



THE HONG KONG  
POLYTECHNIC UNIVERSITY  
香港理工大學



DEPARTMENT OF  
BIOMEDICAL ENGINEERING  
生物醫學工程學系

# Department of Biomedical Engineering

Together, PolyU BME Innovates for Better Health.





# Biomedical Engineering at PolyU

The Department of Biomedical Engineering (BME) at The Hong Kong Polytechnic University (PolyU) strives to provide a supportive and enriching educational and research journey, making it a great choice for both aspiring students and professionals in the field.

## **We are the first Biomedical Engineering programme in Hong Kong**

Stemmed from the Biomedical Engineering Programme within the Jockey Club Rehabilitation Engineering Centre (JCREC), our evolution can be traced back to 1987.

## **We are the first Biomedical Engineering programme accredited by** **BIOMEDICAL DIVISION**

Our undergraduate programme is the first BME programme accredited by the Hong Kong Institution of Engineers (HKIE).

## **We offer a strong integration of rehabilitation engineering and Prosthetics & Orthotics (P&O) elements**

Building on the foundations of the Prosthetics & Orthotics (P&O) Programme (1995-1999) and Health Technology Programme (2000-2004), rehabilitation engineering and P&O elements have always been integrated into the academic programmes and research areas at PolyU BME.

## **We are the only Bachelor's programme in Hong Kong that offers comprehensive P&O related education and training**

Our programme provides a unique opportunity for students to gain in-depth knowledge and hands-on experience in P&O, preparing them for successful careers in the field.

## **Our programme's P&O Stream is accredited by** **International Society for Prosthetics and Orthotics**

The P&O Stream of our BME programme has also been accredited by the International Society for Prosthetics and Orthotics (ISPO) as Professional Prosthetist and Orthotist Training Programme.

## **We pursue diverse research areas at PolyU BME**

With our storied history and a commitment to staying current with global trends, we drive our focus on four key research areas, ensuring innovative and relevant contributions to biomedical engineering.





# Our Missions

At PolyU BME, we aim to be world-class in the advancement of biomedical engineering education, research, and professional services for the betterment of human health.

**We are committed to:**

Nurture future leaders in prosthetics and orthotics, molecular and cellular engineering, medical instrumentation and sensors, sports science and technology, and gerontechnology by imparting interdisciplinary knowledge, innovative ideas, critical thinking and practical skills;

Advance knowledge in prevention, diagnosis, monitoring, treatment and rehabilitation of medical conditions, and promotion of healthy and active ageing through interdisciplinary research and technology transfer;

Enhance the quality of life for the people with impairments or special needs by offering user-focused services in assistive technology, rehabilitation engineering, prosthetics and orthotics, and smart ageing.



“For many years, our Department has been dedicated to educational excellence and impactful research in biological engineering, medical instrumentation, prosthetics/orthotics and rehabilitation engineering. We are excited to introduce new initiatives in sports science and technology, and smart ageing technology, further enhancing our efforts for societal needs. Our goal is to improve health, wellness, and quality of life for individuals of all ages through our commitment to advancing biomedical engineering.”

**Ir Professor Ming ZHANG**  
Head of Department,  
Chair Professor of Biomechanics

# Our Evolution From 1987

Since our inception in 1987 as a pioneering research centre, we have evolved into a full-fledged department at PolyU, advancing cutting-edge research and education in biomedical engineering.

1987

Jockey Club Rehabilitation Engineering Centre (REC) in Faculty of Health and Social Sciences

2005

Department of Health Technology & Informatics (HTI) in Faculty of Health and Social Sciences

2012

Interdisciplinary Division of Biomedical Engineering (BME) in Faculty of Engineering

2017

Department of Biomedical Engineering (BME) in Faculty of Engineering





# Our Mode of Service and Research Collaboration

At PolyU BME, we are dedicated to utilizing our professional expertise and innovative developments to provide valuable service and benefits to the community. This spirit has been integral to our mission since 1987, originating from the Jockey Club Rehabilitation Engineering Centre (JCREC).

Supported by the Hong Kong Jockey Club Charities Trust, as of today, we have two service units that serve clients with rehabilitation engineering and smart ageing technology.

## Jockey Club Rehabilitation Engineering Clinic (JCREClinic)

Leveraging PolyU BME's innovations, JCREClinic offers comprehensive clinical services, including prostheses, orthoses, functional electrical stimulation, robotic rehabilitation, assistive technologies and spinal deformity assessment, along with specialist consultations and community resources.



## Jockey Club Smart Ageing Hub (JCSAH)

JCSAH is a BME initiative aimed at boosting awareness and advancements in elderly care through smart gerontechnology solutions. To achieve this goal, it currently runs a 'Day Experience Centre' and six 'Real-life Hostels'.



Led by PolyU BME's academic and research expertise, there are multiple university-level research resources related to our department, facilitating interdisciplinary research and inspiring innovations across disciplines.

1



RESEARCH INSTITUTE FOR  
SMART AGEING  
智齡研究院

RISA, facilitated by PolyU Academy for Interdisciplinary Research (PAIR), focuses on research and development in the field of smart ageing.  
Director: Ir Professor Yongping ZHENG



RISports  
Research Institute for Sports Science and Technology  
體育科技研究院



RISports, facilitated by PolyU Academy for Interdisciplinary Research (PAIR), aims to foster innovative solutions and applications in sports.  
Director: Ir Professor Ming ZHANG

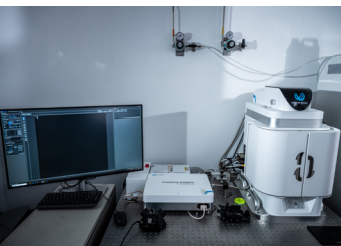
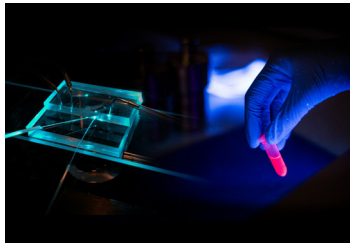
2

3



JOINT RESEARCH CENTER FOR  
BIOSENSING AND PRECISION THERANOSTICS  
生物傳感和精準診療聯合研究中心

RCBPT tackles the current challenges in diagnostic and therapeutic technologies.  
Director: Professor Mo YANG



## Research Centre for Non-invasive Brain Computer Interface

RCNBCI aims to enhance communication and interaction between the brain and computer systems non-invasively.  
Director: Professor Lei SUN

4





# Interdisciplinary Research at PolyU BME





# Advancing Knowledge and Innovation Through Research

Advancing knowledge and fostering innovation are central to everything we do. We focus on four major themes, excelling in interdisciplinary research within biomedical engineering.

## Biomedical Imaging, Instrumentation, Sensing and AI

Here we design and develop new biomedical imaging methods and devices, biosensors, screening methods and treatment approaches, as well as utilize artificial intelligence for such applications.

We also develop wearable sensors for healthcare, designed to monitor motion and vital signs.

Key focuses:

- 1 Biomedical ultrasound instrumentation and application
- 2 Biomedical sensing and molecular imaging

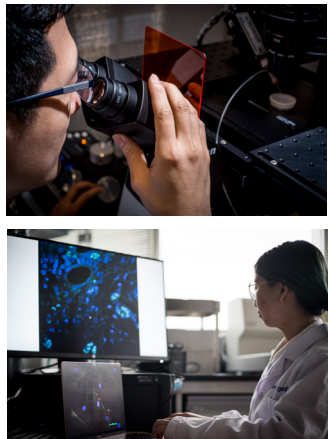


## Molecular, Cellular and Tissue Engineering

This research area focuses on applying engineering principles and tools to address fundamental issues at tissue, cellular, and molecular scales. We aim to overcome tissue and organ failure, enhance understanding of cellular and molecular mechanisms, and tackle challenges related to human health.

Key focuses:

- 1 Immune cell therapy
- 2 Stem cell engineering
- 3 Cell micro-environment
- 4 Cellular electrophysiology
- 5 Biomaterials
- 6 Nanotechnology for theranostics
- 7 Cell therapy and regenerative medicine



## Sports and Neuromusculoskeletal Engineering

We aim to develop technologies that support neuromusculoskeletal (NMS) health by integrating underpinning sciences in sports, clinical, and engineering disciplines related to NMS system within this research field.

Key focuses:

- 1 Molecular understanding and health protection of NMS pathologies
- 2 Assessment techniques of NMS system
- 3 Therapeutics for NMS disorders
- 4 Sports-related science and technology
- 5 Assistive technologies for rehabilitation and enablement



## Prosthetics, Orthotics, Smart Ageing and Rehabilitation Engineering

This research area encompasses prosthetic component design and control, smart orthotic devices, and outcome measures for prosthetic and orthotic interventions. We also cover technological innovations and applications in smart ageing and rehabilitation engineering, supporting the elderly and individuals with disabilities through technology.





# Advancing Knowledge and Innovation Through Research

Explore our laboratories, equipped with state-of-the-art technology for achieving excellence in teaching and research.



Biomechanical Testing Laboratory

Biomechanics Laboratory

Biomedical Engineering Teaching Laboratory

Biomedical Ultrasound Imaging and AI Laboratory

Biophotonics Laboratory

Human Locomotion Laboratory

Neurorehabilitation and Neural Engineering Laboratory

P&O Fabrication Laboratory

Plaster Rectification Laboratory

Smart Ageing & Active Health Laboratory

Smart Digital Health Laboratory

Sports Engineering Laboratory

Autoclave Laboratory

Biological Cell Culture Laboratory

Biomaterials and Tissue Engineering Laboratory

Biomolecular Diagnostics Laboratory

Cancer Mechanobiology Laboratory

Cell Biology and Physiology Laboratory

Common Biological Laboratory

Common Chemistry Laboratory

Microbiological Organism Laboratory

Microscopy Laboratory

Musculoskeletal Aging and Regeneration Laboratory

Precision Nano-Theranostics Laboratory

Ultrasound Neuromodulation and Theranostics Laboratory





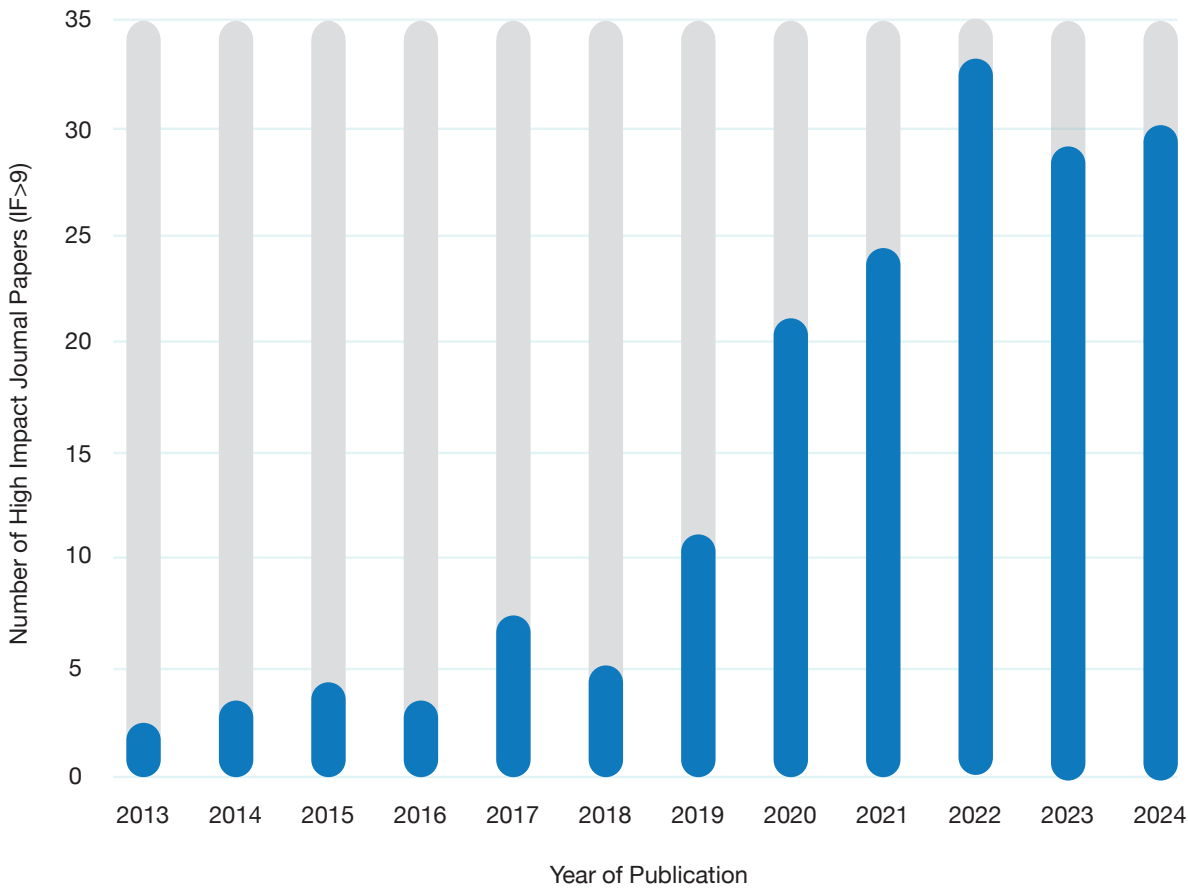
# Our High Impact Publications

From 2013 to 2024, PolyU BME academic staff have published over 170 high-impact papers (with an impact factor greater than 9) in leading journals such as Nature Microbiology, Nature Communications, Science Advances, PNAS, Advanced Materials, Advanced Science, Biomaterials, ACS Nano, and many more.



# Our Longstanding Research Excellence

Building on years of pioneering work, our renowned research expertise continues to drive innovation and impact in the field.





# External Research Funding

The exceptional quality of PolyU BME research has attracted external competitive grants, enabling us to further advance innovations and achieve impactful breakthroughs.



**HK\$250+ Million**  
External Research Funding in 2012-2024

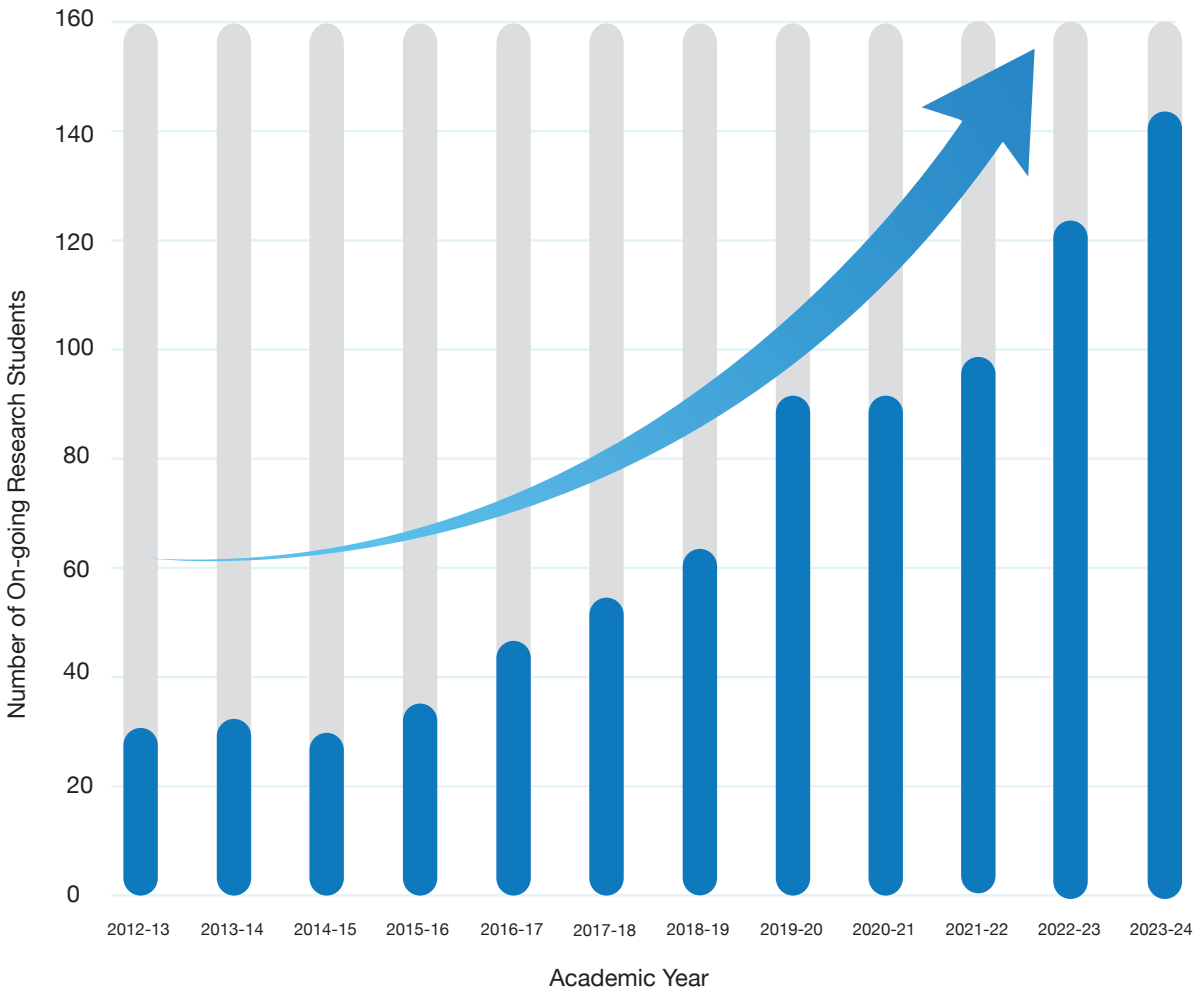
These are some examples of the external research fundings exceeding HK\$2million that have been instrumental in driving our groundbreaking projects forward.

Funding Scheme	Funding	Project Commencement Date	Project Coordinator
RGC Collaborative Research Fund (CRF)	HK\$6.4M	2024	Prof. Mo YANG
RGC Collaborative Research Fund (CRF)	HK\$5.99M	2024	Prof. Youhua TAN
RGC Collaborative Research Fund (CRF)	HK\$7.2M	2023	Prof. Lei SUN
RGC Collaborative Research Fund (CRF)	HK\$7.8M	2022	Prof. Mo YANG
RGC Collaborative Research Fund (CRF)	HK\$2.3M	2019	Prof. Mo YANG
Sports Science and Research Funding Scheme	HK\$3.7M	2023	Prof. Ming ZHANG
Sports Science and Research Funding Scheme	HK\$13.1M	2022	Prof. Ming ZHANG
Sports Science and Research Funding Scheme	HK\$6.2M	2022	Prof. Ming ZHANG
RGC Research Impact Fund (RIF)	HK\$12M	2019	Prof. Yongping ZHENG
Innovation and Technology Fund (ITF)	HK\$3.4M	2023	Prof. Chunyi WEN
Innovation and Technology Fund (ITF)	HK\$3.0M	2021	Prof. Lei SUN
Innovation and Technology Fund (ITF)	HK\$2.2M	2021	Prof. Puxiang LAI
Innovation and Technology Fund (ITF)	HK\$7.3M	2019	Prof. Lei SUN
Innovation and Technology Fund (ITF)	HK\$5.8M	2019	Prof. Yongping ZHENG
NSFC State Key Programme	RMB\$2.9M	2020	Prof. Puxiang LAI
NSFC State Key Programme	RMB\$3.5M	2018	Prof. Ming ZHANG
MOST National Key R&D Program	RMB\$24.9M	2018	Prof. Ming ZHANG

# Our Research Students

We enhance collaborative opportunities and foster a culture of excellence at PolyU BME by embracing diverse perspectives and innovative ideas from our research students, all within a vibrant academic environment and a commitment to advancing biomedical engineering.

## Continuous Growth of Research Students





# Our Prestigious Awards

Our commitment to excellence is reflected in our many prestigious awards. Here are some key recognitions of our dedication to advancing in biomedical engineering.



## Prestigious Awards in 2012-2024



International Exhibition of  
Invention of Geneva  
2015-2024



2022



TechConnect  
2020, 2023



China Biomedical  
Engineering Society  
2017



The Ministry of Education  
of the People’s Republic  
of China  
2016



University Grants  
Committee  
2016/17



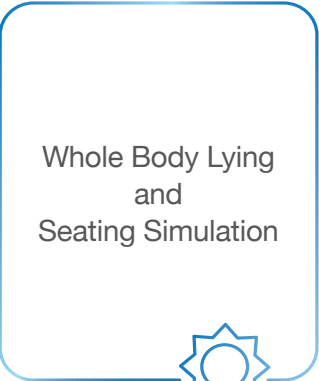
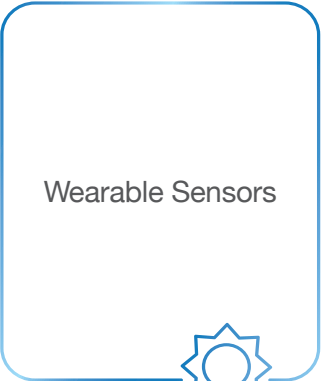
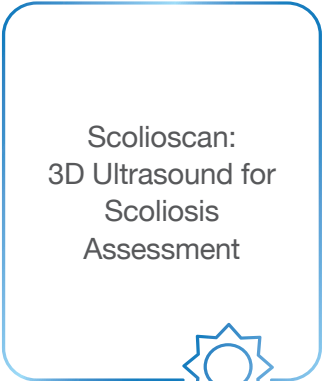
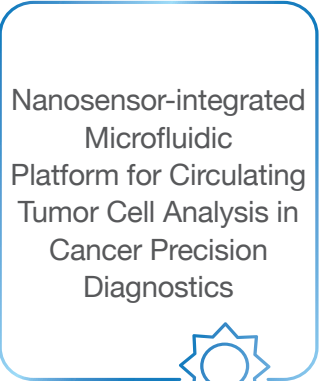
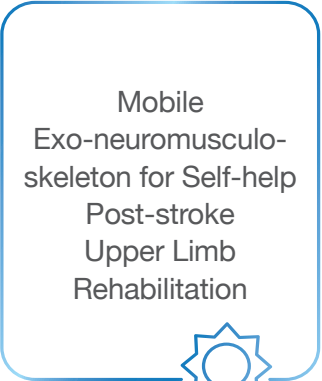
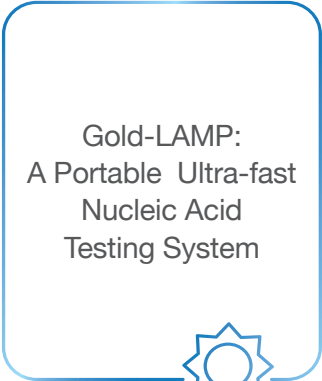
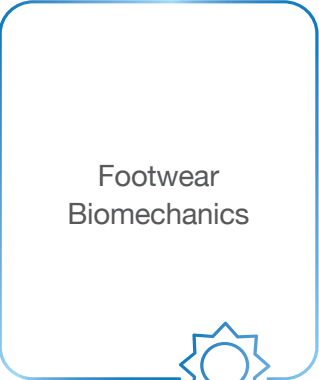
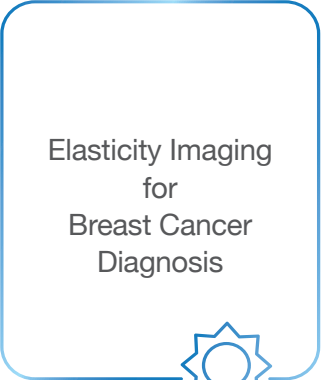
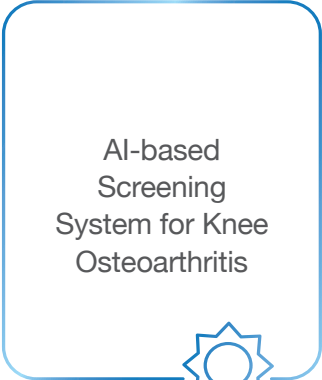
President’s Awards,  
The Hong Kong Polytechnic University  
2016, 2021, 2022

# Our Patents

Over the years, the licensed patents held by PolyU BME stand as a testament to our groundbreaking and remarkable research, showcasing the impact of our work on both industry and society.



## Patents in 2012-2024





# Our Technology Transfers

At PolyU BME, we are committed to transforming groundbreaking research into real-world applications through effective technology transfers, ensuring that our innovations not only advance scientific knowledge but also enhance quality of life and contribute to societal progress.



1

## Scolioscan®

Radiation-free assessment of scoliosis using 3D ultrasound imaging to provide accurate screening, more frequent follow-up monitoring, and treatment outcome measurement.

Scolioscan Air is the portable version of the system.

Principal Investigator: Ir Professor Yongping ZHENG  
Startup Company: Telefield Medical Imaging Limited

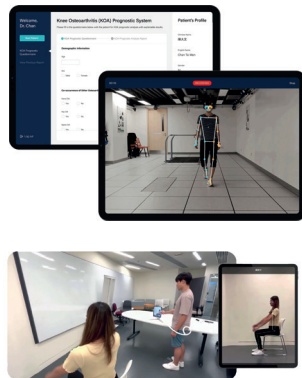


4

## AI-based Knee Osteoarthritis Screening System

This innovative multi-faceted prognosis prediction system can achieve an accuracy rate of up to 90%. It detects the early symptoms of knee osteoarthritis from videos shots with smartphones and is much affordable, making it a viable solution for screening knee osteoarthritis patients in the community.

Principal Investigator: Professor Chunyi WEN  
Startup Company: CLAIRE



2

## Liverscan®

A portable device for easy, accurate and affordable assessment of liver fibrosis and fatty liver with a wireless palm-sized ultrasound probe, for liver health screening, follow-up, and treatment outcome measurement.

Principal Investigator: Ir Professor Yongping ZHENG  
Startup Company: Eieling Technology Limited

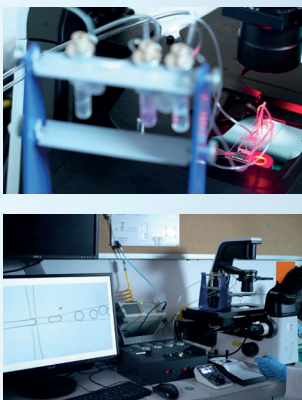


5

## High-throughput Microfluidic Platform for CTCs Detection in Cancer Precision Diagnostics

A portable device that offers high-throughput, and rapid, accurate detection and analysis of CTCs in clinical samples at the single cell level, designed for improving non-invasive early diagnosis and prognosis of cancer.

Principal Investigator: Professor Mo YANG  
Startup Company: Shenzhen Zigzag Biotechnology Ltd



3

## Mobile Exoneuromusculoskeleton

An easy-to-use, portable lightweight robotic arm that provides effective rehabilitation training for stroke patients to operate it themselves at home.

Mobile Ankle-foot Exoneuromusculoskeleton is the version designed for ankle-foot rehabilitation.

Principal Investigator: Professor Xiaoling HU  
Startup Company: Thecon Technology (HK) Limited

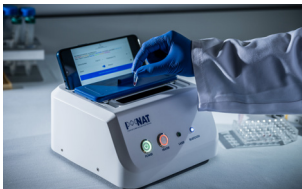


6

## Gold-LAMP

Gold nanoparticle-based loop-mediated isothermal amplification “Gold-LAMP” is a next-generation point-of-care nucleic acid testing method featuring short time, high accuracy, and low cost.

Principal Investigator: Professor Thomas LEE  
Startup Company: PocNAT Limited







# Studying at PolyU BME





# Our Academic Programmes

PolyU BME’s mission is to nurture future leaders who will drive advancements in the dynamic field of biomedical engineering. Hence, our academic programmes are thoughtfully designed to equip students with the expertise needed to excel and lead.

## Undergraduate Programmes

Bachelor of Science (Honours) in Biomedical Engineering

Accredited by   &  International Society for Prosthetics and Orthotics



Bachelor of Science (Honours) in Sports Science and Technology

*This programme is offered in 2026/27 (subject to approval)*



## Taught Postgraduate Programmes

Master of Science in Biomedical Engineering



Master of Science in Sports Technology and Management



## Research Postgraduate Programme

Master of Philosophy  
Doctor of Philosophy



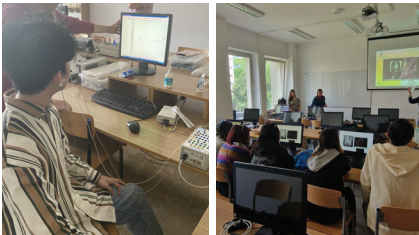
# Expanding Horizons and Uncovering Opportunities

We encourage exploration and discovery, opening doors to new possibilities and pathways for students to grow and thrive.

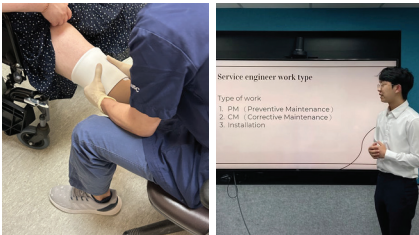
Apart from faculty<sup>#</sup> and university-level exchange programmes, BME has also established student exchange programmes with a number of world-renowned universities\*.



BME study tours for participants to acquire first-hand experiences and new knowledge through academic conferences, as well as medical and healthcare exhibitions.



Clinical and industrial internships to bridge the gap between academic learning and professional application.



Community service initiatives for children with neurological and spinal disorders.



Service learning empowers students to integrate their BME knowledge with social responsibility by designing healthcare products for those in need and professionals in the sector.



\*University of Pennsylvania (USA), Helsinki Metropolia University of Applied Sciences (Finland), University of Strathclyde (UK)

<sup>#</sup>Over 20 universities across Asia Pacific, Europe and North America under PolyU Global Student Exchange for the Faculty of Engineering students





# Discovering Career Potentials

By combining academic training with hands-on experience, we equip our students with the skills and knowledge necessary to thrive in the ever-evolving biomedical engineering landscape, opening doors to diverse career opportunities and enabling graduates to realize their full potential in this dynamic field.



Clinical Engineering



Prosthetics and Orthotics



Quality Assurance and Regulatory Affairs



Service Engineering



Sales and Marketing



Education and Research



Sports Engineering



Entrepreneurship

## Insights from Our Students

Get a glimpse into the vibrant learning environment and community as our students navigate their academic journey at PolyU BME.

I deeply value my experience in PolyU BME. It offers a comprehensive curriculum, projects, and internships that enrich university life. BME also provides resources for those who proactively explore further in research, competitions, and extracurricular activities.

Dio ZHANG

Year 4 student, BSc (Hons) Scheme in Biomedical Engineering - Biomedical Engineering Stream



My experience with P&O has been incredibly valuable, I acquired knowledge from classes and gained a deeper understanding of the industry through firsthand experiences during clinical attachment. I had the particularly enriching experience from the service trip to Guangzhou, being able to apply what I've learned and gain insights into P&O operations outside Hong Kong.

Vanessa IP

Year 4 student, BSc (Hons) Scheme in Biomedical Engineering - Prosthetics & Orthotics Stream





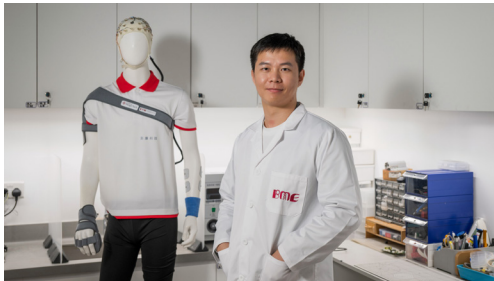
# Insights from Our Students

I learned from excellent teachers on theoretical doctrines, novel materials and therapeutic concepts. The systematic knowledge framework in classrooms provides me with a solid foundation, and the laboratory operations allow me to visualize and transform theories into practical applications. I’ve also opened up horizons with the platform resources and by participating in different projects. These experiences will eventually become the cornerstone of our professional confidence and enduring inspiration for continued scholarly exploration.



Xincan LI  
Student of MSc in Biomedical Engineering

My transformative experience at BME’s Neurorehabilitation and Neural Engineering Lab immersed me in cutting-edge research, where I contributed to projects restoring motor function and enhancing life quality for neurological patients under world-class mentorship. Collaborating across neuroscience, biomedical engineering, and clinical rehabilitation strengthened my technical and theoretical expertise while fostering innovative problem-solving. This foundation has also propelled my career in biomedical engineering and fuels my commitment to advancing neurorehabilitation technology.



Legeng LIN  
PhD student in the Department of Biomedical Engineering

# Insights from Our Alumni

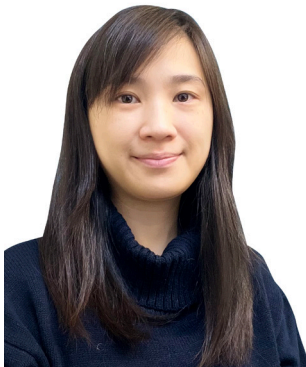
Discover insights from our alumni on how their academic journeys have shaped their career paths and opened exciting opportunities in the field of biomedical engineering.

The interdisciplinary training at BME strengthened my problem-solving and analytical skills, which have been valuable in my role as a medical device QMS auditor. This foundation helps me contribute to the industry by supporting regulatory compliance and quality systems to ensure safe and effective medical devices.



Mr Billy WONG  
Principal Advisor (Medical Device) of Corp R&D Department in SGS HK Limited;  
Master of Science in Health Care (Healthcare Technology) (2008);  
2022 Outstanding Alumni Awardee

My time at BME laid the foundation for my career and passion in biomedical engineering. The spectrum of courses provided is diversify yet comprehensive. Different outside-classroom activities, like industry visits and placement programs, provides the early opportunities for us to try out different BME job nature and allows us to choose the right one for ourselves.



Ir Cristina LEUNG  
Biomedical Engineer, Hospital Authority;  
Master of Philosophy (2010); Bachelor of Science in Biomedical Engineering (2007);  
2022 Outstanding Young Alumni Awardee

Biomedical engineering is a dynamic field filled with opportunities. Embrace change with an open mind, adapt easily, and trust in your ability to make a difference. A humble attitude, along with sharpened skills, will lead to an impactful career.



Mr Chapman LEE  
Director of Imsight Technology Co. Limited;  
BSc (Hons) in Health Technology (2005);  
2024 Outstanding Alumni Awardee



# Our Academic & Teaching Staff

Meet our distinguished academic and teaching staff, dedicated to inspiring and guiding your educational journey.



**Ir Professor Ming ZHANG**  
Head of Department, Director of Research Institute for Sports Science and Technology, Chair Professor of Biomechanics



**Professor Youhua TAN**  
Associate Professor



**Professor Cheng DONG**  
Associate Vice President (Mainland Research Advancement),  
Chair Professor of Cell Engineering and ImmunoMedicine



**Professor Chunyi WEN**  
Associate Professor



**Ir Professor Yongping ZHENG**  
Henry G. Leong Professor in Biomedical Engineering, Director of Research Institute for Smart Ageing, Director of Jockey Club Smart Ageing Hub,  
Chair Professor of Biomedical Engineering



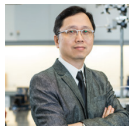
**Professor Yun CHANG**  
Assistant Professor



**Professor Mo YANG**  
Associate Head (Research), Director of Joint Research Center for Biosensing and Precision Theranostics, Chair Professor of Precision Theranostics



**Professor Christina Zonghao MA**  
Assistant Professor



**Professor M. S. WONG**  
Associate Head (Academic), Professor



**Professor Emma Shujun WANG**  
Assistant Professor



**Professor Lei SUN**  
Professor



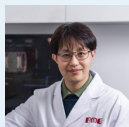
**Dr Hin-chung LAU**  
Assistant Dean (Student Development) of Faculty of Engineering,  
Senior Lecturer



**Professor Xiaoling HU**  
Associate Professor



**Dr Kenneth Chik-chi CHENG**  
Lecturer



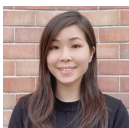
**Professor Elmer Dai Fei KER**  
Associate Professor



**Dr Babak HASSAN BEYGI**  
Clinical Associate



**Professor Puxiang LAI**  
Associate Professor



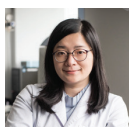
**Ms Jessie KAR**  
Instructor



**Professor Thomas LEE**  
Associate Professor



**Ir Professor Albert Ka-fat POON**  
Professor of Practice



**Professor Sharon Y. C. RUAN**  
Associate Professor



Through our continuous commitment to advancing biomedical engineering education, research, and professional services, we are dedicated to making a meaningful impact on society and contributing to a healthier world.

# Together, PolyU BME Innovates for Better Health.



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Kowloon, Hong Kong



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@PolyU | Department of Biomedical Engineering



THE HONG KONG  
POLYTECHNIC UNIVERSITY  
香港理工大學



DEPARTMENT OF  
BIOMEDICAL ENGINEERING  
生物醫學工程學系