



香港中文大學
The Chinese University of Hong Kong



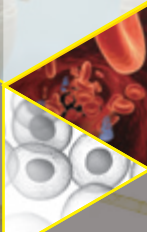
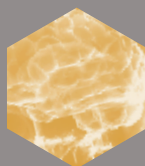
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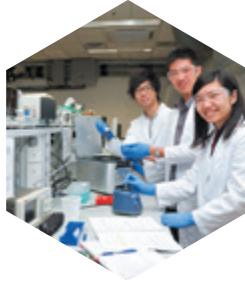
BEng (Hons) in Biomedical Engineering

Offered by the newly established
Department of Biomedical Engineering
The Chinese University of Hong Kong

Explore

*Innovate.
Care*





What is Biomedical Engineering?

Biomedical Engineering (BME) is an interdisciplinary study in which engineering and technology are applied innovatively to solve human health problems.

What do we offer?

Our BME (Hons) programme is offered by the Faculty of Engineering in close collaboration with the Faculty of Medicine. We equip our students with:

- a solid foundation in the underpinning sciences & mathematics,
- critical thinking & innovative problem-solving skills in interdisciplinary contexts,
- knowledge and competence in the design and development of medical devices,
- awareness of the emerging trends of healthcare & related industries, and
- passion & capacity for life-long learning.

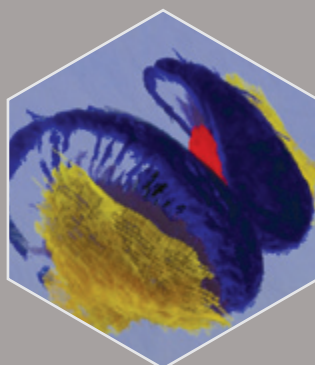
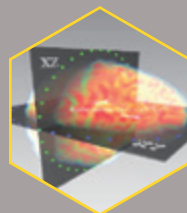
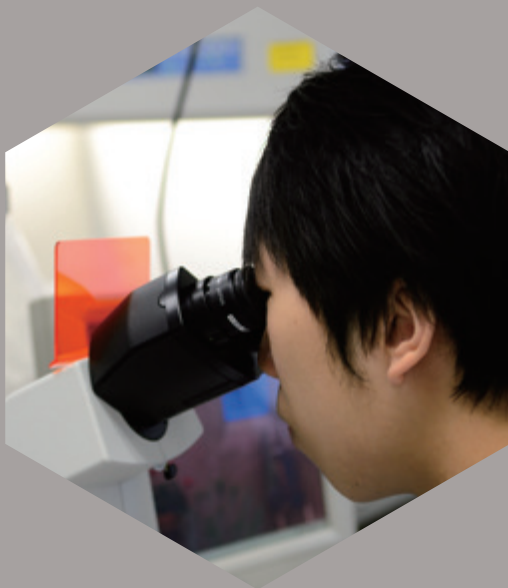
Admission Criteria (for JUPAS students)

We look for students who like science subjects, love to EXPLORE, INNOVATE and CARE, passionate for learning in breadth as well as in depth, ready to acquire new knowledge across disciplines, and eager to apply their learning to solve real-life problems in the medical and healthcare industries.

Students are expected to have completed at least two elective subjects plus the four core subjects. One of the electives should be Physics, Chemistry, Biology, Combined Science, or Mathematics Extended Module M1/M2. Priority score are computed based on the Best 5. A higher weighting of 1.5 will be given to English, Physics, Chemistry, Biology, Combined Science and one of the Mathematics subject (either the core Mathematics or the M1/ M2 Extended Module).

Scholarships

Ample scholarships are available through multiple sources – the Office of Admission and Financial Aids, Colleges, as well as Faculty of Engineering. Department of Biomedical Engineering also provides subsidies for students to encourage students to participate in international competitions and conferences.





BME Curriculum

Lower Years	Engineering Foundation	Free Electives*, General Education & Languages
	Biology / Chemistry / Physics, Engineering Design, Engineering Mathematics, Programming	Biomedical Sciences
	BME Fundamentals	Business Administration
	Anatomy and Physiology, Biomechanics, Cell and Molecular Biology, Circuits and Signals, Engineering Mathematics	Accounting Law
Upper Years	Advanced Major Courses	Science
	Biomaterials and Tissue Engineering, Medical Instrumentation and Design, Global Medical Device Regulations	Arts Social Science
	One-year Work Study Program (optional)	Physical Education
	Electives for BME Streams	English
	Graduation Project BME Electives	Technical Communications

* Units for free electives can be used to fulfill the minor requirement.





Streams

Medical Instrumentation & Biosensors

TeleMedicine & Mobile Healthcare	Biofluids	Neuroengineering
Medical Robotics	BioMEMS	Bionanotechnology

- Recommended to minor in Electronic Engineering, Mechanical & Automation Engineering, OR Physics

Biomedical Imaging, Informatics & Modeling

Bioinformatics	Biomedical Imaging	Biomedical Modeling
Medical Imaging Applications	Sound and Light Waves in Medicine	

- Recommended to minor in Computer Science, OR Electronic Engineering

Molecular, Cell & Tissue Engineering

Cell Biology	Genetic Engineering	Bionanotechnology
Musculoskeletal Tissue Engineering		
Biomolecular Engineering	BioMEMS	

- Recommended to minor in Biology, OR Biochemistry



BME + Business Administration Double-Degree Programme

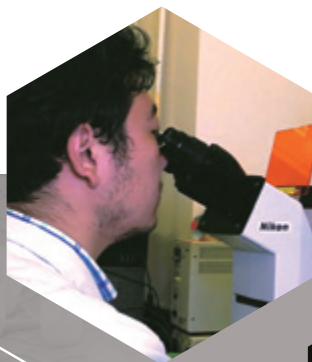
The double degree option is designed to provide students with maximum flexibility to acquire a second degree by an additional year of study after their first degree. Biomedical engineering students can pursue a second bachelor's degree in the Faculty of Business Administration within a 5-year normative period of study if they fulfill certain requirements. For further information, please refer to the Faculty website at <http://www.erg.cuhk.edu.hk/erg/ergbba>.



BME Minor Programme

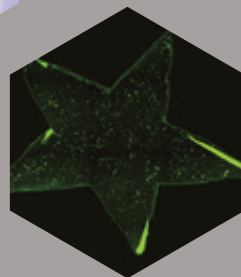
The BME minor programme is a good option for students with a science background to apply engineering tools on medical science and biology. For details, see the curriculum information in our website: <http://www.bme.cuhk.edu.hk>.

Areas of Research



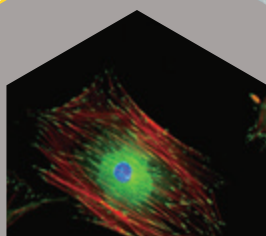
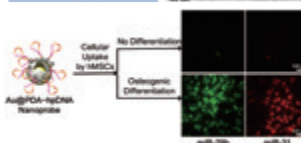
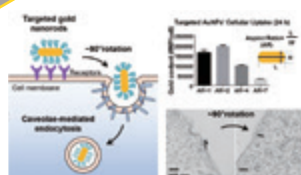
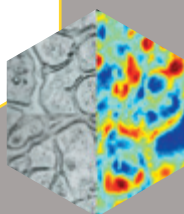
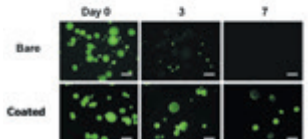
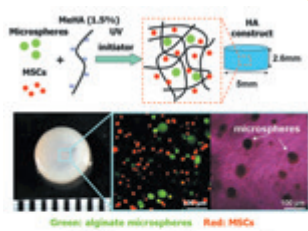
Biomaterials and Regenerative Medicine

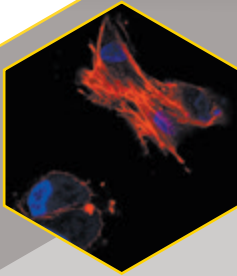
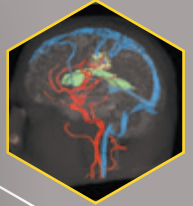
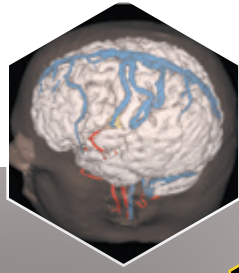
Biomaterials scaffolds, stem cell technology, microenvironmental cues in stem cell differentiation, biophysical stimulation and mechanobiology



Biomolecular Engineering and Nanomedicine

Lab-on-a-chip biosensors, point-of-care devices, microfluidic manipulation and detection of biomolecules, bionanotechnology and delivery of diagnostic and therapeutic molecules



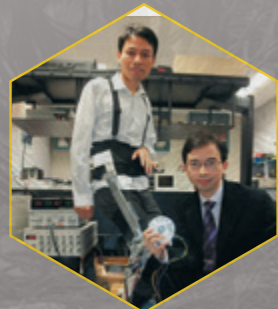


Medical Imaging and Informatics

Computer-aided diagnosis, functional magnetic resonance imaging, terahertz imaging and spectroscopy, biomedical optics, bioinformatics, health informatics, telemedicine

Medical Instrumentation and Biosensors

Wearable sensors and mobile health, home healthcare technology, surgical robotics, wireless capsule endoscopy, wearable robotics for rehabilitation





Hospital Training

Students are required to participate in a two-week summer training in the Prince of Wales Hospital. During the training, students can experience the daily operation, information flow and logistics in the running of a hospital. They will also learn about the fundamentals and the clinical use of medical instruments. The summer training provides a valuable chance for students to relate theory and engineering knowledge to practice in a real-world setting.



Students' Sharing

Cola HO (Class of 2014):

It was surely an unforgettable experience which urges me to think about the contributions of biomedical engineers to those who desperately need help.

Nico CHEN (Class of 2017):

The training was eye-opening and exposed us to multitudinous hospital equipment and facilities, granting us a real-time perception of the state-of-the-art technologies adopted by hospital personnel. We were invited to observe the machinery operation on patients with their consent, polishing our viewpoint on our role as biomedical engineers of the next generation.



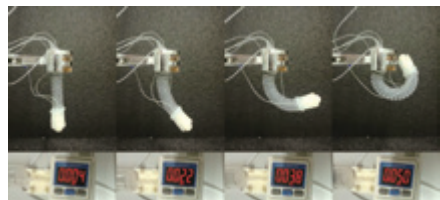
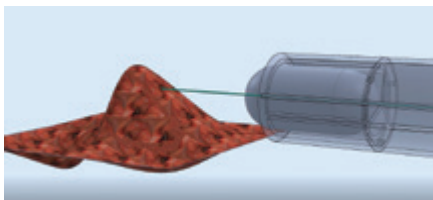
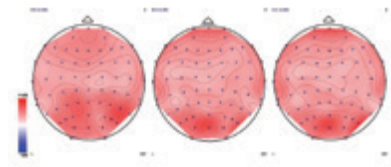


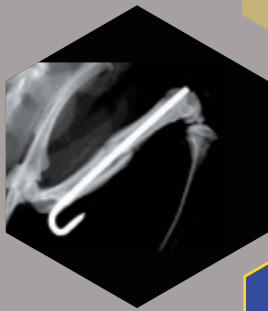
Graduation Project

Graduation projects are offered from both Faculty of Engineering and Faculty of Medicine. Recent project topics include:

Medical Instrumentation & Biosensors

- EEG brainwave system to analyze the effects of background music on college students
Supervised by Biomedical Engineering Programme, Year 2015-16
- Biomimetic soft crawling robot for GI tract inspection
Supervised by Department of Surgery, Year 2016-17



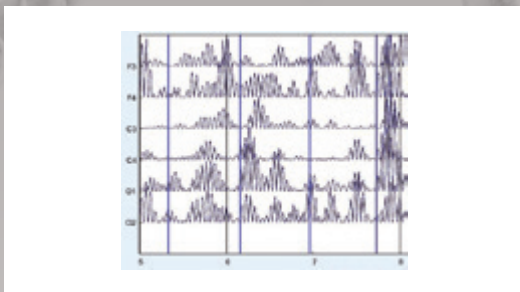
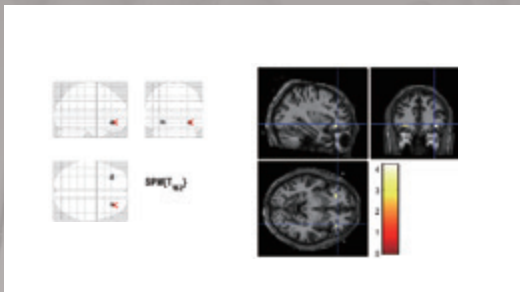


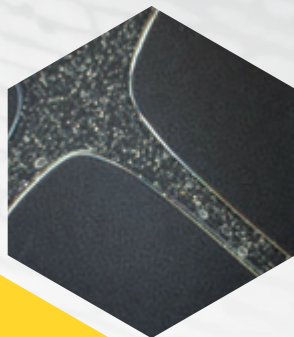
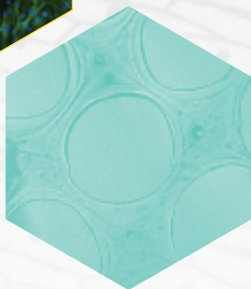
Biomedical Imaging, Informatics & Modeling

- Application of contrast agent to enhance the quality of computed tomography (CT) imaging for evaluating fracture healing
Supervised by Department of Orthopaedics and Traumatology, Year 2015-16

- Fusion of EEG and fMRI

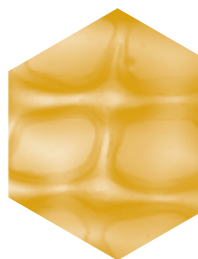
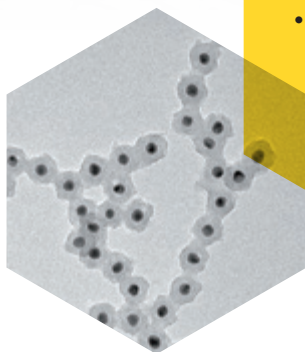
Supervised by Department of Medicine & Therapeutics, Year 2015-16



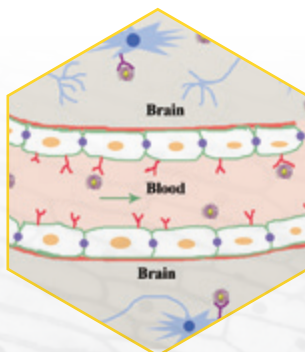


Molecular, Cell & Tissue Engineering

- Bioink Development for Organ Printing
*Supervised by School of Biomedical Sciences,
Year 2016-17*



- Development of bionanomaterials for neuron targeting
*Supervised by Biomedical Engineering
Programme, Year 2016-17*



Experiential Learnings

Based on interests, students are encouraged and supported to participate in various experiential learning activities, such as academic exchanges, community services, early research exposures, international design competitions, study field trips, summer internships, work-study, etc. Examples are provided below.



Design Competitions

- iGEM, International Genetically Engineered Machine Competition at the Massachusetts Institute of Technology (MIT)
- Engineering Medical Innovation Global Competition in Taipei
- Hong Kong University Student Innovation and Entrepreneurship Competition

Local Summer Industrial Internships

- Academy of Science Shenzhen Institute of Advanced Technology
- Philips Electronics Hong Kong Ltd., etc.
- Hospitals such as the Hong Kong Adventist Hospital and Prince of Wales Hospital
- Hong Kong Government Electrical and Mechanical Services Department
- Hong Kong Productivity Council



中国科学院深圳先进技术研究院
SHENZHEN INSTITUTE OF ADVANCED TECHNOLOGY
CHINESE ACADEMY OF SCIENCES

PHILIPS

Adventist 港
Health 安
Hong Kong Adventist Hospital
香港通安醫院

機電工程署
EMSD



HKPC

Overseas Summer Research Internships

- Columbia University, USA
- Imperial College, UK
- Korea Institute of Science & Technology, Korea
- National University of Singapore, Singapore
- Northwestern University, USA
- University of California at Irvine, USA
- University of Toronto, Canada

COLUMBIA UNIVERSITY
IN THE CITY OF NEW YORK

Imperial College
London

KIST
Korea Institute of
Science and Technology



Northwestern

UCI University of
California, Irvine

Students' Sharing

Summer Overseas Research Internship at
Musculoskeletal Research Center (MSRC),
Department of Bioengineering, University of
Pittsburgh

Bonnie LEUNG (Class of 2013)

I was so glad to be given an opportunity to gain research experience at the Musculoskeletal Research Center (MSRC). I learnt not only research skills, but also cooperation that a good researcher requires. During the summer internship, my project was to perform computational and in vitro tests on a magnesium-based suture anchor. My training as a problem solver at the MSRC provided me with a chance to further sharpen my analytical skills. Throughout my short stay at MSRC, I experienced what research is and learned what to do whenever I encounter setbacks in the research process.



International Genetically Engineered Machine
Competition (iGEM)
Winnie SO (Class of 2013)

Joining iGEM is an amazing adventure in my university life. This competition is launched by the Massachusetts Institute of Technology (MIT) and requires teams to show their knowledge in biotechnology, innovation, teamwork and public outreach. For half a year, students from both Life Science and Engineering cooperate with each other to finish a synthetic biology research project. It is my great pleasure to be one of the teammates of iGEM CUHK 2011. Several teammates and I also feel delighted to conduct further research on ChloRiColight – development of a microbial desalination power plant in the Biomedical Engineering Laboratory after the competition. This iGEM experience has broadened my horizons and enriched my study life in CUHK.



**Global Educational Exchange Program (GLOBEX) at
Peking University**
Po Wen LO (Class of 2015)

GLOBEX constitutes an initiative for international and educational exchange between the College of Engineering at Peking University and engineering schools all around the world. Studying at Peking University with foreigners gave me countless opportunities. The course on Nanomaterials and Nanotechnology was in some way difficult for a freshman but I really enjoyed knowing things at the nanometer length scale and their special properties and applications. The course on Orthopedic Biomechanics was really full of fun. I learned a lot of new and in-depth knowledge about mechanics and anatomy of bone during such days. I feel really grateful to join the Global Educational Exchange Program. Not only did I learn a lot of new knowledge, but I also made a lot of foreign friends.



Overseas Exchange

University provides overseas exchange opportunities to students to immerse in multi-cultural settings and to enrich their study life and personal experience. Many undergraduate students in Biomedical Engineering participate in overseas exchange programmes around the world. Recent examples include:

- Ewha Womans University, Korea
- Karlsruhe Institute of Technology, Germany
- KTH Royal Institute of Technology, Sweden
- Nanyang Technological University, Singapore
- National University of Singapore, Singapore
- Pompeu Fabra University, Spain
- San Diego State University, USA
- State University of New York at Stony Brook, USA
- University College London, UK
- University of Illinois at Urbana-Champaign, USA
- University of Ottawa, Canada
- University of Tennessee, USA
- University of Western Australia, Australia





ASIASAT

ASM

AUTOMATIC MFG LTD

機電工程署
EMSD

HSBC 滙豐

SENGITAL

ARUP

中国科学院深圳先进技术研究院
SHENZHEN INSTITUTE OF ADVANCED TECHNOLOGY
CHINESE ACADEMY OF SCIENCES



Work-Study Programme

Students can choose to participate in “Work-Study Programme” upon completion of the third year of their major study. The Programme provides students an opportunity to apply engineering principles and methods from their studies to an authentic working environment. Students will continue their final year of study on campus afterwards. Partners include Hospital Authority, private hospitals, companies from the biomedical engineering industries. Recent examples include:

- Asia Satellite Telecommunications Co. Ltd
- ASM Technology Hong Kong Ltd.
- Automatic Manufacturing Ltd.
- Electrical and Mechanical Services Department, HKSAR Government
- Hong Kong Productivity Council
- The Hongkong and Shanghai Banking Corp. Ltd. (HSBC)
- ITE Smartcard Solutions Ltd.
- Medisen Ltd.
- Ove Arup & Partners Hong Kong Ltd.
- Paul C. Lauterbur Research Centre



Career Opportunities

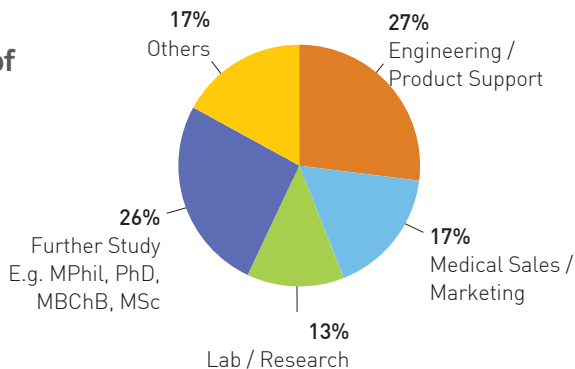
According to a long-range forecast of the U.S. Bureau of Labor, employment of biomedical engineers is expected to grow much faster than the average for all occupations. The aging population and the focus on health issues will increase the demand for better medical devices and equipment. The development of biomedical engineering is therefore a worldwide trend. Our graduates are pursuing the following career paths.

- Medical device distribution and technical sale
- Medical device manufacturing
- Consulting services for medical device industry
- Research and development
- Further studies both local and overseas. Most of them go deeper in a specific biomedical engineering area or other related areas in engineering or science. Some go for other complementary study, including business administration, medicine, and law.
- Our graduates are also sought by non-BME related companies, likely due to their interdisciplinary preparation and generic competence.

Employers include: AB Sciex, ArjoHuntleigh, ASM Pacific Technology, Electrical and Mechanical Services Department of HKSAR Government, Healthlink Holdings Limited, Hong Kong Adventist Hospital, Hong Kong Aircraft Engineering Company Ltd. (HAECO), Hong Kong Applied Science and Technology Research Institute (ASTRI), Hong Kong Productivity Council, Hong Kong and Shanghai Banking Corp. Ltd. (HSBC), Innotronik Hong Kong Ltd, Johnson & Johnson, Medisen (Sengital), Medtronic, Philips, Siemens (Healthcare sector), Transmedic, Ultronic Enterprise Limited



Employment survey Graduating classes of '13, '14, '15 and '16





Jason LAU (Class of 2014)

Biomedical Equipment Technician, Hong Kong Adventist Hospital

My job is to maintain the medical devices in the hospital. Specifically, I am required to fully understand the operating principles of these biomedical equipment items so that I can trouble-shoot any on-site technical issues independently. From my undergraduate studies in biomedical engineering at CUHK, I have well understood the principles of different medical devices such as MRI, CT scanner, pulse oximeter, and infusion pump.

As a technician, I am also responsible on procurement, sorting out the merits of medical devices from different brands to determine the best suited ones use in the hospital. As I learned about the regulations of medical devices at CUHK, I was well equipped for the task of procurement before I officially started my current position at the hospital.

Tracy WONG (Class of 2014)

Student, Bachelor of Medicine and Bachelor of Surgery (MBChB), CUHK



Having studied Medicine as my second bachelor's degree for around one year, I feel grateful that I studied Biomedical Engineering as my first bachelor's degree a few years ago. Biomedical Engineering and Medicine have very different studying modes and styles. Biomedical Engineering emphasizes on understanding the principles underlying medical instruments and doing hands-on experiments, while Medicine emphasizes on the clinical knowledge and practice as well as application of medical instruments. However, there is overlapping between the two disciplines. My previous education in Biomedical Engineering has undoubtedly equipped me with the basic knowledge and skills for my current study in Medicine. For example, the knowledge of Biomechanics that I learnt helped me understand the clinical manifestation of a gait when a hip muscle is impaired.

Apart from the knowledge that I learnt in Biomedical Engineering, participating in a summer research internship in The University of Toronto was a great and inspiring experience for me. In that summer, I worked on characterizing the physiological patterns for activity engagement in youth with severe disabilities. It was an invaluable opportunity for me to apply and consolidate my engineering knowledge. More importantly, this research experience revealed to me the possibility of Biomedical Engineering in the advancement of Medicine. I look forward to doing medical research armed with my Biomedical Engineering knowledge and skills in future!



Shirley WU (Class of 2014)

Ph.D. student in Bioengineering, University of California, San Diego, USA

As a Ph.D. student, I work in the Wang Lab that specializes in engineering fluorescence resonance energy transfer (FRET) - based biosensors for the visualization of molecular interactions at high resolution. I am currently investigating the quantitative coupling between biochemical activities and biophysical dynamics at cellular focal adhesions by integrating FRET imaging, single particle tracking algorithm and cross-correlation analysis. Besides live cell imaging, my project also involves intensive programming in MATLAB, which requires solid theoretical knowledge in mathematics and programming. I am glad that my undergraduate education at CUHK has equipped me with these knowledge and skills. Indeed, the informative courses, practical training and research experience that I had in the BME programme at CUHK laid a solid foundation for me to pursue further research. More importantly, I also learnt to think critically and work efficiently during my undergraduate study in such a professional and friendly environment. Situated along the coastline, UCSD constantly reminds me of CUHK and those memorable days I spent there. I am grateful to the BME programme at CUHK for her guidance on my way to becoming a better biomedical engineer.

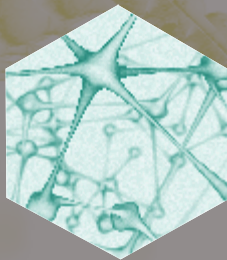
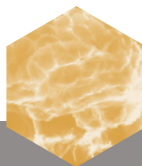
Carmen SIN (Class of 2017)

Biomedical Engineering Graduate,
Electrical and Mechanical Services Department (EMSD)



In this day and age, there is an increased awareness of the safety, efficacy, and quality of medical devices in Hong Kong's market. This in turn has given rise to a need for new legislation concerning medical devices, and therefore more opportunities for the likes of me and others studying BME. The BME programme educates students on a variety of theories concerning engineering, biology and medical science. This, coupled with the practical skills gained in courses such as Global Regulatory Affairs and exposure to a clinical environment, has led me to a career as a biomedical engineer, acting as a middle man between both medical and engineering experts.

Explore Innovate, Care



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Facebook: <http://www.facebook.com/CuhkBiomedicalEngineering>

