



香港中文大學  
The Chinese University of Hong Kong



Innovate

Care



Explore

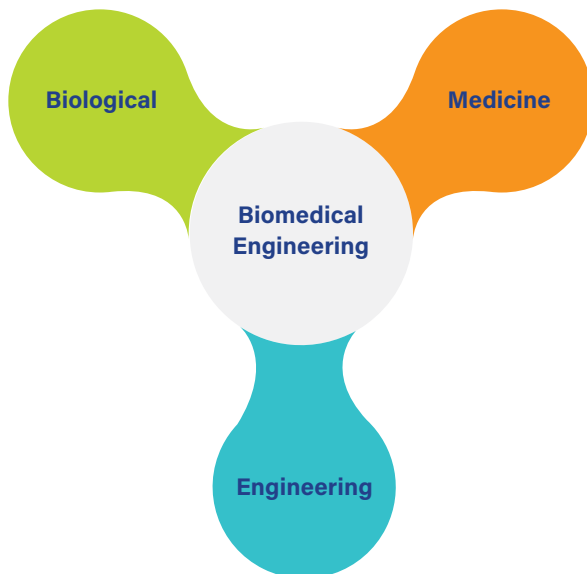
# JS4460 BENG (HONS) IN BIOMEDICAL ENGINEERING

Offered by Department of Biomedical Engineering  
The Chinese University of Hong Kong



# What is Biomedical Engineering?

Biomedical Engineering (BME) is an **interdisciplinary programme** offered by the Faculty of Engineering in close collaboration with the Faculty of Medicine. It involves the use of **engineering principles** to solve **biological** and **medical** problems for the welfare of mankind.



# Programme Highlights

- Supported by the CUHK Faculty of Engineering and Faculty of Medicine in teaching and research.
- Accredited by the Hong Kong Institution of Engineers (HKIE), ample opportunities for industrial and academic placements
- Around 27% of our graduates pursue further studies in various engineering and medical disciplines.
- The Prince of Wales Hospital is our teaching hospital and CUHK has our own private hospital (CUHK Medical Centre was launched in 2020), students have opportunities to learn on-site how technology may enhance clinical services and patient benefits.
- CUHK is one of only two Universities in Hong Kong that can offer interdisciplinary Biomedical Engineering education at the interface between Faculty of Medicine, Faculty of Engineering and Faculty of Business Administration. The Chinese University of Hong Kong is also the only University in Hong Kong that organizes students and staff in a collegiate system, bringing various fields of studies together and provides aspects of holistic education.
- Students with outstanding academic records are eligible for potential enrollment in the CUHK MBChB program in an accelerated track

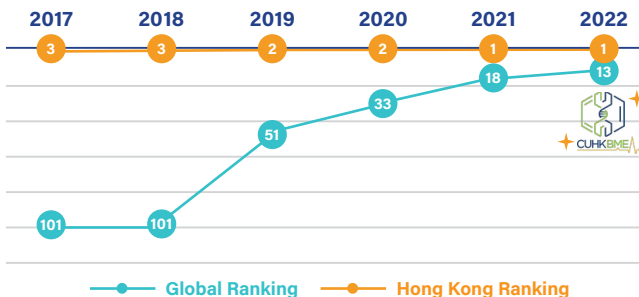
## Rankings

### Academic Ranking of World Universities 2022

By Subject: Biomedical Engineering



**13<sup>th</sup>** In Global | **1<sup>st</sup>** In Hong Kong



# Admission Criteria

## 1 JUPAS Admission (JS4460)

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.

JUPAS Admission



Students are expected to have completed at least two elective subjects plus the four core subjects. Priority score are computed based on the Best 5 HKDSE subject results with subject weighting as below:

4 Core Subjects	Minimum Level	Subject Weighting
English Language	3	1.5
Chinese Language	3	1
Mathematics (Compulsory Part)*	3	1.5
Liberal Studies	2	1
2 Elective Subjects	Minimum Level	Subject Weighting
Biology / Chemistry / Physics / Combined Science / Mathematics Extended Module (M1 / M2)*	3	1.5
Other elective Subject	3	1

More detailed information are available at  
<http://admission.cuhk.edu.hk/jupas/download.html>

*\* Subject weighting of "1.5" is given to the best Mathematics subject (either the core Mathematics or the M1/M2 Extended Module)*

## 2 Non-JUPAS (local) / International Student Admission

Non-JUPAS Local  
Student Admission

Local and non-local students with other qualifications can also apply through the non-JUPAS admission scheme. These qualifications include GCE, IB, SAT/AP and other overseas qualifications for university admission. Preferences are given to applicants with good grades in at least two of the following subjects - Physics, Chemistry, Biology, or Mathematics. More detailed information are available at <http://admission.cuhk.edu.hk/non-jupas-yr-1/requirements.html> (Non-JUPAS local) and <http://admission.cuhk.edu.hk/international/requirements.html> (Non-JUPAS International).



Non-JUPAS International  
Student Admission

A non-JUPAS applicant may apply for "Admission with Advanced Standing" if he/she meets specific requirements (including GCE-AL, IB-HL, etc.). For students admitted with Advanced Standing, the number of units for graduation may be reduced by up to 24. Applicants should indicate in the application form whether they would like to be considered for "Admission with Advanced Standing".



Reference Scores for Major International Qualifications 2021:

Programme	Lowest reference score range for IB Diploma	Lowest reference score range for GCE AL / IAL	Lowest reference score range for SAT / AP
Biomedical Engineering	33-35	ABB to AAB	1350-1450 in SAT 700-750 each in 2 SAT Subject Tests   3-4 each in 2 AP Tests

*Note: Admission is not based on public examination results alone, and the overall scores of students admitted to each programme vary from year to year, the information provided is for reference only and should not be used to predict the chance of admission to any programme in subsequent years.*

3 Senior-Year Admission for Sub-degree Holders

Students with a Higher Diploma / Associate Degree from local institutions can apply for the senior year admission in Biomedical Engineering. For details, please refer to the website of the Office of Admissions and Financial Aid <http://admission.cuhk.edu.hk/non-jupas-senior/requirements.html>

Non-JUPAS Senior-Year  
Admission for  
Sub-degree Holders



4 Mainland Gao Kao Admission

For Mainland JEE applicants, please go to <http://admission.cuhk.edu.hk/sc/mainland/requirements.html>

Mainland Gao Kao  
Admission



Scholarships

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

In previous two years (2021 & 2022), around 20% of our newly admitted students have received Admission Scholarship (in one-off or renewable offer), the highest admission scholarship received is up to HK\$145,000 per academic year.



# BME Curriculum

Total Units Requirements: at least 123 units

	Major Programme Requirements (75 units)	University Core Requirements (39 units)	
Year 4 or 5	Graduation Project Electives for BME Streams	<div>English</div> <div>Chinese</div> <div>General Education</div> <div>Physical Education</div> <div>IT</div> <div>Understanding China</div> <div>Hong Kong in the Wider Constitutional Order</div>	<div>Free Electives*</div> <div>* Units for free electives can be used to fulfil the minor requirement</div>
Year 4	One-year Work-study Programme (optional)		
Year 3	Advanced BME Major Courses Biomaterials and Tissue Engineering, Medical Instrumentation and Design, Global Medical Device Regulations		
Year 2	Fundamental BME Major Courses Anatomy and Physiology, Biomechanics, Cell and Molecular Biology, Circuits and Signals, Engineering Mathematics		
Year 1	Engineering Foundation Biology / Chemistry / Physics, Engineering Design, Engineering Mathematics, Programming		

## Streams

### Medical Instrumentation & Biosensors

- Big Data in HealthCare
  - TeleMedicine & Mobile Healthcare
  - Biofluids
  - Neuroengineering
  - Medical Robotics
  - Global Engineering Medical Innovation
  - Wearable Biomedical Devices and IoT in Healthcare
- Advanced Imaging and Spectroscopy Techniques in Biomedicine
  - BioMEMS
  - Bionanotechnology
  - Cardiovascular Engineering
  - Microelectronic Devices and Circuits
  - CSCI course(s)

\* Students are allowed to take a maximum of 3 units of CSCI course(s) at 1000 or above level

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

## Biomedical Imaging, Informatics & Modeling

- Bioinformatics
- Big Data in HealthCare
- Global Engineering Medical Innovation
- Biomedical Modelling
- Data Analytics for Personalized Genomics and Precision Medicine
- AI & Imaging for Biomedical Engineering
- Advanced Imaging and Spectroscopy Techniques in Biomedicine
- Cardiovascular Engineering
- CSCI course(s)

*\* Students are allowed to take a maximum of 3 units of CSCI course(s) at 1000 or above level*

*Recommended to minor in Computer Science, OR Electronic Engineering*

## Molecular, Cell & Tissue Engineering

- Cell Biology
- Data Analytics for Personalized Genomics and Precision Medicine
- Molecular and Cellular Engineering Laboratory
- Biofluids
- Global Engineering Medical Innovation
- BioMEMS
- Bionanotechnology
- Biomolecular Engineering
- Cardiovascular Engineering
- Musculoskeletal Tissue Engineering
- Genetic Engineering
- CSCI course(s)

*\* Students are allowed to take a maximum of 3 units of CSCI course(s) at 1000 or above level*

*Recommended to minor in Biology, OR Biochemistry*

## BME + Business Administration Double-Degree Programme

- 1<sup>st</sup> degree: Bachelor of Engineering (Biomedical Engineering)
- 2<sup>nd</sup> degree: Bachelor of Business Administration (Integrated BBA Programme)
- Collaborated with the Faculty of Business Administration

*For further information, please refer to the Faculty website at <http://www.erg.cuhk.edu.hk/erg/ergbba>*

## BME Minor Programme

- Students can take up to two minors programmes
- 18-30 units for each minor programme

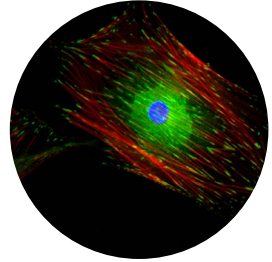


# Areas of Research



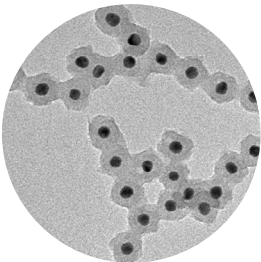
## Biomaterials and Regenerative Medicine

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.



# Practical Training



Students are required to participate in a four-week professional and practical summer training on CUHK main campus and at Prince of Wales Hospital (PWH) and CUHK Medical Centre (CUMC). The in-house training involves electronic circuit design, simulation, fabrication, interfacing with software, data acquisition, and wireless communication, while the hospital 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 training provides a valuable chance for students to relate theory and engineering knowledge to practice in a real-world setting.



## Students' Sharing

Choosing a major is one of the most important decisions people make in their lives. It has to be something they will not regret spending 4 years on. I believe I made the right choice by joining BME!

In BME, not only we acquire knowledge from various subjects but also we learn how to apply those skills. During my first year, BME conducted summer training for all undergraduate students. The training helped me to see real-life applications of the concepts learned in class, and gave me an insight view on the working environment of biomedical engineers. All the hospital visits, medical instrumentation company visit and the laboratories motivate aspiring engineers, like me, to keep working and make a contribution later in lives.

As an international student, I had some difficulty finding local friends but BME summer training changed that. BME Summer Training is what brought both local and non-local students together by dividing us into groups. Despite the short time we spent together as a group, we still were able to make vivid memories together! I am very grateful to the department for this opportunity!

Explore, innovate and care together with BME!



Aiana BAEKOVA (Class of 2022)



# Graduation Project

## Medical Instrumentation & Biosensors

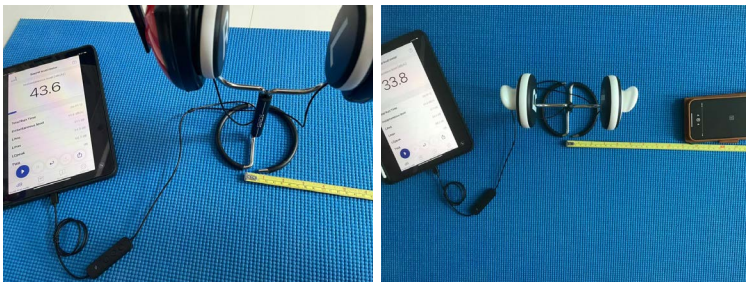
- Soft Robotics Design for Rehabilitation

*Supervised by Department of Surgery, Year 2021-22*



- An ergonomic headphone with active noise cancellation for sleep applications

*Supervised by Department of Biomedical Engineering, Year 2020-21*



## Biomedical Imaging, Informatics & Modeling

- AI enabled pulmonary OCT for COVID-19

*Supervised by Department of Biomedical Engineering, Year 2021-22*

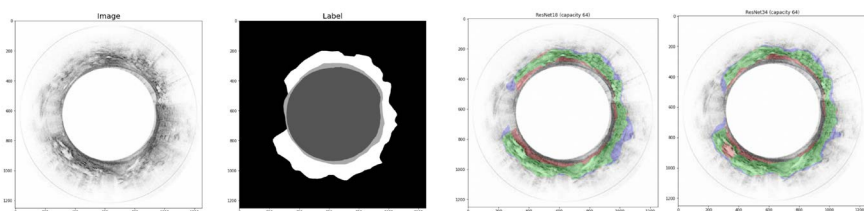
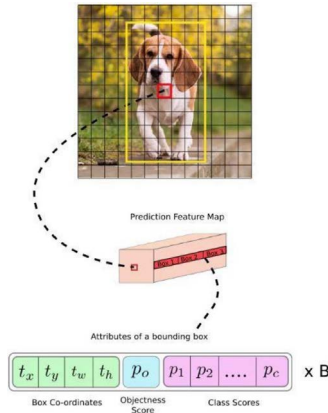


Fig 9. Sample of image in test set with corresponding label. Color in label from dark to bright

- Machine-learning based approach for blood smear testing using portable quantitative phase microscope

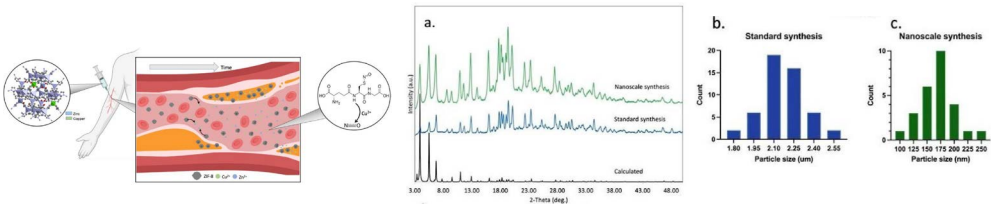
*Supervised by Department of Biomedical Engineering, Year 2020-21*



## Molecular, Cell & Tissue Engineering

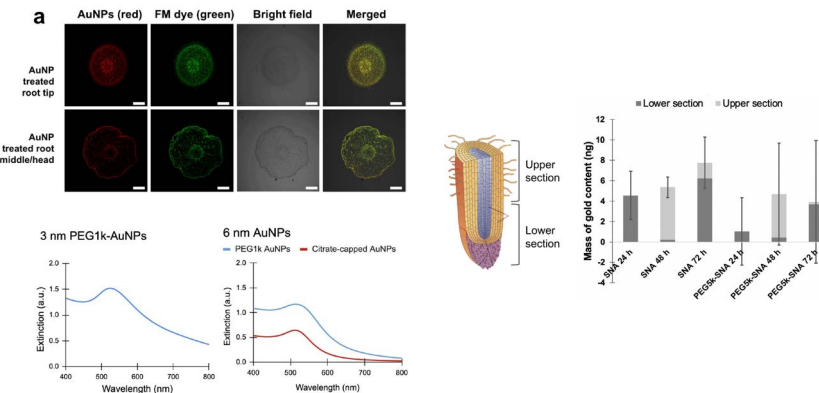
- Zeolitic Imidazolate Frameworks (ZIFs) for Advanced Bone Healing

*Supervised by Department of Biomedical Engineering, Faculty of Engineering and Co-supervised by The Institute for Tissue Engineering and Regenerative Medicine (iTERM), Year 2021-22*



- Delivery of Biomolecules to Plant Cells by Functionalized Nanoparticles (NPs)

*Supervised by Department of Biomedical Engineering, Year 2020-21*



# Experiential Learning

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 filed trips, summer internships, work-study, etc. Examples are provided below.

## Design Competitions

- iGEM, International Genetically Engineered Machine Competition at Giant Jamboree in Boston, USA
- Engineering Medical Innovation Global Competition in Taipei
- Hong Kong University Student Innovation and Entrepreneurship Competition
- ASM Technology Competition

## Local Summer Industrial Internships

- Academy of Science Shenzhen Institute of Advanced Technology
- Philips Electronics Hong Kong Ltd., etc.
- Johnson & Johnson Medical Devices Hong Kong
- 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



## Overseas Summer Research Internships

- University of California at Irvine
- Columbia University
- Imperial College
- University of Pennsylvania
- University of Limoges, XLIM Research Institute
- Korea Institute of Science & Technology
- Northwestern University
- University of Pittsburgh
- National University of Singapore
- University of Toronto
- Nanyang Technological University
- The University of California
- University of California at San Diego
- University of Illinois at Urbana-Champaign





## Students' Sharing

### Overseas Summer Research Internship

*participated in Overseas Summer Research Internship Programme 2022 at XLIM Research Institute (CNRS), University of Limoges, France*

I worked on a summer research internship supervised by Prof. Shuwen ZENG in this summer. Throughout the three months internship in France, I exposed myself to the fabrication and characterization of nanomaterials. I also understand nanomaterials' optical properties and nanomaterials applications in biosensing, and I built my laser setup in the laboratory for surface plasmon resonance (SPR) sensing. This internship experience has equipped me with critical and independent thinking, improving effective communication and teamwork. I have also obtained an innovative mindset and an affinity for problem-solving after solving the bugs by myself. It is valuable continuous learning. I am very thankful to my supervisor.



SZE Hoi Kuen Patrick (Class of 2023)



CHEN Chun Hin Jack (Class of 2021)

### International Genetically Engineered Machine Competition (iGEM)

*received gold medal as a member of the CUHK school team at the iGEM Competition 2019 Giant Jamboree held in Boston, USA*

I had plenty of chances to participate in different activities during my four years of studies. In my Year 2, I join the iGEM Competition. iGEM is a worldwide synthetic biology competition in which teams design and implement engineered biological systems in both basic as well as applied areas or research. CUHK iGEM team is the only one team in Hong Kong who won a Gold Medal. After this competition, I found myself interested in hands-on experiments, it is really inspired for my further study and work!



# 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:

- Aston University, UK
- Eidgenossische Technische Hochschule Zurich, Switzerland
- Ecole Polytechnique Federale De Lausanne, Switzerland
- Fudan University, China
- Graz University of Technology, Austria
- Lille Catholic University, France
- Nanyang Technological University, Singapore
- National University of Singapore, Singapore
- Shanghai Jiao Tong University
- Simon Fraser University, Canada
- Singapore University of Technology and Design, Singapore
- The University of Sydney, Australia
- University of Pennsylvania, USA
- University of Liverpool, UK
- University College London, UK



## 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:

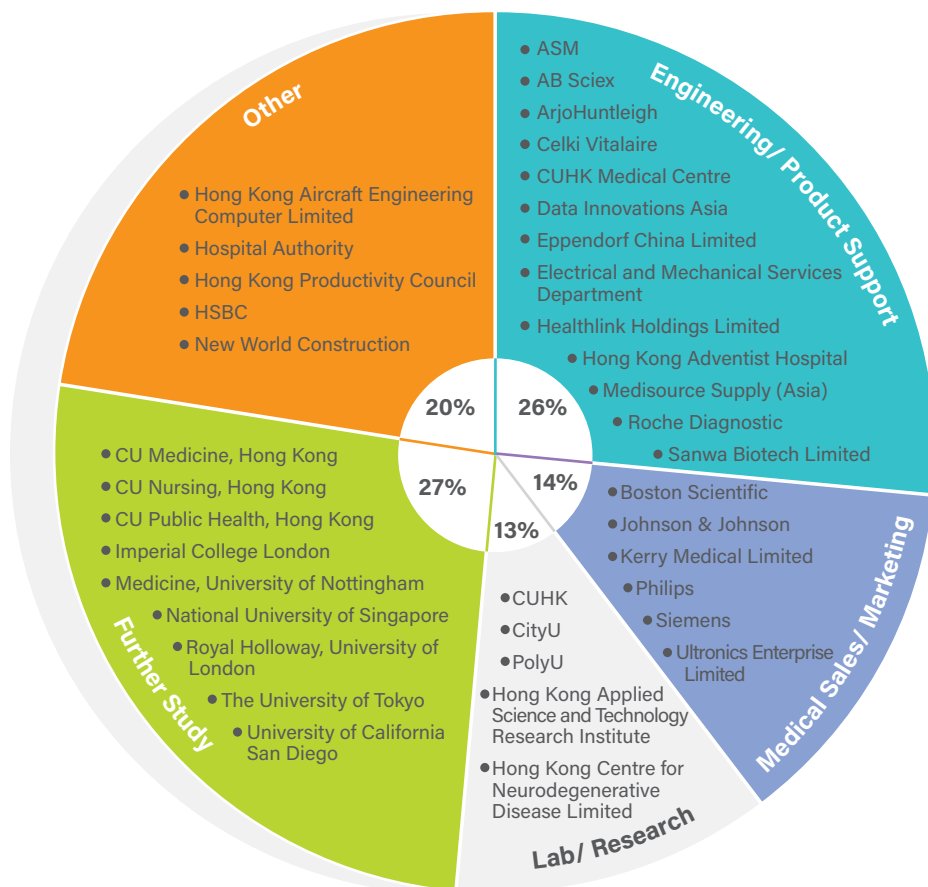
- Asia Satellite Telecommunications Company Limited
- ASM Technology Hong Kong Limited
- Automatic Manufacturing Limited
- Electrical and Mechanical Services Department, HKSAR Government
- Hong Kong Productivity Council
- The Hong Kong and Shanghai Banking Corporation Limited (HSBC)
- ITE Smartcard Solutions Limited
- Medisen Limited

# Career Opportunities

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.

- Manufacturing Industries
- Clinical Engineers in Hospitals
- Entrepreneurs in Biotech Companies
- Regulatory Affairs
- Distribution & Sale
- Testing Laboratories
- Research Scientists & Engineers
- Further Studies (MSc, PhD, MD, MBA, PCLL)

## BME Graduate Employment Survey (13, 14, 15, 16, 17, 18, 19, 20, 21)





## BME Alumni Sharing

LAU Fong Yung Yolanda



2021 BEng (Biomedical Engineering) graduate  
Medicine Degree, University of Nottingham

I've always been passionate about biomedicine, and seeing a surgical robot in an operating theatre stemmed my curiosities into the use of biomedical technologies, which is how my journey in engineering began.

What inspires me most about engineering is its high applicability in other disciplines and the way it intersects with other fields. This is especially the case for biomedical engineering, and CUHK provides dynamic opportunities to explore sub-specialities like biomechanics, Nanomedicine, tissue engineering etc. We get a lot of hands on exposure on top of lectures, such as through laboratory work and hospital training, where I especially enjoyed learning from biomedical engineers at work in a hospital setting.

To me, being a good engineer means being creative and flexible in face of challenges, because solving problems is our pivotal role. The CUHK BME programme has equipped us with a broad knowledge base spanning across topics like anatomy and physiology, biochemistry, physics and math, as well as programming and laboratory skills. I also had the opportunity to do a summer research project on Nanomedicine in my freshmen year. Having these tools and experiences helps us translate technology into real-world solutions.

PANG Cheuk Him Johnny



2020 BEng (Biomedical Engineering) graduate  
Biomedical Engineering Graduate, Electrical and Mechanical  
Services Department (EMSD), HKSAR Government

I joined the EMSD Engineering Graduate Training Scheme, which is a two-year training scheme recognized by the Hong Kong Institution of Engineers (HKIE). I have the opportunity to rotate to different divisions of EMSD and Department of Health to learn to be a qualified biomedical engineer in the healthcare systems of Hong Kong. I have just finished my practice in the Department of Health about the regulation of medical device. Recently, I work in the Health Sector Division and handle the tendering of maintenance of biomedical equipment for public hospitals. I am lucky I can pursue my desired career in this field. I am glad what I acquired at CUHK BME can make this happens and apply the related knowledge and skills into my work.

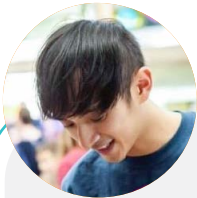
SHUM Ka Yu Sam



2017 BEng (Biomedical Engineering) graduate  
Biomedical Engineer, Electrical and Mechanical Services  
Department, HKSAR Government

Population expansion and the prevalence of aging have accelerated the growth of healthcare services. To support the delivery of medical and clinical services, BME engineers play a significant role in the discipline of medical devices by bringing constant improvements in safety, efficacy, and quality. CUHK BME has equipped graduates with a solid foundation in engineering and medical sciences. Examples of which include electronic design, hands-on practice in circuitry, in-depth understanding of physio- and medical phenomena. Topics related to regulatory affairs have ensured that students are well aware of the importance of market requirements concerning quality and risk management. The exposure to clinical environment and making contact with industry professionals also help students explore their potential and career prospects in various fields of BME.

CHEN Nico



2017 BEng (Biomedical Engineering) graduate  
Equity Research Analyst, Healthcare Sector, DBS Bank (Hong Kong)

Being a healthcare analyst in a world class bank, an all-rounded background is of paramount importance as I often have to estimate the market value of a company through understanding their clinical trials and financials, often prior to launch of their products.

CUHK BME programme has provided me with a strong foundation crucial for my role, with knowledge spanning across multiple healthcare divisions - from inner workings of medical devices to physiological reactions from pharmaceutical products and medical software algorithm optimisation.

Not only have I gained the ability to understand the intricacies of modern medical advancements, but I've also been lucky enough to build strong friendships with a circle of experts in the healthcare field to discuss medical breakthroughs and stay at the forefront of the healthcare industry.

AU Chun Ki Franklin



2018 BEng (Biomedical Engineering) graduate  
2020 MPhil in Imaging and Interventional Radiology graduate  
Senior MRI Clinical Application Specialist, Philips

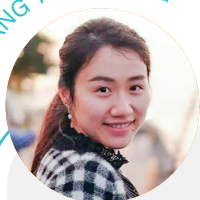
I am honored to be part of the family of CUHK BME. As an inter-disciplinary subject, BME offers us an excellent learning platform and abounding scientific research opportunities. Not only do we benefit from receiving forefront knowledge about the world of engineering and medicine, our horizon on cutting-edge biomedical technology also gets expanded.

My BME undergraduate experience has opened the doors for advancing my studies in medicine. As a Biomedical Engineer, I found myself well-prepared in a variety of medicine-related specialties including Interventional Radiology and Imaging – a topic which I have chosen for my further study.

Passionate professors in CUHK BME have inspired and nurtured my creativity for medical devices and related technologies. With their open assistance, I recently invented my first medical device for stroke rehabilitation. The device also helped me win the Golden Technopreneur Award 2017 organised by Hong Kong Science & Technology Park Corporation (HKSTPC).

The revolution is now upon us. “Explore, Innovate and Care” – the Motto of CUHK Biomedical Engineering – is the promise for this fast-changing industry. I feel grateful that Biomedical Engineering of CUHK has prepared me to become a highly-qualified professional in this booming sector.

TANG Yu Lam Anna




2015 BEng (Biomedical Engineering) graduate  
Senior Sales Executive, Roche Diagnostics

I started working as a Product Specialist/ Medical Sales since graduation. Being a medical sales, both soft and hard skills count. Soft skills include interaction with customers and different departments in the company, initiation of sales, closing a deal, service satisfaction to the customers, etc. Hard skills, which could be learnt in BME lectures, include knowing the principle behind medical instruments, and application supports when the customers seek for our help. You have to be sensitive to fast changes in technologies employable in medical fields. The career path could be wide as other than moving on as a Sales Manager/ BU head/ GM/ Director, it could be also moving horizontally, e.g. Marketing/ Product Manager, etc.



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