Doctor of Philosophy (PhD) in Electrical and Electronic Engineering.

Full-time and part-time options are available for the MSc, MPhil and PhD degrees. Full-time students can take, at most, 12 credits per semester whereas part-time students can take, at most, 8 credits per semester.

Master of Science (MSc) Program in Electronic Engineering

Program Director:

Bertram SHI, BS, MS *Stanford*; PhD *Univ of California, Berkeley*
   (Associate Professor of Electronic and Computer Engineering)

At a very fundamental level, the increasing speed at which we can acquire, interpret, and take action based on information impacts on many of the changes we are observing in the modern world. Much of this increased speed is due to advances in Electronic Engineering. Advances in automation and control enable factories to reconfigure their production lines to respond to market driven changes in products. Advances in networking, communication, photonics and display technologies increase the speed at which information can be transmitted around the world as well as the number of ways we can access that information. Advances in signal processing and pattern recognition enable computers to automatically inspect the quality of production lines, respond to natural human input, or improve medical diagnostic technology. Powering these technologies are advances in chip design and computer architecture. Indeed, technology is advancing across a broad front of areas at such a rapid pace that even recent degree holders find their knowledge base fast becoming obsolete. The MSc program in Electronic Engineering brings students up-to-date in state-of-the-art technologies which are changing the way we work and interact in an increasingly interconnected world.

Admission Requirements

Applicants must hold a bachelor's degree in electrical, electronic or computer engineering, a bachelor's degree in a related field, or an equivalent qualification from a university or tertiary institution.

Program Fee

The program fee is HK$80,000. There is no reduction in tuition fee for students who transfer credits into the program. Students who need to retake or substitute for failed course(s) are required to pay the pro-rata fee for the course(s) involved.

Curriculum

The program, which can normally be completed in one year on full-time mode or two years on part-time mode, requires students to take a total of 24 course credits of course work. Lectures will be given at the University campus or other venues in Hong Kong. Classes will be held in the evenings and/or weekends.

Students are required to take five courses (15 credits) from the following course list:

EESM	501	CMOS VLSI Design	[3-0-0:3]
EESM	510	Photonics Technology and Applications	[3-0-0:3]
EESM	514	Digital Communication Networks and Systems	[3-0-0:3]
EESM	525	Flat Panel Displays	[3-0-0:3]
EESM	532	Image and Video Signal Processing	[3-0-0:3]
EESM	534	Signal Analysis and Pattern Recognition	[3-0-0:3]
EESM	570	Feedback Control Theory	[3-0-0:3]
EESM	581	Advanced Computer and Networking Architectures	[3-0-0:3]
EESM	600*	Special Topics	[3-0-0:3]
EESM	690	Independent Study	[3 credits]

* *Students may take EESM 600 for a maximum of 3 credits.*

Students may take the remaining 9 credits of course work from the above course list. Alternatively, subject to the prior approval of the Program Director, students may take a maximum of 9 credits of course work offered by other self-financing MSc programs, including

(a) a maximum of 9 credits of EESM courses offered by the MSc program in IC Design Engineering, and the MSc program in Telecommunications, or

(b) a maximum of 3 credits of non EESM courses.

The availability of courses offered by other self-financing MSc programs may be subject to quota limitations imposed by individual programs.

Credit transfer may be granted to students in recognition of studies satisfactorily completed elsewhere. Applications must be made to the Department within students' first semester of study after admission. A maximum of three credits of UG courses at the 300-level or above which had not been used to earn another academic qualification can be transferred into the program. All credit transfer must be approved by the Program Director and is subject to university regulations governing credit transfer.

Course Assessment and Graduation Requirements

Regular attendance of courses is expected. Courses will be assessed according to the grading scheme used for postgraduate courses. Students in the program must complete the program with a graduation grade average (GGA) of B or above as required for all postgraduate students at HKUST. If a student fails to meet the graduation grade average requirement, he/she is required to repeat or substitute the course(s).

Master of Science (MSc) Program in IC Design Engineering

Program Director:
Wing-Hung KI, BS *Univ of California, San Diego*; MS *California Inst of Tech*; PhD *Univ of California, Los Angeles*
(Associate Professor of Electronic and Computer Engineering)

Hong Kong is rapidly shifting to a knowledge-based economy. There is an increasing need to upgrade the knowledge of the professional workforce, particularly on subjects which are related to modern technological advances in the fields of information technology and integrated circuit design engineering.

IC design is a prime example of a knowledge-based industry. Workers in the industry are highly skilled professionals. The chips they design provide high added value to the end-products. Today, integrated circuit design and manufacturing is a highly specialized and global business. A chip may be designed by an IC design company in Hong Kong and fabricated in a wafer foundry in Taiwan. The wafer packaging and assembly may be done in Hong Kong and the final testing may be carried out in Malaysia. The finished chips are then shipped to customers in the Pearl River Delta (PRD) region. The IC business is now a highly segmented business and there are many specialized and low-cost service providers. These service providers are extremely competitive. IC design is on the top of the 'food-chain'. The IC design companies provide the most added value in the entire product development and manufacturing cycle. They are often called fabless design houses since these companies do not have their own manufacturing facility (or Fab). Hong Kong has several geographic and infrastructural advantages for engaging in the fabless IC deign business, thus creating enormous need for education.

The MSc program in IC Design Engineering is a master's degree program designed for professionals with a bachelor's degree in engineering or science who are interested in acquiring in-depth knowledge in microelectronic engineering, or upgrade their knowledge in the subjects of integrated circuit design engineering. Students may choose the full-time option to finish the program in around a year, or they may choose the part-time option to finish in two years if they cannot afford to leave their current jobs.

Admission Requirements

Applicants must hold a bachelor's degree in electronic engineering, engineering, or physical sciences with second-class honors or higher, or an equivalent qualification from a university or tertiary institution.

Program Fee

The program fee is $80,000. There is no reduction in tuition fee for students who transfer credits into the program.

Curriculum

The program comprises a total of 24 course credits. It normally requires two years for completion. All lectures will be delivered at HKUST, or suitable venues in Hong Kong and/or Mainland China. Classes will be held in the evenings and/or weekends.

Students are required to take 21 credits of courses from the following course list and complete 3 credits of MSc Project:

EESM	501	CMOS VLSI Design	[3-0-0:3]
EESM	503	Analog IC Analysis and Design	[3-0-0:3]
EESM	504	Advanced Analog IC Analysis and Design	[3-0-0:3]
EESM	506	Semiconductor Devices for Integrated Circuit Designs	[3-0-0:3]
EESM	508	IC Systems Design and Analysis	[3-0-0:3]
EESM	516	Digital VLSI System Design and Design Automation	[3-0-0:3]
EESM	518	VLSI Signal Processing Architecture	[3-0-0:3]
EESM	600*	Special Topics	[3-0-0:3]
EESM	692	Topics in Analog IC Systems and Design	[3-0-0:3]
EESM	698	MSc Project	[3 credits]

* *Students may take EESM 600 for a maximum of 3 credits.*

Subject to the approval of the Program Director, students who had previously taken courses similar to those listed above may take a maximum of 6 credits of courses offered by the MSc Program in Electronic Engineering and the MSc Program in Telecommunications to fulfill the graduation requirement. Credit transfer may be granted to students in recognition of studies completed successfully elsewhere. Upon the approval of the Program Director, a maximum of 9 credits can be transferred to the program. For regulations governing credit transfer for postgraduate programs, please refer to Section 31 of the Postgraduate Regulations in this Calendar.

Course Assessment and Graduation Requirements

Regular attendance of courses is expected. Courses will be assessed according to the grading scheme used for postgraduate courses. Students in the program must complete the program with a graduation grade average (GGA) of B grade or above. If a student fails to meet the graduation grade average requirement, he/she is required to repeat or substitute the course(s).

Master of Science (MSc) Program in Materials Science and Engineering

This multidisciplinary program is jointly offered by the Departments of Chemistry, Physics, Chemical Engineering, Electronic and Computer Engineering, and Mechanical Engineering. For details, please click here.

Master of Science (MSc) Program in Telecommunications

Program Director:
Ross David MURCH, BEng, PhD *Univ of Canterbury, Christchurch*
(Professor of Electronic and Computer Engineering)

Due to the rapid introduction and proliferation of telecommunication technologies such as Dense Wavelength Division Multiplexing (DWDM) Networks, wireless Local Area Network (WLAN), 3G systems, broadband multimedia communication, etc, there is a need for the telecommunication practitioners, technologists and managers to update themselves. The objective of the program is to provide students with a comprehensive and up-to-date knowledge on the latest topics in telecommunications.

The MSc program in Telecommunications is a degree program designed for people with a bachelor's degree in science or engineering who are interested in acquiring in-depth knowledge in telecommunications.

Admission Requirements

Applicants must hold a bachelor's degree in electronic engineering, or engineering or physical sciences or an equivalent qualification from a university or tertiary institution.

Program Fee

The program fee is $80,000. There is no reduction in tuition fee for students who transfer credits into the program.

Curriculum

The program comprises a total of 30 course credits which can normally be completed in two years. All lectures will be given at HKUST, or suitable venues in Hong Kong and/or Mainland China. Classes will be held in the evenings and/or weekends.

Students are required to take 24 credits of EESM courses from the following course list and complete 6 credits of MSc Project:

EESM	515	IP Networks	[3-0-0:3]
EESM	520	Telecommunication Regulations, Markets, and Services	[3-0-0:3]
EESM	536	Digital Communications	[3-0-0:3]
EESM	539	Broadband Communication Networks	[3-0-0:3]
EESM	540	Introduction to Telecommunication Networks	[3-0-0:3]
EESM	546	Wireless Communication Systems	[3-0-0:3]
EESM	547	Multimedia Signal Processing	[3-0-0:3]
EESM	600*	Special Topics	[3-0-0:3]
EESM	691	Topics in Telecommunications and Network Convergence	[3-0-0:3]
EESM	698	MSc Project	6 credits#

* *Students may take EESM 600 for a maximum of 3 credits.*

Each MSc Project carries 1-3 credit(s). Students are required to repeat this course to obtain 6 credits for graduation.

Subject to the approval of the Program Director, students who had previously taken courses similar to those listed in the program curriculum may take a maximum of 6 credits of courses offered by the MSc Program in Electronic Engineering and the MSc Program in IC Design Engineering to fulfill the graduation requirement. Credit transfer may be granted to students in recognition of studies completed successfully elsewhere. Upon the approval of the Program Director, a maximum of 9 credits can be transferred to the program. For regulations governing credit transfer for postgraduate programs, please refer to Section 31 of the Postgraduate Regulations in this Calendar.

Course Assessment and Graduation Requirements

Regular attendance of courses is expected. Courses will be assessed according to the grading scheme used for postgraduate courses. Students in the program must complete the program with a graduation grade average (GGA) of B grade or above as required for all postgraduate students in HKUST. If a student fails to meet the graduation grade average requirement, he/she is required to repeat or substitute the course(s).

Master of Philosophy (MPhil) Program in Electronic and Computer Engineering

The MPhil program is designed for students who are interested in pursuing a career in research and development in industry or academia. It is also an excellent preparation for those interested in pursuing a PhD degree.

Besides completing an approved postgraduate course sequence, an MPhil student must complete, under the supervision of a research advisor, a research project leading to a master's thesis and pass an oral thesis defense. To be eligible for an MPhil degree, a student must:

- complete at least 15 credits (excluding ELEC 690 Independent Study and LANG 501 Group Communication Skills Development) of approved coursework, of which at least 9 in Electronic and Computer Engineering;
- pass LANG 501 Group Communication Skills Development, except those who register in the part-time mode; and
- undertake research leading to a satisfactory thesis.

Students can be exempted from taking LANG 501 by the Department Head or PG Coordinator. This exemption will be granted based on students' background and/or the English proficiency assessment of the Language Center.

In addition to the program requirements specified above, students who opt for the Nanotechnology concentration are required to

- take one NANO course*;

  * *NANO 540 and NANO 545 can be counted as ELEC elective courses in partial fulfillment of the 15-credit requirement of the program.*

- complete NANO 601 for one semester; and
- conduct research in nano area.

Doctor of Philosophy (PhD) Program in Electronic and Computer Engineering

The PhD program caters for students who wish to pursue a career in advanced industrial research and development, or university research and teaching. It emphasizes training in original thinking and independent research. To be eligible for the PhD degree, a student must:

- complete at least 15 credits (excluding ELEC 690 Independent Study and LANG 501 Group Communication Skills Development) of approved postgraduate coursework, of which at least 9 in Electronic and Computer Engineering;
- enroll for ELEC 695 Departmental Seminar, except those who register in the part-time mode;
- pass LANG 501 Group Communication Skills Development, except those who register in the part-time mode;
- pass the qualifying examination within two years after admission, with a maximum of 2 attempts;
- pass the Thesis Proposal before the final Thesis Defense; and
- undertake research leading to a satisfactory doctoral thesis.

Students can be exempted from taking LANG 501 by the Department Head or PG Coordinator. This exemption will be granted based on students' background and/or the English proficiency assessment of the Language Center.

In addition to the program requirements specified above, students who opt for the Nanotechnology concentration are required to

- take one NANO course*;

  * *NANO 540 and NANO 545 can be counted as ELEC elective courses in partial fulfillment of the 15-credit requirement of the program.*

- complete NANO 601 for one semester; and
- conduct research in nano area.