

MASTER OF SCIENCE IN

METAVVERSE TECHNOLOGY

元宇宙科技理學碩士學位課程

EMBARK ON JOURNEY TO LIMITLESS
IGNITE YOUR SPARK OF GENIUS

About US

About PolyU

With over 85 years of proud tradition and ranking among the world's top 100 institutions, PolyU strives in interdisciplinary research and impactful innovations to address real-world challenges.

About COMP

The Department of Computing (COMP) is one of the pioneers offering computing education in the territory. Since 1974, COMP has been devoted to nurturing professional talents to support the advancement of society.

International Recognition

Today, COMP has gained international recognition in world-class research and high-quality education and ranked among the top 100 in a number of world rankings. In the latest world university rankings by the subject "Computer Science":

34th

U.S. News & World Report 2023

44th

Global Ranking of Academic Subject 2022

79th

The Times Higher Education World University Rankings 2023

Advanced learning facilities & laboratories

COMP owns world-class laboratories and the first University Research Facility in Big Data Analytics in Hong Kong, providing solid hardware support for cross-disciplinary research and teaching activities.

- Biometrics Research and Innovation Centre (BRIC)
- FinTech and Cyber Security Lab (FCSL)
- Internet and Mobile Computing Lab (IMCL)
- Research Centre on Data Science and Artificial Intelligence (RC-DSAI)
- The Research Centre for Blockchain Technology (RCBT)
- University Research Facility in Big Data Analytics (UBDA)

Students undertaking projects and dissertations will have the opportunity to access other resources such as the Game Lab and the Big Data and Cloud Computing Platform.



Game Lab



Research Centre on Data Science and Artificial Intelligence (RC-DSAI)

Excellent platform for peer learning & exchange

Our MSc programmes offer a well-resourced environment of broad student mix, students can benefit from interaction with their peers in exchanging ideas and sharing experiences. COMP also maintains an extensive network of MSc alumni, students can acquire both advanced expertise and professional networks that help them scale new heights in their careers.



Programme Introduction

COVID-19 raised the tremendous demands of immersive experience in the virtual world when the activities in the real world were limited by stay-at-home orders. This has ripened people's conception about the metaverses from a faraway future idea to a reality in prototyping. On the frontier of development, there are increasing calls for practitioners from a wide range of fields such as VR/AR, gaming, social media, artificial intelligence, decentralised infrastructures, and crypto properties. The trend motivates us to offer a new programme for metaverse designers, builders, and visioners in research and industry.

Learning Outcomes:

- Have an in-depth understanding of the nature of metaverses;
- Understand the fundamental technology for building metaverses;
- Build up the ability to integrate various technologies into metaverse applications; and
- Envision metaverse development as a multidisciplinary coevolutionary process so that students will enthusiastically engage in lifelong learning in this setting.

Features

GET A TASTE FOR EVERY ASPECT OF METAVERSE

A comprehensive exploration of the latest metaverse technologies, including VR/AR, game development, machine learning, decentralised infrastructures, crypto properties, computer vision and AIoT.

Teamwork and Collaboration

Work in teams as both a leader and a member and effectively collaborate with practitioners from various disciplines.

Favourable Environment for Future Development

In October 2022, The Government of Hong Kong Special Administrative Region announced a policy statement on the development of Virtual Assets in Hong Kong, providing a facilitating environment for promoting sustainable and responsible development of the VA sector. Graduates of this programme would be able to grasp this golden opportunity to develop careers in this sector.

Industrial Support

We have connected with the industry and found positive support in our programme, especially the Metaverse Project, which provides an opportunity for the industry and university to work together on a new business solution. We have received the supporting letters from Cyberport, MTR, HKT, The Sandbox, Hong Kong Extended Reality Association, Votanic, Xensory Lab, Lutech, etc.

Facility for 360° Video Creation

An Immersive Prototyping and Experience facility designed for 360° video creation, photorealistic 3D modelling, physical-metaverse prototyping, and interaction will be set up to facilitate immersive experiences with virtual worlds. The facility will be used for teaching & learning, research, and a showcase of metaverse applications and will be equipped with state-of-the-art VR headsets, IoT sensors, 3D/4D capture devices, different CAVE system, and high-performance servers.

Programme Structure

MSc in Metaverse Technology

Each subject consists of one class a week over a 13-week semester. Students are enrolled in 4-5 subjects per semester and a Metaverse Programme core (Metaverse Project II) in the summer semester.

Core	Credits
Metaverse Programme core	12
Metaverse Technology core	6
Metaverse Design & Ecology core	6
Electives and/or Additional Core subjects	6
Total	30

MODE OF STUDY

This is a full-time programme.

AWARD REQUIREMENT

Students are required to complete 30 credits for the MSc in MT.

Subject Introduction

Subjects

Metaverse Programme Core

- Extended Reality
- Metaverse Fundamentals
- Metaverse Project I
- Metaverse Project II

Metaverse Technology Core

- Blockchain & Smart Contract
- Human Computer Interaction
- Digital Twins & Virtual Human
- Game Engine & Programming

Metaverse Design & Ecology Core

- Game Design
- Metaverse Applications: Design and Case Studies
- Metaverse Economics & Ecosystems

Elective Subjects

- Software Engineering and Development
- Wireless Networking and Mobile Computing
- Cyber and Internet Security
- Multimedia Computing, Systems and Applications
- Natural Language Processing
- Big Data Computing
- AI Concepts
- Computer Vision and Image Processing
- Machine Learning and Data Analytics
- Applied Cryptography for Financial Applications
- Decentralised Apps Fundamentals and Development
- Business Forecasting
- IoT – Tools and Applications
- Social Media Marketing
- UX Design Fundamentals
- Advanced Visualisation and Interaction
- Psychology of Design I

This programme focuses on collaborative projects which aim to provide students with more work practices and exposure to industrial applications, enabling them to integrate various technologies into metaverse applications.

Students are allowed to choose from a common pool of electives within the Department of Computing, subject to vacancies available. Some subjects may be offered during the summer to provide students with greater flexibility in designing their own study programme.

All subjects bear three credits unless otherwise stated and they are subject to review and changes.

MScMT Programme Leader

Dr Korris Chung
BSc (Manitoba); MPhil,
PhD (CUHK)

Research Areas:
Data Mining, Machine
Learning, Big Data Analytics,
Computational Intelligence,
Pattern Recognition, Multimedia

Deputy Programme Leader

Dr Peter Ng
BSc, MSc, PhD [PolyU(H.K.)]

Research Areas:
Artificial intelligence,
Game Development,
Fuzzy Measure and Integral

Artificial Intelligence and Robotics

Dr CHEN Gong	PhD [PolyU(H.K.)]
Dr CHUNG Fu Lai Korris	BSc (Manitoba); MPhil, PhD (CUHK); MIEEE
Prof. HOORN Johan	BA, MA (University of Amsterdam); PhD (D. Litt.), PhD (D. Sc.) (Vrije University Amsterdam)
Dr LI Ping	BEng (Jinan); PhD (CUHK)
Dr LIN Wanyu	BEng (HUST); MSc [PolyU(H.K.)]; PhD (Toronto); MIEEE
Dr LIU Yan Fiona	BEng (Southeast); MSc (Nanjing); PhD (Columbia)
Dr NG Hiu Fung Peter	BSc, MSc, PhD [PolyU(H.K.)]
Prof. TAN Kay Chen	BEng (Glasgow); PhD (Glasgow); FIEEEE
Dr WU Xiaoming	BSc, MSc (Peking); MPhil (CUHK); PhD (Columbia)
Dr WU Jibin	BEng; PhD (NUS)
Dr XU Wenchao	BEng, MEng (Zhejiang); Ph.D. (Waterloo); MIEEE

Cyber Security and Privacy

Prof. AU Man Ho Allen	MPhil (CUHK); PhD (Wollongong); MIEEE
Dr GAO Shang	BS (HDU); MEng (SEU); PhD [PolyU(H.K.)]
Dr LI Zecheng	BEng (Southeast); PhD [PolyU(H.K.)]
Dr LU Xingye	BEng [Southeast]; PhD [PolyU(H.K.)]
Prof. LUO Xiapu Daniel	BSc, MSc (Wuhan); PhD [PolyU(H.K.)]; SMIEEE
Prof. XIAO Bin	BSc, MSc (Fudan); PhD (UT Dallas); SMIEEE; MACM; MCCF
Dr XUE Haiyang	BSc, MSc [Shandong U]; PhD [Chinese Academy of Sciences]
Dr ZHANG Mengyuan	BEng, MEng (NUPT); PhD (Concordia)
Dr ZHENG Yuanqing	BSc, MEng (BNU); PhD (NTU); MIEEE, MACM
Dr ZHOU Hao	BEng, MEng (NJUPT), PhD [PolyU(H.K.)]

Data Science, Information Retrieval and HCI

Dr FAN Wenqi	BM (GDMU); MEng (SYSU); PhD (CityU)
Dr HUA Wen	BEng, PhD [RUC]
Dr HUANG Xiao	BSc (Shanghai Jiao Tong U); MSc (IIT); PhD (TAMU)
Dr JIN Fengmei	BEng [SYSU], MEng [RUC], PhD [UQ]
Dr LEONG Hong Va	BSc, MPhil (CUHK); PhD (California); MACM; MIEEE
Prof. LI Qing	BEng (Hunan); MSc, PhD (USC); FIEEEE; FIET/IEE; DMCCF
Dr LUK Wing Pong Robert	BSc & Dip. Eng. (Southampton); MSc (Warwick); PhD (Southampton); FBSC; SMACM; SMIEEE, CEng, CITP
Dr NGAI Grace	ScB (Brown); MSE, PhD (Johns Hopkins)
Dr SHI Jieming	BSc (Nanjing); PhD (HKU)

Dr YIU Man Lung Ken	BEng, PhD (HKU)
Dr ZHANG Chen Jason	BSc (MPI); MSc, PhD (HKUST)
Dr ZHOU Kai	BSc (SJTU); PhD (Michigan State)

Fundamentals and Software

Dr CAO Yixin	BEng (Harbin Engineering U); MS (BUAA); PhD (TAMU); MACM; MCCF; MSIAM
Dr LI Bo	BSc, MSc (OUC); PhD (SBU)
Dr LYU Mingsong	BEng, MSc, PhD (NEU); MIEEE
Dr PEI Yu	BSc, PhD (Nanjing); PhD (ETH Zurich)
Dr WANG Qixin	BEng, MEng (Tsinghua); PhD (UIUC)
Dr ZHANG Zhaorui	BSc (Xi'an Jiaotong); PhD [HKU]

Networking and Mobile Computing

Prof. CAO Jiannong	BSc (Nanjing); MSc, PhD (Washington State); MAE; FIEEEE; DMACM; FCCF
Dr CHAN Chun Bun Henry	BA, MA (Cambridge); PhD (British Columbia); MIEEE
Dr GUO Jingcai	BEng (Sichuan); MEng (Waseda); PhD [PolyU (H.K.)]; MIEEE
Dr LOU Wei	MEng (BUPT); PhD (Florida Atlantic); MIEEE
Dr SAXENA Divya	B.Tech., M.Tech., PhD (IIT Roorkee); MIEEE; MACM
Prof. WANG Dan	BSc (Peking); MSc (Case Western Reserve); PhD (Simon Fraser)
Dr XIA Xianjin	BSc, MSc, PhD (NPU); MIEEE; MACM
Dr YANG Lei	BSc, MSc, PhD (Xi'an Jiaotong)

Vision, Language and Graphics

Prof. CHEN Changwen	BS (USTC); MSEE (USC); PhD (UIUC); FIEEEE; FSPIE; MAE
Prof. LI Wenjie Maggie	BSc, MSc (Tianjin); PhD (CUHK); MACM
Dr LI Jing	BSc (Peking); PhD (CUHK)
Dr LI Chen Richard	BSc (Nanjing); MSc, PhD (CityU)
Prof. PATHAK Ajay Kumar	PhD (HKU); FIAPR; FIEEEE
Dr SIN Ping Tat Zackary	BSc, PhD [PolyU(H.K.)]; MACM, MSIGGRAPH
Dr YANG Bo	BEng (BUPT); MPhil (HKU); DPhil/ PhD (Oxford)
Dr YONG Hongwei	BSc, MSc (Xian Jiaotong), PhD (PolyU)
Prof. YOU Jia Jane	BEng (Xi'an Jiaotong); PhD (La Trobe); Dip (Beijing Foreign Language); MIEEE
Prof. ZHANG Lei	MSc, PhD (Northwestern Polytechnical); FIEEEE

Academic Staff of our Department

Career Prospect

Graduates of this programme will gain the knowledge necessary to pursue careers in start-ups and big players in the metaverse industry and other related industries.

Metaverse is powered by Non-fungible tokens (NFTs), Mixed Reality and other technologies. It is widely recognised as the next stage of the Internet. It potentially could change the ways we work, socialise, game and shop, with its market size is US\$100.27 billion in 2022 (Fortune Business), expected to reach

US\$716.5 billion by 2027 (Brandessence Market Research), and US\$ 947.118 billion by 2030 (PMI). Gartner also recommends Metaverse as one of the top five emerging trends and technologies for 2022. It will be the next big technology platform that can attract content creators, game developers, social networks and other technology leaders to capture a slice of this huge market opportunity. New rendering algorithms, Human-Computer Interface, and encryption techniques will be developed to create a convergence of the physical and digital assets.

Practicality

An increasing job market as local start-ups grow (e.g., Animoca) and big players (e.g., Meta and Roblox) expand their business in Hong Kong, Mainland, and Asian countries/regions. Candidates are suitable for cutting-edge development, such as 3D computational photography, neural rendering, scene reconstruction, computational imaging, visual-inertial odometry, state estimation, sensor fusion, mapping and localization, mixed reality, chatbot, and game development. They can also become metaverse planners, ecosystem developers, hardware and infrastructure developers, virtual building architects, event managers, and content developers.



Admission Requirements

- A Bachelor's degree in Computing / Computer Science / Engineering, Engineering Sciences, Mathematics or related disciplines. Applicants with a Bachelor's degree in other disciplines and who have at least three years of significant IT-related work experience will also be considered. In general, relevant work experience is preferred, and employers' support or sponsorship is an advantage.
- If you are not a native speaker of English, and your Bachelor's degree or equivalent qualification is awarded by institutions where the medium of instruction is not English, you are expected to fulfil the University's minimum English language requirement for admission purpose. Please refer to the "Admission Requirements" section for details.
- A Test of English as a Foreign Language (TOEFL) score of 80 for the Internet-based test or 550 for the paper-based test; OR
- An overall Band Score of at least 6 in the International English Language Testing System (IELTS).

More information can be found at www.polyu.edu.hk/study.

Application

To apply for the programme, applicants can submit their application via an online admission system at www.polyu.edu.hk/admission. This programme has a quota for admission therefore early application is strongly encouraged.

Programme Code | **61038**

Tuition Fee | **HK\$ 10,850 per credit for local and non-local students**

**Department
of Computing**



PolyU COMP

PQ806

Mong Man Wai Building
The Hong Kong Polytechnic University
Hung Hom, Kowloon, Hong Kong

comp.pg@polyu.edu.hk

www.polyu.edu.hk/comp

facebook.com/polyucomp