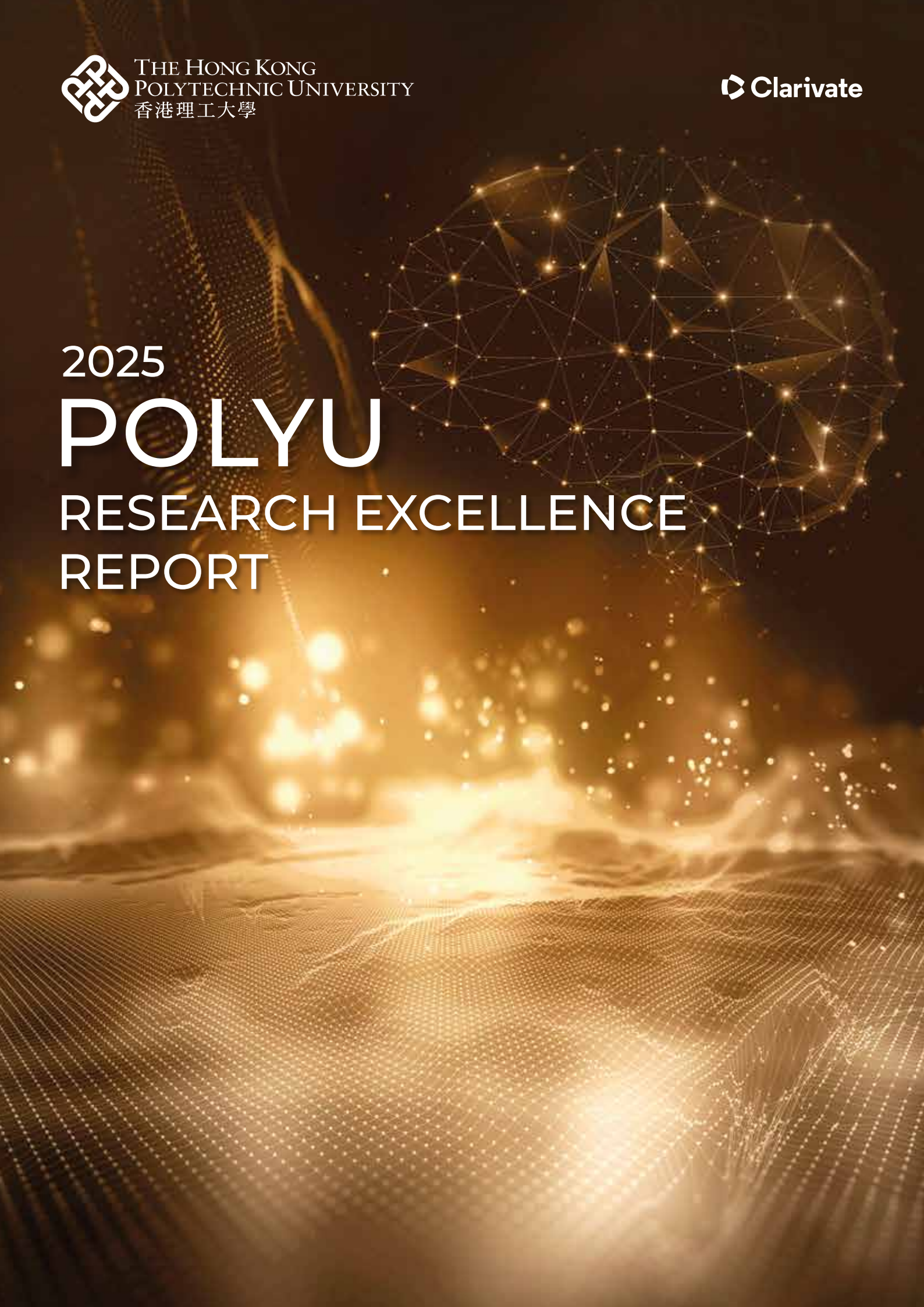
THE HONG KONG
POLYTECHNIC UNIVERSITY
香港理工大學
Clarivate
2025
POLYU
RESEARCH EXCELLENCE
REPORT

POLYU RESEARCH EXCELLENCE REPORT 2025

EXECUTIVE SUMMARY

The Hong Kong Polytechnic University (PolyU) is a world-leading university that continues to demonstrate global leadership through high-impact research, strategic innovation and knowledge transfer. PolyU is consistently ranked among the world's Top 100 universities in major global rankings, with many subjects in the Top 10 globally and ranked first in Hong Kong.

Over decades of research innovation, PolyU has established diverse expertise across disciplines where interdisciplinary integration has driven many of the ground-breaking advances. With strong growth in research output, PolyU had the highest number of publications among those funded by the University Grants Committee (UGC) in 2024. The strong performance has attracted international talent and opportunities — nearly 30% of PolyU's research output was produced in collaboration with Quacquarelli Symonds (QS) Top 50 universities. Its research outcomes have real-world implications and are readily applicable. PolyU was granted 1,020 patents between 2020 and 2024, the second highest total among the UGC-funded universities. To further facilitate research translation, PolyU has partnered with leading industry companies, such as NVIDIA, Huawei and Alibaba.

This report highlights PolyU's research performance, emphasising its well-established leadership in engineering, advancements in medical research through emerging AI technologies, and unique contributions to the hospitality, design and art disciplines.

Engineering

PolyU is a leading global institution for engineering education and research. Its Engineering discipline is the only one in Hong Kong ranked within the global Top 0.01% in the Essential Science Indicators ranking. Its research excellence in engineering has supported many billion-dollar national strategic programmes, such as the Chang'e-5 and Tianwen-1 missions, and benefited local society, for example, by providing technical expertise for the Double-arch Steel Bridge of the Cross Bay Link at Tseung Kwan O in Hong Kong.

AI-driven medical research

PolyU's advancement and excellence in computer science and artificial intelligence have transformed its medical research in recent years. AI-powered technologies are driving breakthroughs in imaging, nursing, rehabilitation, and optometry, accelerating discovery and improving the quality and accessibility of care for individuals with special needs.

Unique disciplines

With research that bridges creativity, sustainability and innovation, three of PolyU's distinctive disciplines – Hotel and Tourism Management, Fashion and Textiles, and Design – have gained global recognition. Leveraging Hong Kong's prime geographical and cultural position, PolyU's innovative approach in tourism planning and management has been recognised by the United Nations World Tourism Organization. Its fashion and textiles, and design disciplines have led to particularly impactful work that has improved social welfare through interdisciplinary research.

Through the collective efforts of staff, students, alumni and other community stakeholders, PolyU will continue its leadership and innovation for long-lasting impact that benefits Hong Kong, the Nation and the world.

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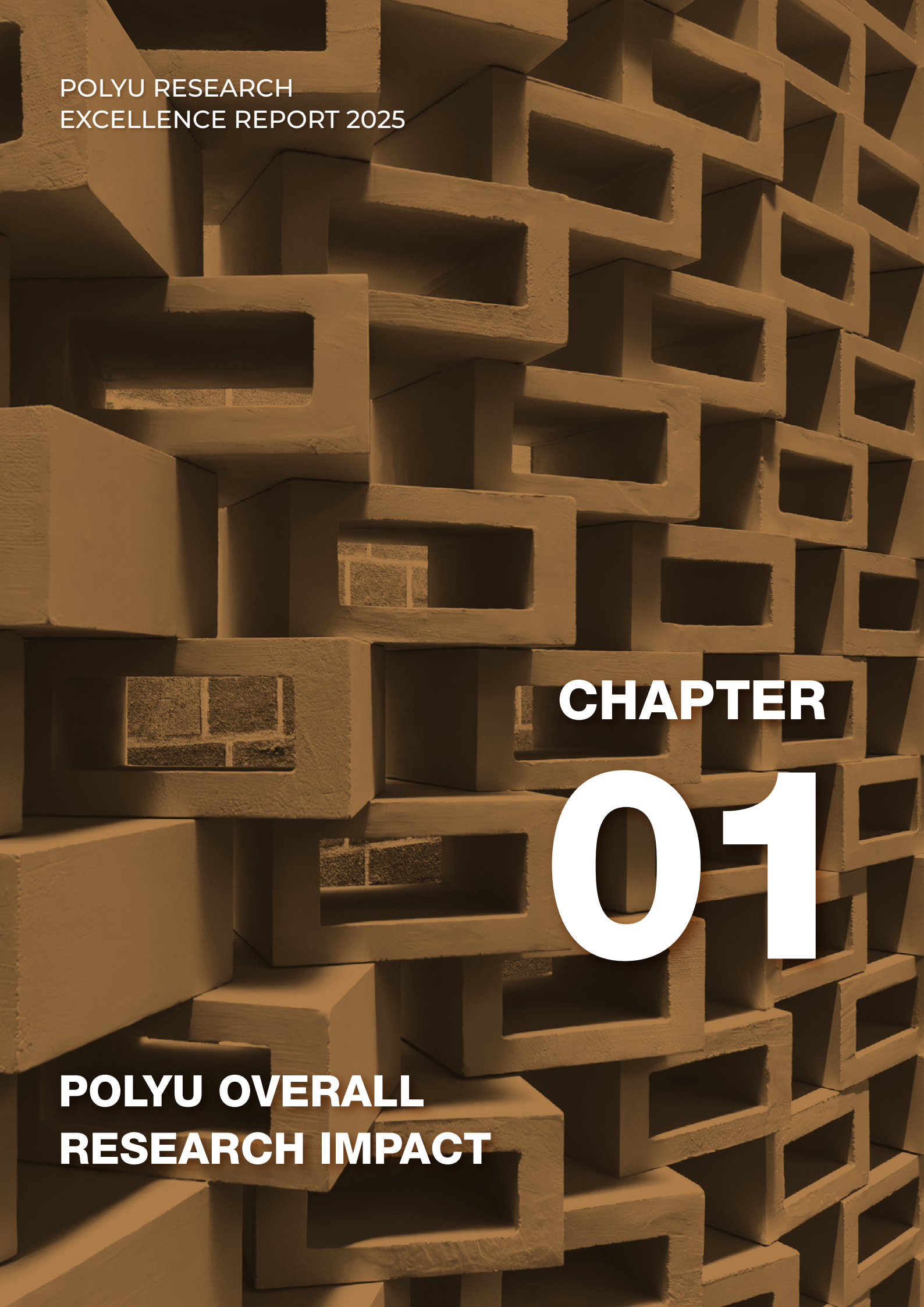


CHAPTER

01

POLYU OVERALL RESEARCH IMPACT

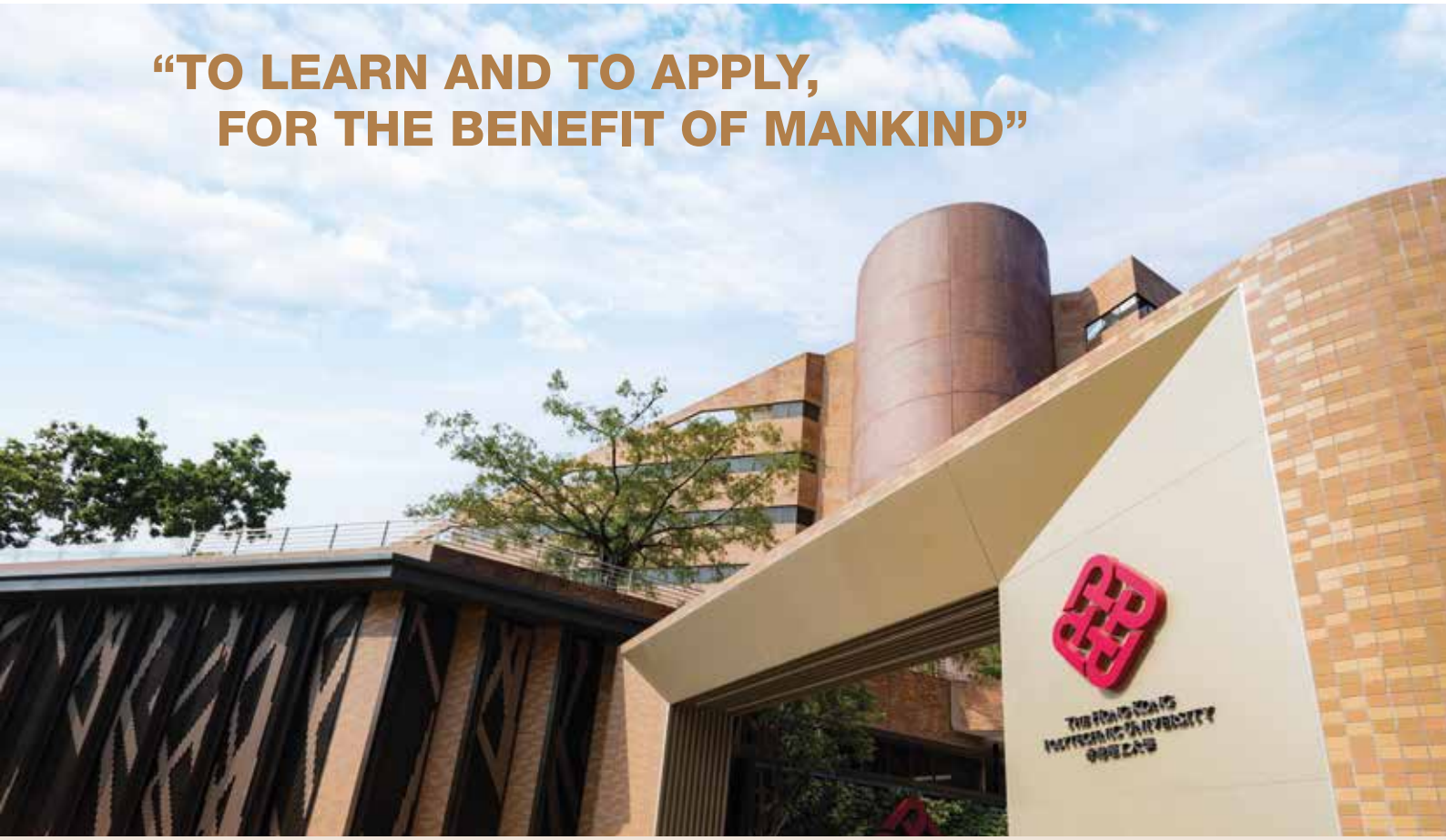
CHAPTER 1

POLYU OVERALL RESEARCH IMPACT

As one of the Top 100 universities globally, PolyU has significantly increased its research output and knowledge transfer in the past decade. In 2024, PolyU had the highest number of publications and the third highest number of granted patents among the UGC-funded universities, demonstrating its regional leadership in research excellence.

1.1 POLYU VISION AND MISSION

Established as the Government Trade School in 1937, shortly before World War II, to support the development of local technical education, The Hong Kong Polytechnic University (PolyU) has excelled by nurturing talent and driving positive impact. Aspiring to be an innovative world-class university, PolyU thrives with its vision to pursue excellence in education, research and knowledge transfer for the benefit of Hong Kong, the Nation and the world. Today, **PolyU is ranked among the world's Top 100 universities for its leadership in cutting-edge research, innovative teaching and contributions to sustainability.**



The University's mission centres on people: To nurture socially responsible professionals and leaders, and foster a community of belonging and pride. Guided by its motto, the University's core values have informed its newly published Strategic Plan (2025/26 – 2030/31), which has the theme **"Unite to Meet Challenges, Innovate to Benefit Society"**.[1] This objective highlights PolyU's commitment to advancing research excellence and delivering significant contributions to society.

This chapter will explore PolyU's overall research excellence with a focus on ranking performance, scholarly output, leading scholars, knowledge transfer and societal impact.

1 PolyU's Strategic Plan 2025/26 - 2030/31, https://www.polyu.edu.hk/cpa/Ebook/Strategic_Plan/2025-31/pdf/Polyu_StrategicPlan_25-31.pdf

1.2 UNIVERSITY RANKING PERFORMANCE

The University's excellence in education, research and knowledge transfer has earned it significant international recognition. PolyU is now among the world's Top 100 universities, with its positions in the Quacquarelli Symonds (QS) World University Rankings, Times Higher Education (THE) World University Rankings and U.S. News & World Report Best Global Universities Rankings all showing substantial improvements in the past decade (Figure 1), reflecting its unwavering pursuit of academic and research achievement. In the most recent ranking evaluations, **PolyU achieved 54th place in the QS World University Rankings 2026,[2] 58th in the U.S. News & World Report Best Global Universities Rankings 2025-2026,[3] and 80th in the THE World University Rankings 2026.[4]**

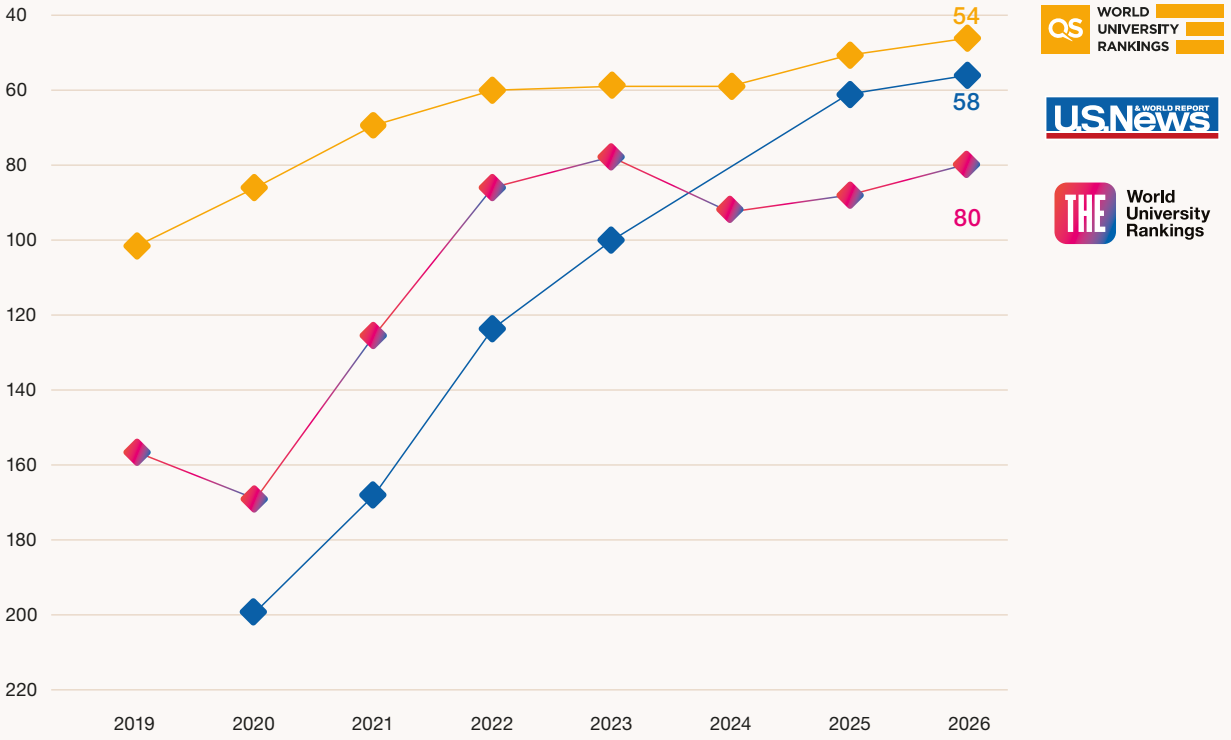


Figure 1. PolyU global university rankings

1.3 SUBJECT RANKING PERFORMANCE

PolyU educates students to be critical thinkers, innovative problem solvers and socially responsible global citizens. As part of its vibrant academic community, researchers and students can build a dynamic learning and research environment that not only empowers learning but also creates lasting impact. Established as a post-secondary technical institution, PolyU has evolved into a multidisciplinary institution that supports high-quality research endeavours across both fundamental and applied disciplines. **PolyU now has seven faculties: Business, Computer and Mathematical Sciences, Construction and Environment, Engineering, Health and Social Sciences, Humanities, and Science, as well as three schools: Design, Fashion and Textiles, and Hotel and Tourism Management**. Interdisciplinary integration supports the development of strategic, diversified and emerging research areas that attract and retain top scholars.

In response to changing workforce demands, PolyU is dedicated to curriculum innovation by continuously developing and launching cutting-edge programmes and refining its structure. For instance, the new Faculty of Computer and Mathematical Sciences was established in January 2025 to fulfil the growing demand for talent and impactful research in data science and AI. Additionally, the PolyU Marshall Research Centre for Medical Microbial Biotechnology was established in March 2025 to enhance the diagnosis and treatment of bacterial infections by utilising AI-driven e-biobanks. From the 2025/26 academic year onwards, PolyU offers programmes in emerging fields that include Interdisciplinary Studies, Quantitative Finance and FinTech, Intelligent Robotics Engineering, Vision Science and Innovation, and Sports Technology and Management.[5]

2 QS World University Rankings 2026, https://www.topuniversities.com/world-university-rankings?search=polytechnic
3 U.S. News & World Report Best Global Universities Rankings 2025-2026, https://www.usnews.com/education/best-global-universities/hong-kong-polytechnic-university-500421
4 THE World University Rankings 2026, https://www.timeshighereducation.com/world-university-rankings/hong-kong-polytechnic-university
5 PolyU programmes are offered in the 2025/26 academic year, https://www.polyu.edu.hk/en/media/media-releases/2024/0930_polyu-info-day-2024-to-be-held-on-12-october/

PolyU's strong performance in the global university rankings is closely tied to its outstanding performance in the global subject rankings, where the University consistently ranks first in Hong Kong (Figure 2). These achievements reflect PolyU's commitment to delivering world-class education and conducting impactful research that addresses societal needs.

In the QS World University Rankings by Subject 2025, seven PolyU disciplines rank in the global Top 30, with **Hospitality and Leisure Management, Art and Design, and Environmental Sciences achieving the highest rankings in Hong Kong.[6] Overall, 26 disciplines are listed among the world's Top 100.[7]**

PolyU's commitment to societal impact is also internationally recognised, as evidenced by its position at 56th in the THE Impact Rankings 2025, where it secured first in Hong Kong and 16th globally in Good Health and Well-Being (SDG 3).[8]

PolyU has demonstrated exceptional strength in engineering. **In the U.S. News & World Report Best Global Universities Rankings 2025 - 2026, PolyU ranked second globally in Civil Engineering, while its overall Engineering discipline ranked sixth in the world**. Its forward-thinking approach to transforming traditional engineering into sustainable solutions has also earned it the 11th position globally in Green and Sustainable Science and Technology, and the 18th position globally in Environmental Engineering.[9]

Beyond its strong performance in engineering, the University's collaborative environment fosters multidisciplinary talent in unique subjects. In the **ShanghaiRanking's Global Ranking of Academic Subjects 2025, PolyU globally ranked first in Hospitality and Tourism Management, and fifth in Textile Science and Engineering.[10]**

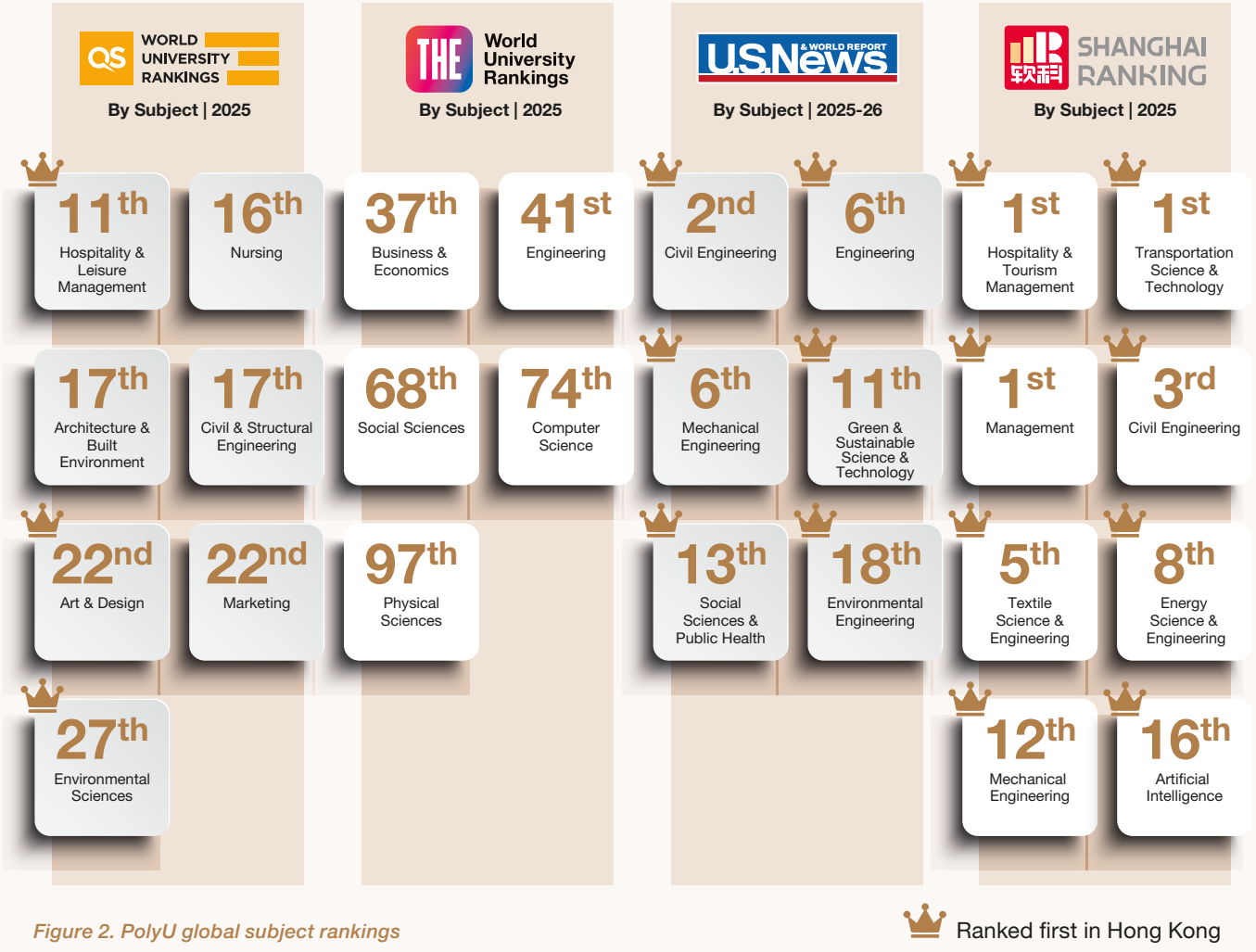


Figure 2. PolyU global subject rankings

6 QS World University Rankings 2026, https://www.topuniversities.com/universities/hong-kong-polytechnic-university
7 QS World University Rankings by Subject 2025, https://www.topuniversities.com/subject-rankings
8 THE University Impact Rankings 2025, https://www.timeshighereducation.com/impactrankings/good-health-and-well-being#!/length/25/locations/HKG/sort_by/rank/sort_order/asc
9 U.S. News & World Report Best Global Universities Rankings 2025-2026, https://www.usnews.com/education/best-global-universities/hong-kong-polytechnic-university-500421
10 ShanghaiRanking's Global Ranking of Academic Subjects 2025, https://www.shanghairanking.com/institution/the-hong-kong-polytechnic-university

1.4 RESEARCH PERFORMANCE

At PolyU, curiosity is transformed into solutions with the belief that knowledge can address the world's most pressing problems. Its research strategy emphasises interdisciplinary collaboration and finding innovative solutions to real-world problems. Specifically, PolyU implements targeted initiatives and partnerships that help turn ideas into positive societal, economic and environmental changes in Hong Kong and make significant contributions to the development of the Nation and beyond. This section explores the University's expanding research footprint and its contributions to global knowledge.

Research and innovation are facilitated by various bodies, including the PolyU Academy for Interdisciplinary Research (PAIR), the Research and Innovation Office (RIO), and the Knowledge Transfer and Entrepreneurship Office (KTEO).

PolyU hosts some of Hong Kong's premier research infrastructure and facilities and has deployed translational research platforms in Hong Kong and the Chinese Mainland for knowledge transfer and start-up incubation. It now supports eight National Research Laboratories, including two State Key Laboratories, three Greater Bay Area Joint Laboratories, two InnoHK Research Centres, 12 Interdisciplinary Research Institutes, eight Interdisciplinary Research Centres, 46 University-level Research Institutes, Centres and Facilities, and 25 Faculty and School-level Research Centres.[11] The National Research Laboratories, in particular, have contributed significantly to national missions, including deep space exploration.

To further support the Chinese Mainland's technology growth and implementation, PolyU has increased its footprint in the region. The University has aligned its research expertise, innovations and manpower with local industry needs, leveraging its partner cities' resources, including infrastructures, facilities and research funding. To date, PolyU has established 15 translational research institutes and centres in various cities in the Chinese Mainland,[12] which gives the University a significant presence in the Chinese Mainland and among the countries participating in the Belt and Road Initiative.

Between 2020 and 2024, PolyU had the second highest growth in publications among the eight universities funded by the University Grants Committee (UGC) in Hong Kong (Figure 3). It had the second highest number of publications among the UGC-funded universities, with a total of 38,265 publications during this period.

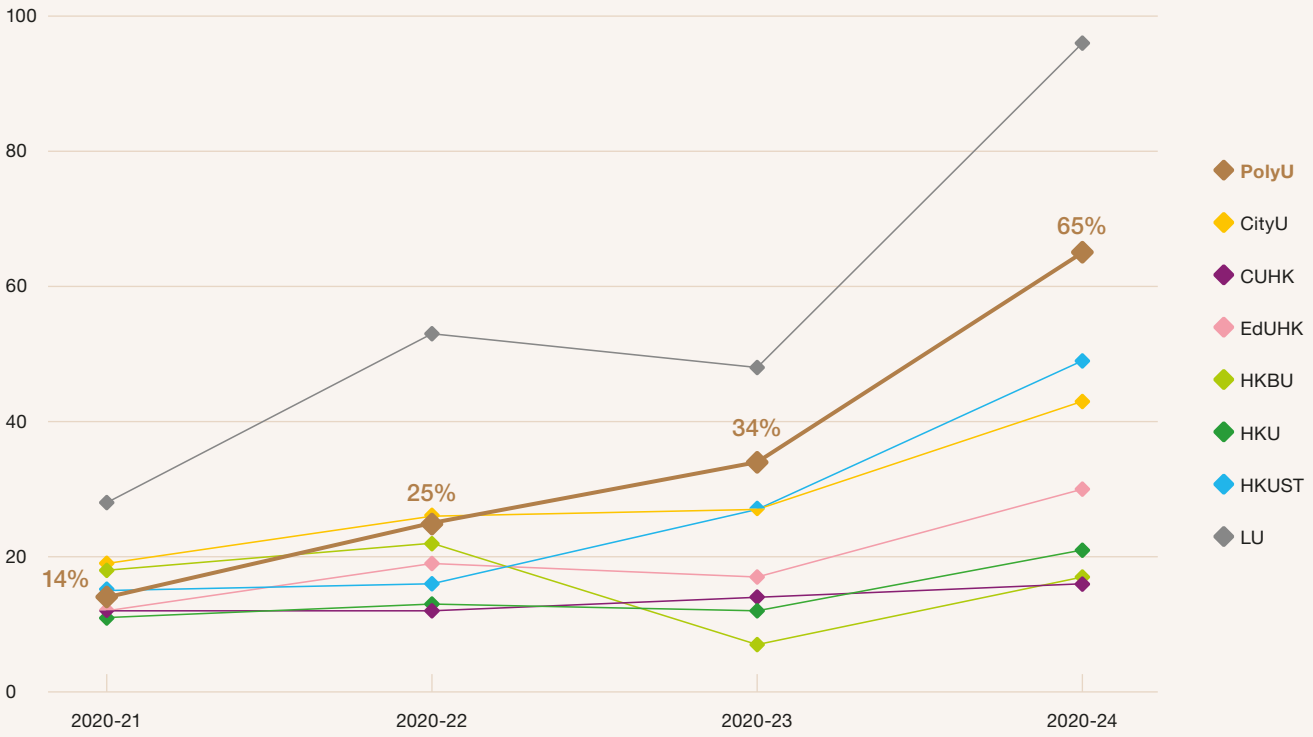


Figure 3. Cumulative publication growth: Hong Kong UGC-funded universities

11 A list of PolyU's Research Labs, Institutes and Centres, https://www.polyu.edu.hk/en/research/labs-institutes-centres/
12 PolyU's Strategic Plan 2025/26 - 2030/31, https://www.polyu.edu.hk/cpa/Ebook/Strategic_Plan/2025-31/pdf/Polyu_StrategicPlan_25-31.pdf

In 2024, with a steady and strong 65% growth in publications, PolyU had the highest number of publications in Hong Kong (Figure 4).

The quality of PolyU publications is also highly regarded in academia. Highly Cited Papers are publications performing in the Top 1% based on the number of citations received when compared to other papers published in the same field and the same publication year. Between 2020 and 2024, PolyU achieved a 55% increase in the number of Highly Cited Papers (Figure 5). Compared to Hong Kong, the Asia Pacific Region (APAC) and the world average, PolyU also consistently demonstrated a higher percentage of publications that achieved Highly Cited Papers status (Figure 6).

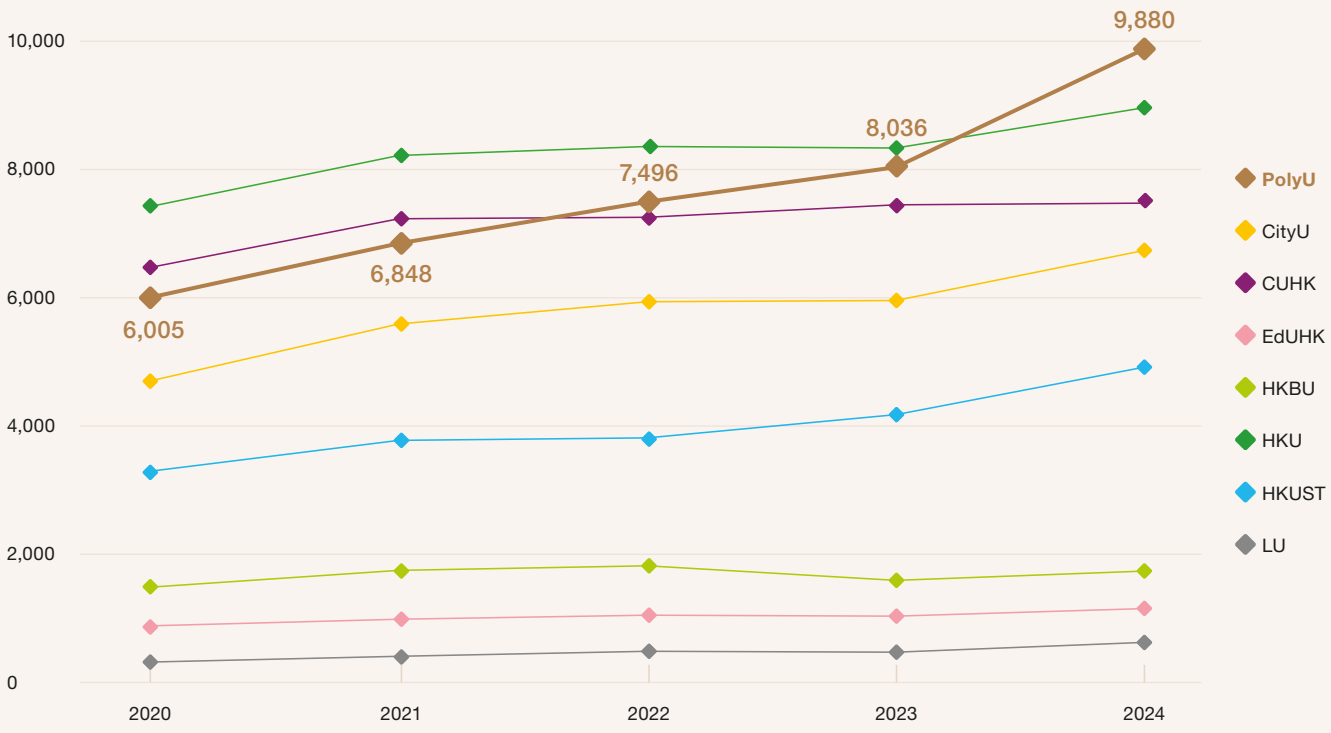


Figure 4. Number of yearly publications: Hong Kong UGC-funded universities

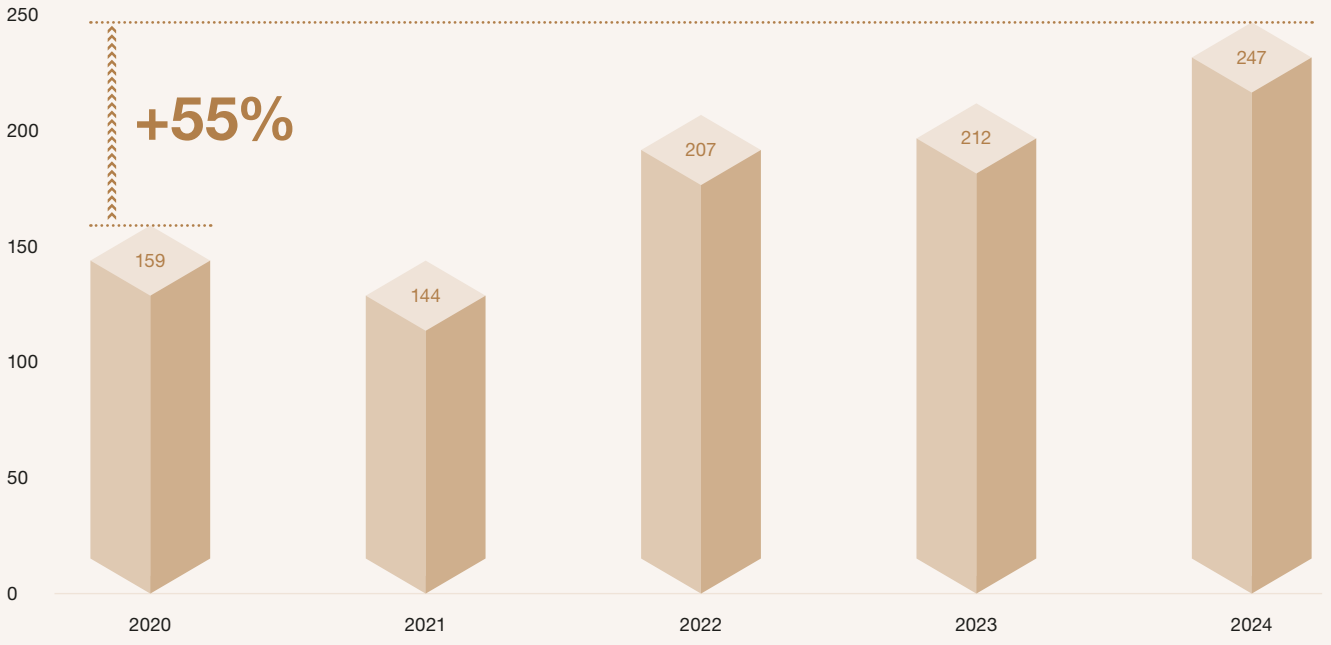


Figure 5. PolyU number of Highly Cited Papers

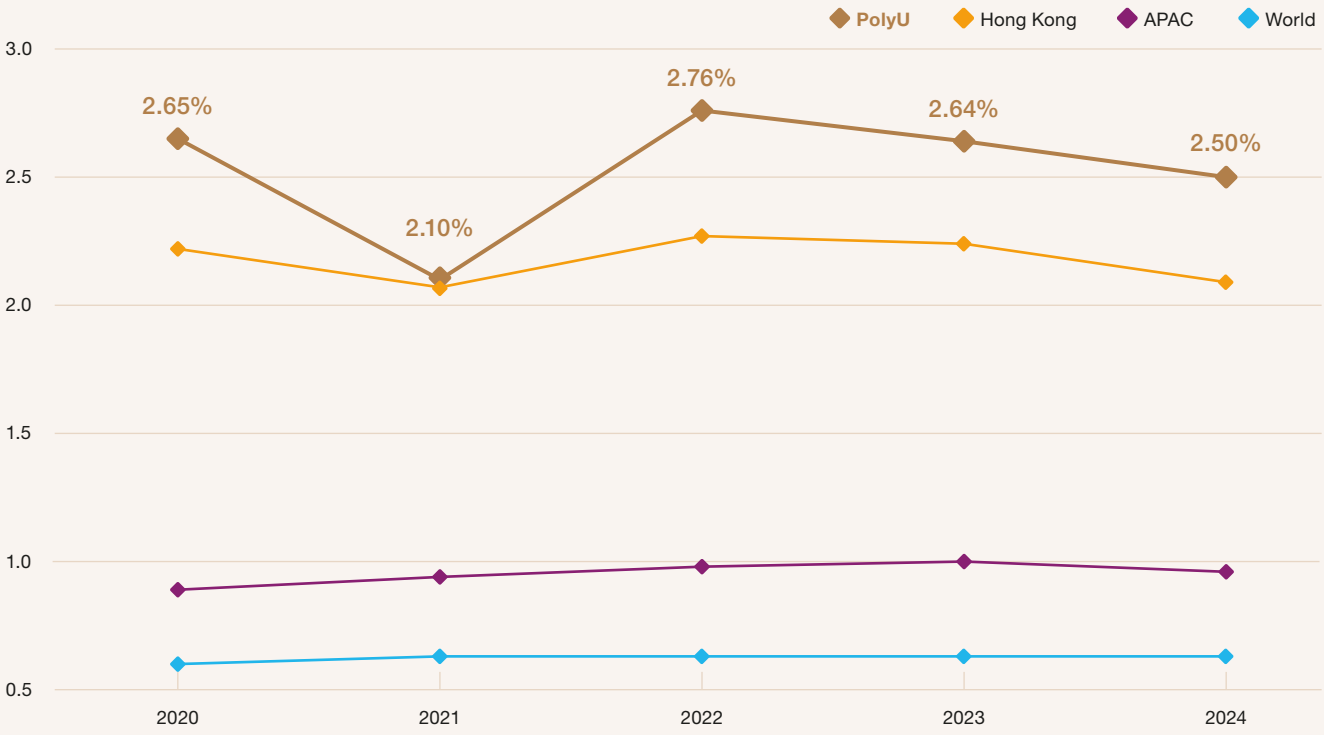


Figure 6. Share of Highly Cited Papers: PolyU, Hong Kong, APAC, and world

The University's rapid growth has also increased its global presence. Between 2020 and 2024, the percentage of global publications affiliated with PolyU increased by 63%. Similarly, the percentage of publications in Q1 publications and Top 10% global publications affiliated with PolyU increased by 58% and 54% respectively, while the percentage of global Highly Cited Papers affiliated with PolyU increased by 45% (Figure 7).

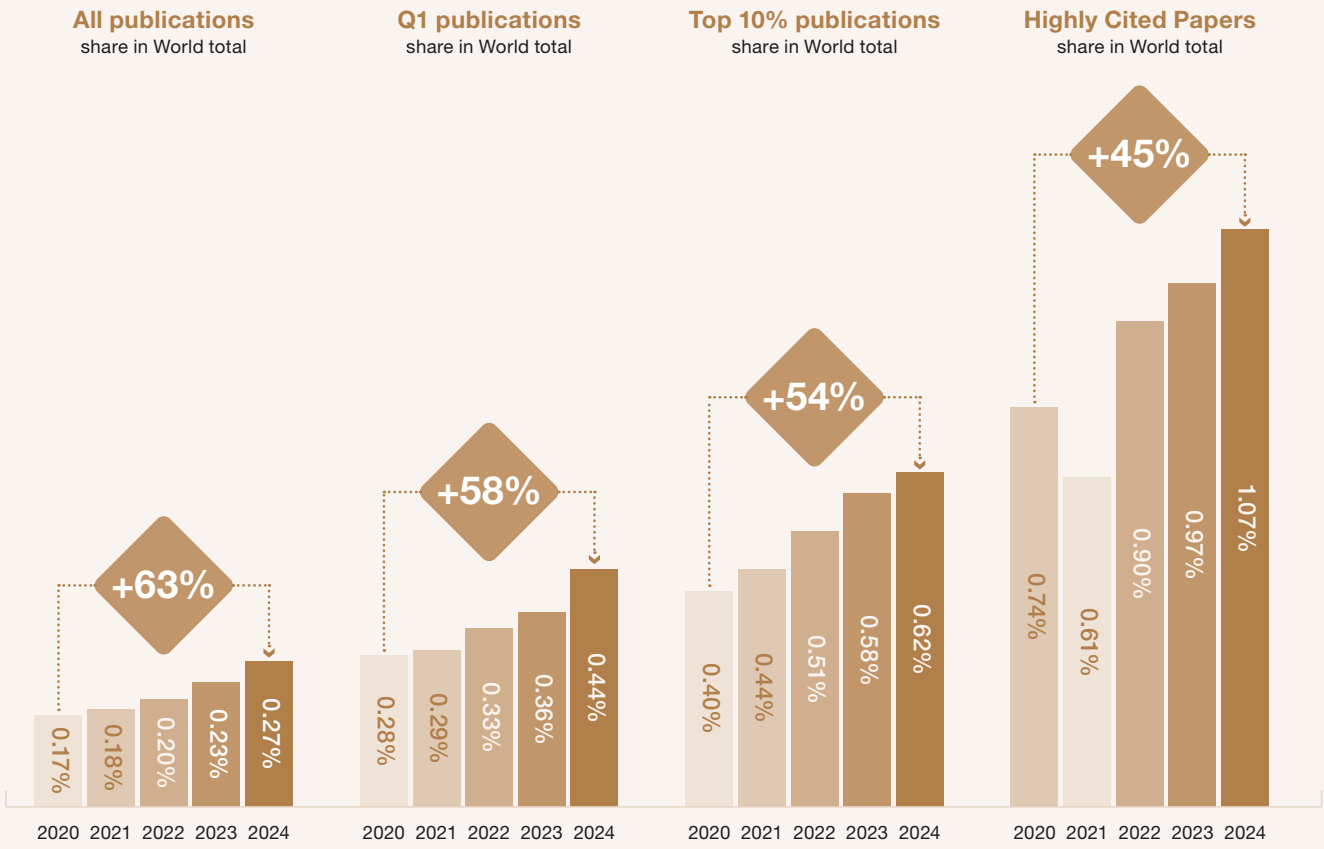


Figure 7. PolyU global share: all publications, Q1 publications, Top 10% publications and Highly Cited Papers

PolyU's markedly advancing research capabilities and international acclaim for its institutional excellence are closely tied to the dedication and efforts of its staff.

Clarivate's Highly Cited Researcher is a prestigious award for researchers who have multiple publications ranked in the top 1% worldwide by citations. In 2025, PolyU had 21 researchers recognised as Highly Cited Researchers.[13] Among them, **Professor John Lei ZHANG**, Chair Professor of Computer Vision and Image Analysis in the Department of Computing, has been listed for 12 consecutive years, while **Professor Gang LI**, Chair Professor of Energy Conversion Technology in the Department of Electrical and Electronic Engineering, has also been listed for 12 consecutive years.

Essential Science Indicators (ESI) measures citations authors receive in a 10-year period and determines the authors who are among the Top 1% in their research field based on citations. Currently, among the 1,353 ESI Top 1% researchers affiliated with institutions in Hong Kong, a total of 263 Top 1% researchers are affiliated with PolyU, the second highest among the eight UGC-funded universities. Within the 22 ESI research areas, PolyU had the highest number of Top 1% researchers in Engineering, Mathematics, and Biology and Biochemistry compared to the other seven UGC-funded universities.

1.5 COLLABORATION WITH LEADING GLOBAL INSTITUTIONS

As global challenges demand collective action, research collaboration is becoming increasingly critical for learning and innovation. PolyU embraces its role as a responsible global partner and cultivates collaborations with organisations and countries worldwide. As of January 2026, more than 600 international collaboration agreements have been signed with over 390 overseas institutions, spanning more than 45 countries and regions, including Australia, Belgium, Canada, France, Germany, Japan, Singapore, Sweden, the United Kingdom and the United States. These partnerships help to create meaningful societal contributions.[14]

In its research, PolyU is dedicated to applying its expertise to tackle both global and local challenges through extensive collaborations. Between 2020 and 2024, among its 38,265 publications, nearly 50% were with domestic collaborators and nearly 40% with international collaborators. Of these publications, 27% were with QS Top 50 universities, achieving a high Category Normalized Citation Impact (CNCI) of 2.27 that is more than double the world average (global average=1). In addition, all collaborations had a relatively high Average Impact over the 55th percentile, with some collaborations, such as with the Massachusetts Institute of Technology (MIT), reaching above the 77th percentile for their Average Impact (Figure 8). This aligns with the local funding landscape, as the UGC promotes high-quality research that is collaborative across institutions, disciplines and borders through schemes such as the Collaborative Research Fund and the Joint Research Scheme with the Chinese Mainland and the European Union.

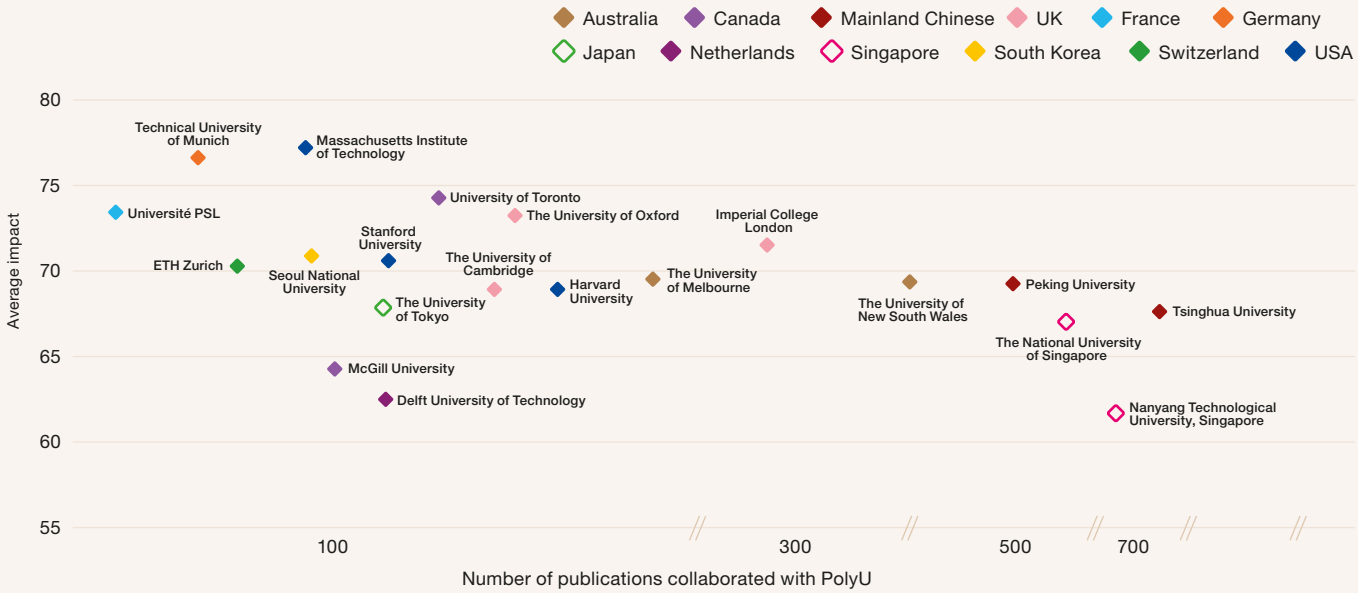


Figure 8. PolyU collaboration with 2026 QS Top 50 universities (2020 - 2024)

13 Highly Cited Researchers 2025, https://clarivate.com/highly-cited-researchers/?action=clv_hcr_members_filter&clv-paged=1&clv-category=&clv-institution=Hong%20Kong%20Polytechnic%20University&clv-region=&clv-name=

14 PolyU Partners List, https://www.polyu.edu.hk/geo/partnerships/partners-list/

Clarivate utilises a suite of indicators, the Collaboration Category Normalized Citation Impact (Collab-CNCI), to measure citation impact for various types of collaborations. These include overall collaboration (Collab-CNCI), overall domestic collaboration (Collab-CNCI Domestic), overall international collaboration (Collab-CNCI International) and multilateral international collaboration (Collab-CNCI International Quadrilateral+). Aggregated data for 2020-2024 showed that PolyU achieved higher Collab-CNCI in all domains compared to Hong Kong, APAC and the world average (Figure 9), indicating PolyU engagement in impactful collaborations.

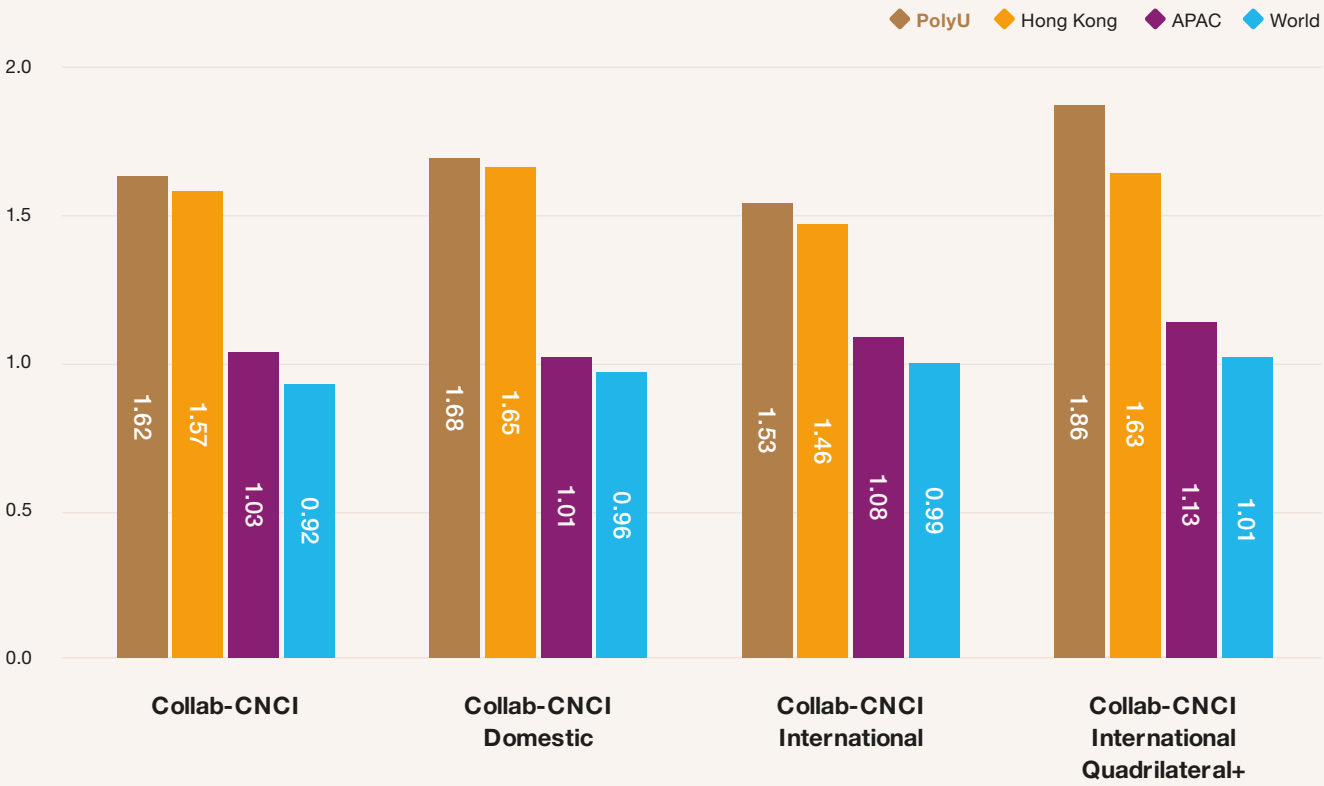


Figure 9. Collaboration Category Normalized Citation Impact: PolyU, Hong Kong, APAC, and world (2020 - 2024)

Through the InnoHK initiative funded by the Government of the Hong Kong Special Administrative Region of the People's Republic of China (the Government of the HKSAR), PolyU established two world-class research centres at the Hong Kong Science Park, partnering with the Royal College of Art in the United Kingdom for the Laboratory for Artificial Intelligence in Design (AiDLab) and the University of Waterloo in Canada for the Centre for Eye and Vision Research (CEVR). Further collaboration with the University of Waterloo has led to the establishment of the Research Centre for Nanoscience and Nanotechnology, which aims to develop innovative approaches in nanoscience. These partnerships demonstrate a global reach in the arts, health, science and technology.

PolyU's collaborative network in the Chinese Mainland is extensive and long-standing. In 1997, it became the first Hong Kong university approved by the Ministry of Education for cross-border collaboration, offering a higher education programme in the Chinese Mainland.[15] The University has since strategically established its Chinese Mainland presence and now has over 950 Chinese Mainland partner universities and research institutes, with over 3,100 collaborative projects completed.[16] These efforts concentrate on translational areas such as advanced manufacturing, aerospace, biomedical technology and intelligent transportation. Its translational research actively contributes to the Nation's key strategic initiatives, such as the Belt and Road Initiative. It co-founded the University Alliance of the Silk Road in 2015 with Xi'an Jiaotong University, bringing together over 150 universities from 37 countries and regions to promote higher education collaborations.[17] PolyU serves as the Vice-President institution of the Alliance in 2025, further increasing the impact of its education, research and knowledge transfer activities.

15 The first Hong Kong university approved by the Ministry of Education for cross-border collaboration, https://www.polyu.edu.hk/publications/excelximpact/issue/202516/cover-story/international-collaborations-with-impacts
16 An overview of PolyU's World-class excellence and innovation for societal impact, https://www.polyu.edu.hk/cpa/university_brochure/PolyU_Brochure_EN.pdf
17 PolyU's Belt and Road Initiative: University Alliance of the Silk Road (UASR), https://www.polyu.edu.hk/geo/partnerships/belt-and-road-initiatives/

1.6 TRANSLATING RESEARCH INTO INDUSTRIAL APPLICATIONS

Research ideas and outcomes are only meaningful when they serve people. PolyU drives technology transfer from academic research into real-world applications with its sense of societal responsibility. Forming close university partnerships with government and industry, and actively supporting entrepreneurship and start-up development are key priorities at PolyU for driving research translation. As part of this effort, PolyU has built a strategic patent portfolio globally.

Between 2020 and 2024, PolyU experienced a 257% increase in the number of its granted patents (Figure 10).

This growth also marked a 61% increase in the percentage of Hong Kong patents to which PolyU contributed in this period, representing the University's significant contribution to Hong Kong's technology development and translation.

Reflecting such rapid growth, PolyU was granted a total of 1,020 patents between 2020 and 2024, ranking second among the eight UGC-funded universities in both total patents granted (2020-2024) (Figure 11) and patents granted annually (2020-2023) (Figure 12).

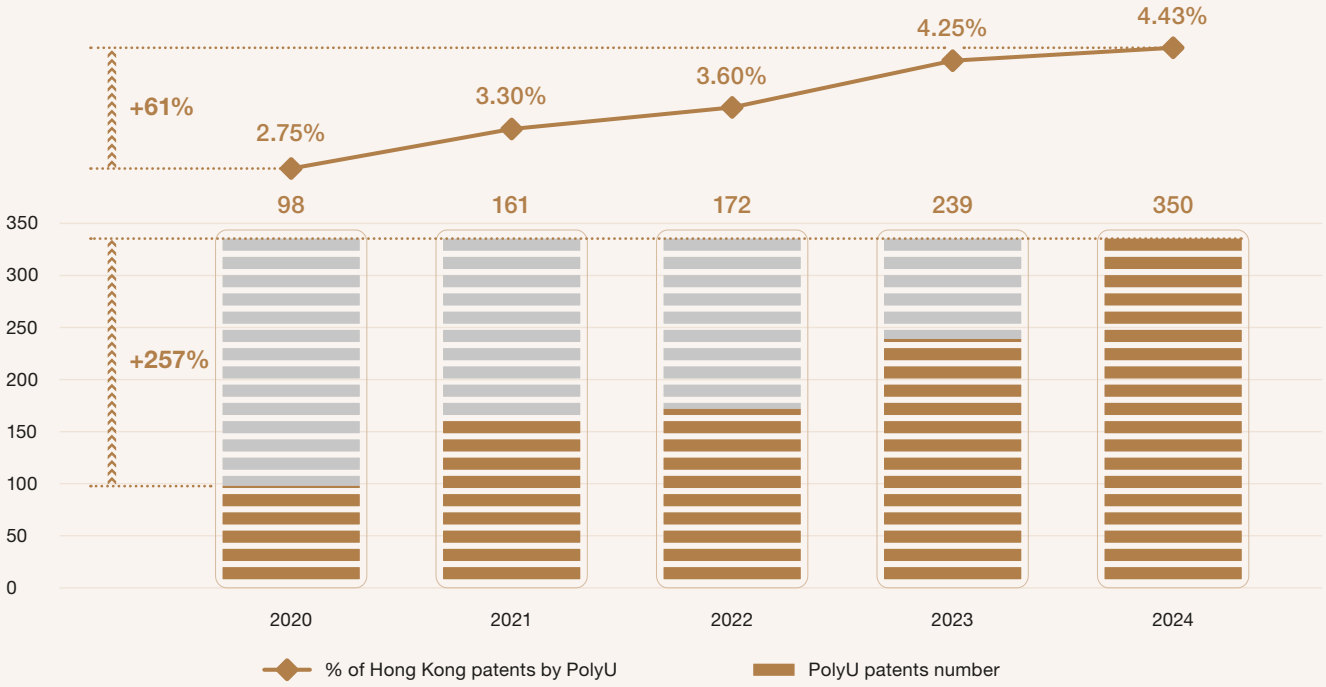


Figure 10. PolyU yearly granted patents

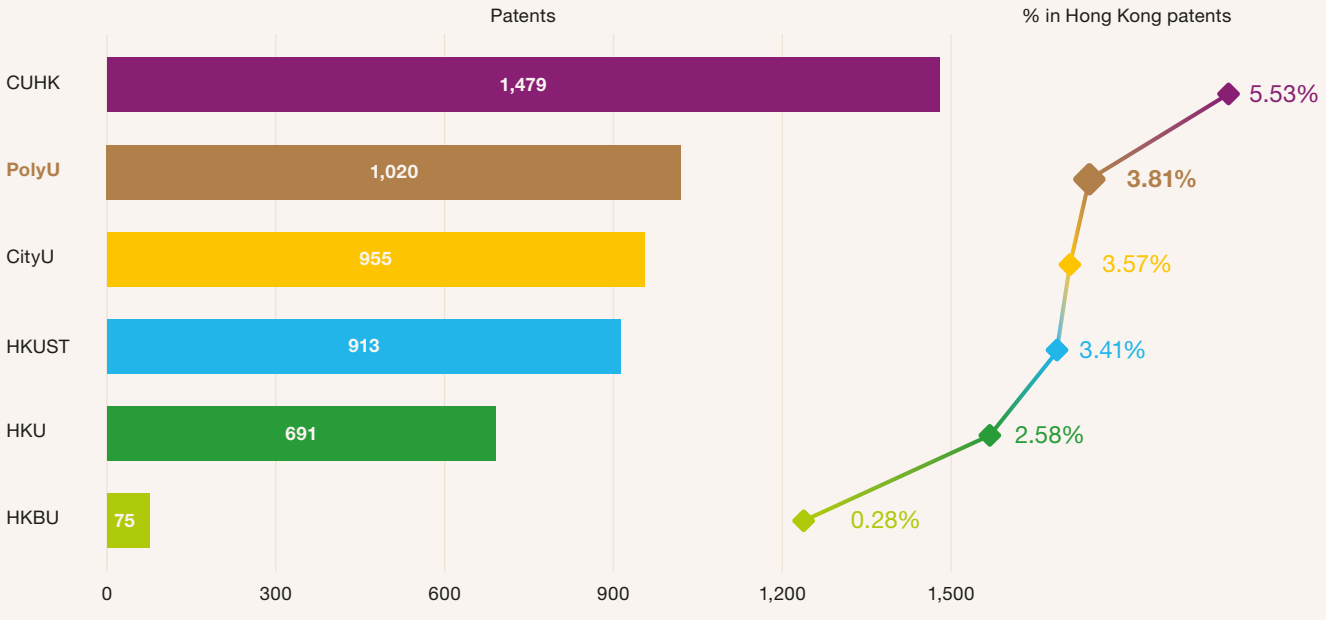


Figure 11. Total granted patents: Hong Kong UGC-funded universities (2020 - 2024)

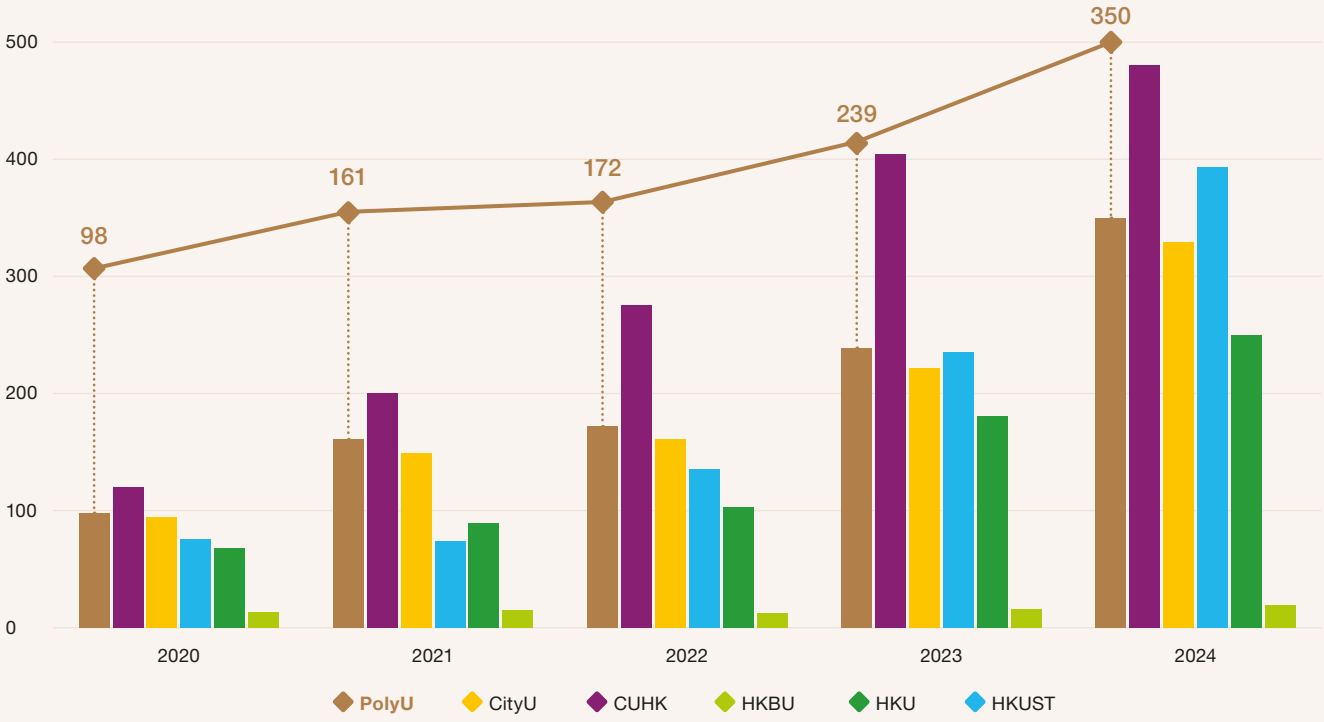


Figure 12. Yearly granted patents: Hong Kong UGC-funded universities

PolyU patents are distributed among many disciplines, showcasing the University's multidisciplinary research advancements. The patent category Computing and Control received 261 patents, the highest number awarded to any single category, highlighting PolyU's recent substantial advancement in computer science and artificial intelligence. The computer science discipline also supported numerous significant developments in the Pharmaceuticals category. By powering drug identification and development with advanced artificial intelligence technology, the Pharmaceuticals category became the fourth most patented research discipline at PolyU (Figure 13). While expanding into new research areas, the University's traditional strengths in various engineering research fields were also recognised with a high number of patents, including materials science, electronic engineering and mechanical engineering, as well as interdisciplinary research areas such as textile science. (Figure 14)

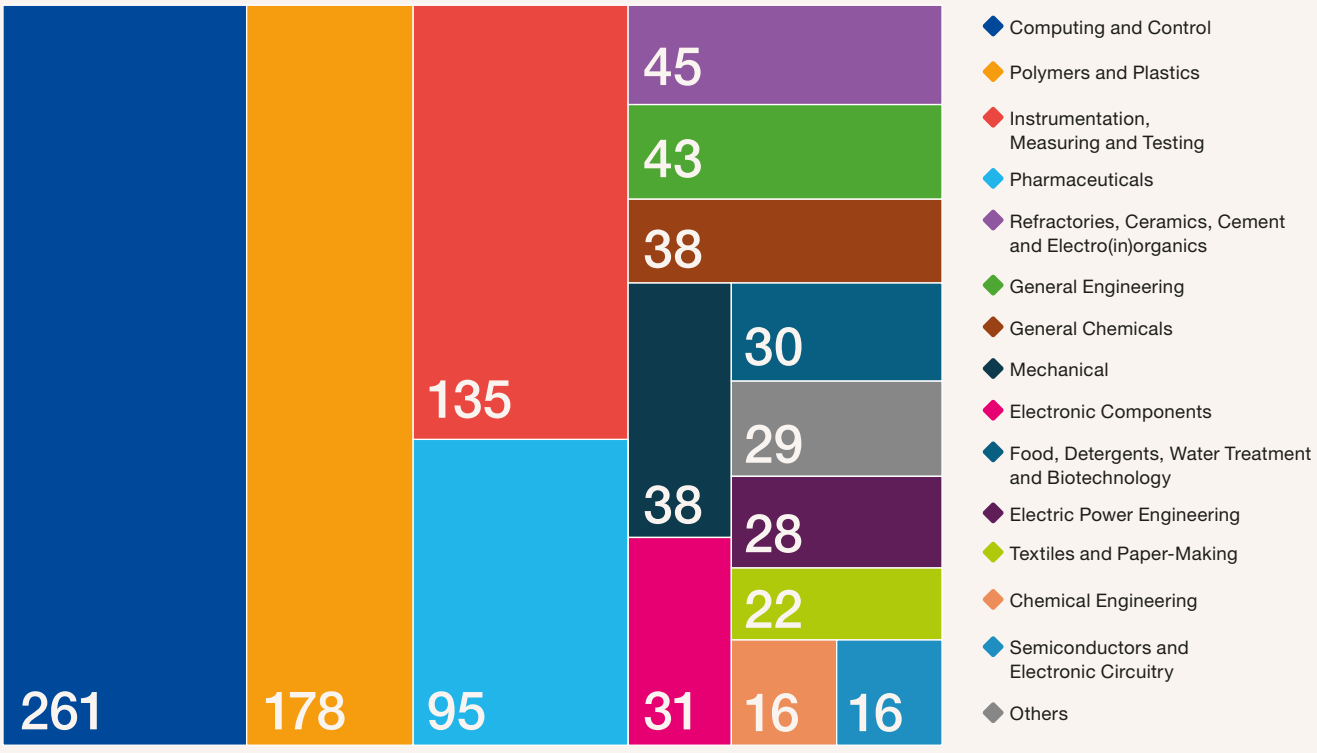


Figure 13. Disciplines associated with PolyU granted patents (2020 - 2024)

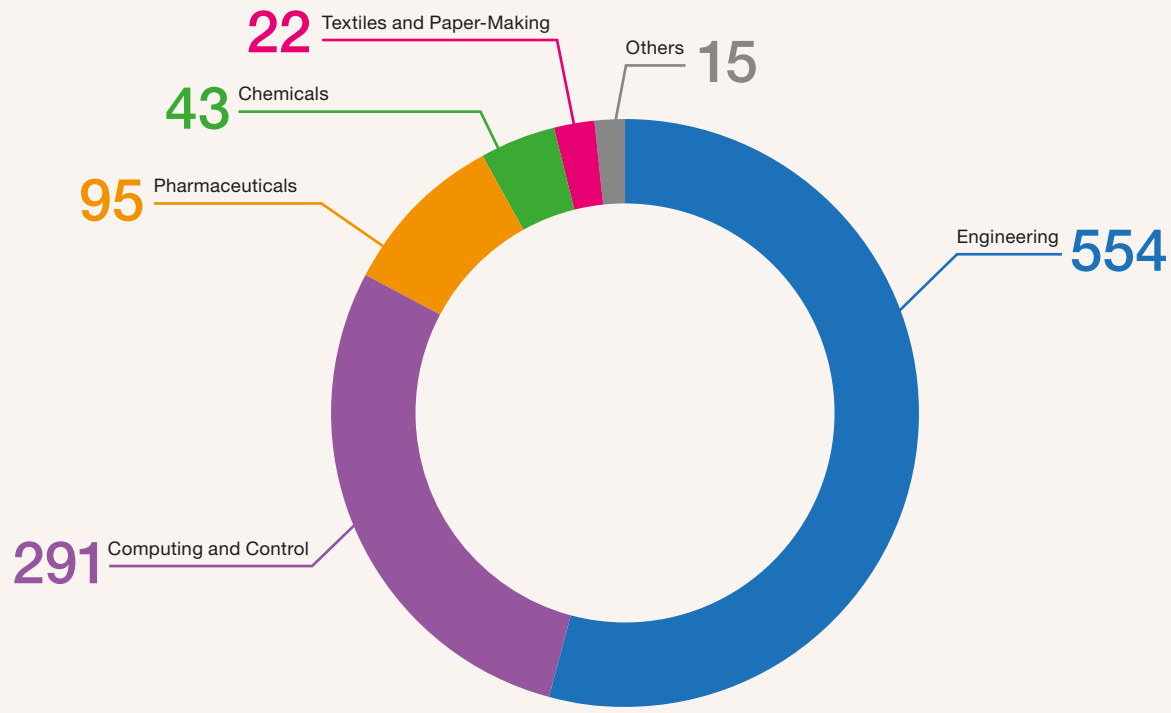


Figure 14. Aggregated disciplines associated with PolyU granted patents (2020 - 2024)

To raise its global standing, PolyU has strategically expanded its global footprint for its inventions. Between 2020 and 2024, PolyU continued to increase its patent filing both in international patent offices, spanning the United States, Europe, and Southeast Asia (Figure 15 and Figure 16), as well as in domestic patent office in the Chinese Mainland (Figure 17). The high number of granted patents in the Engineering category globally not only showcases PolyU's decades-long leadership in engineering-related technological advancement but also reflects the University's strategic efforts to expand into regions with both market potential and manufacturing hubs to commercialise its inventions. The patent boom in the Computing and Control category, both domestically and internationally, underscores PolyU's remarkable advancement in computer science and its swift knowledge translation.

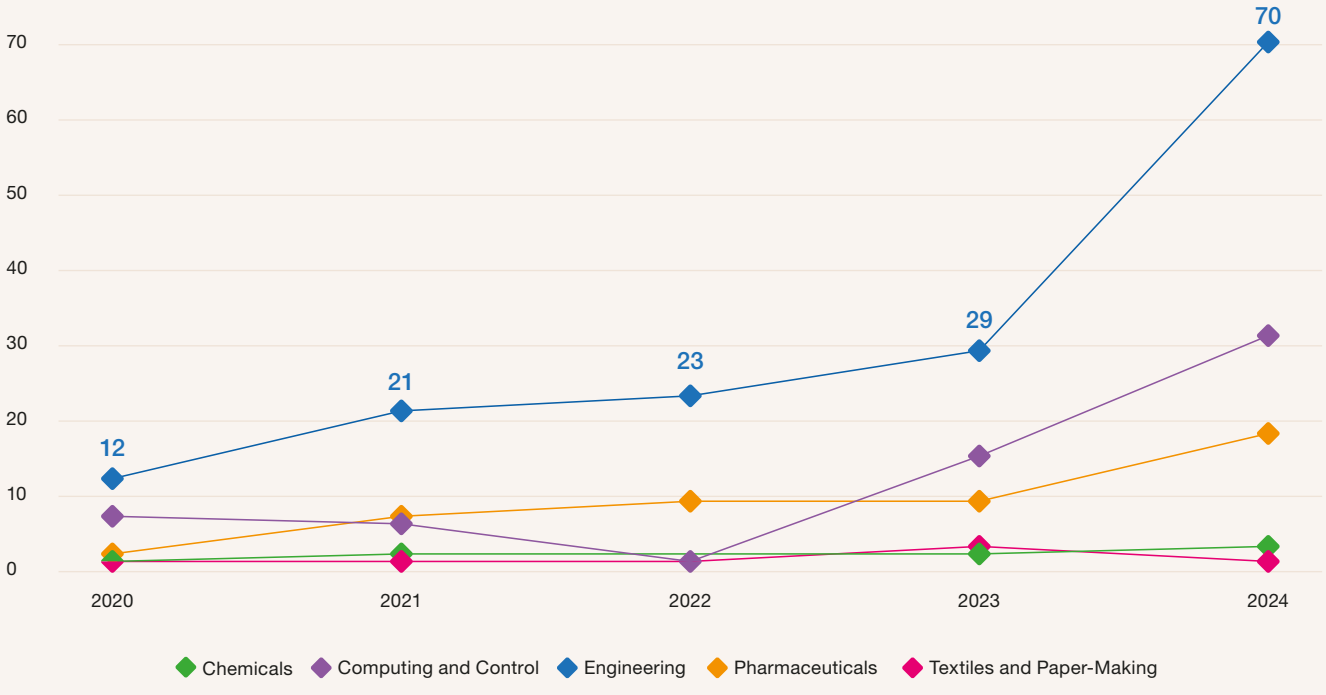


Figure 15. Top 5 patent classes filed in international patent offices

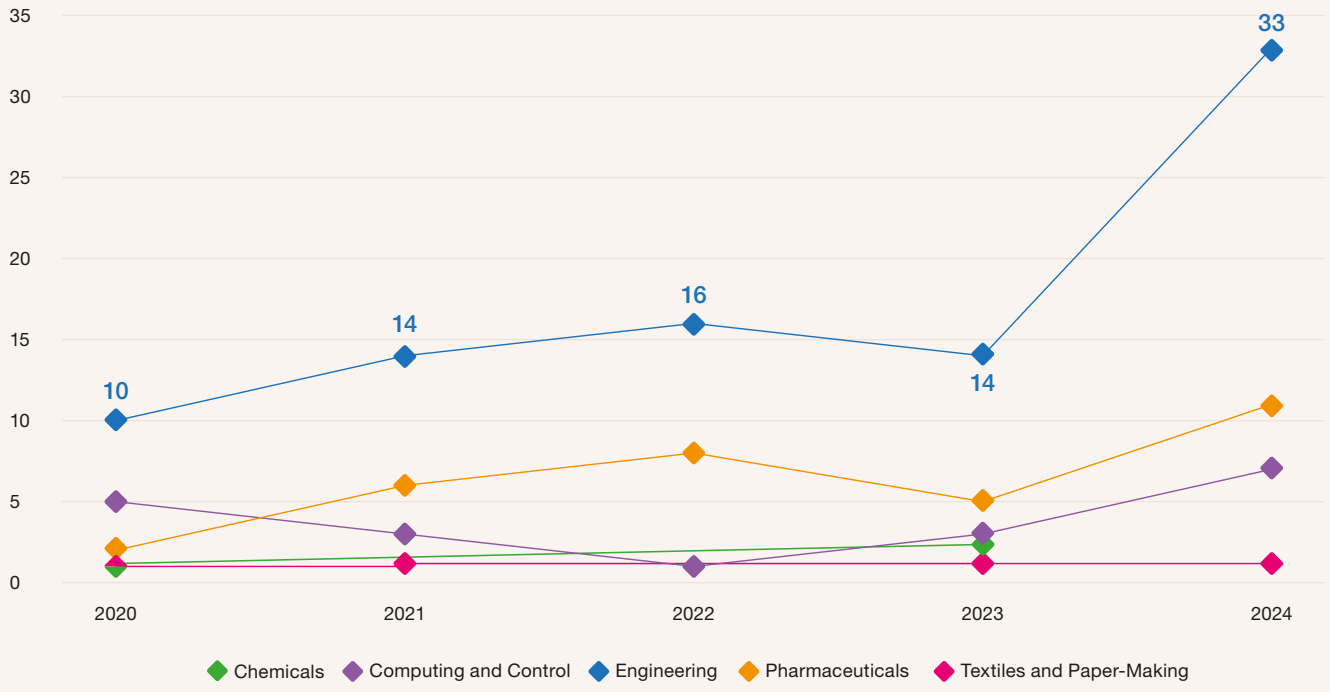


Figure 16. Top 5 patent classes filed in the United States patent office

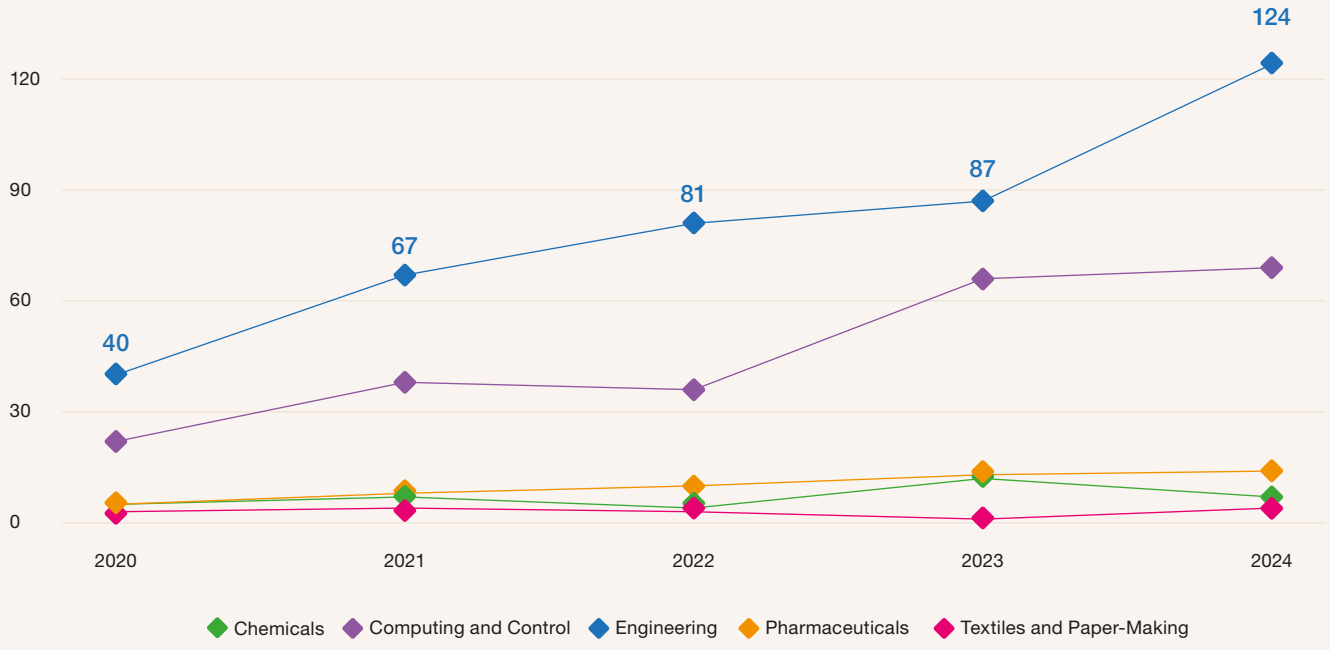
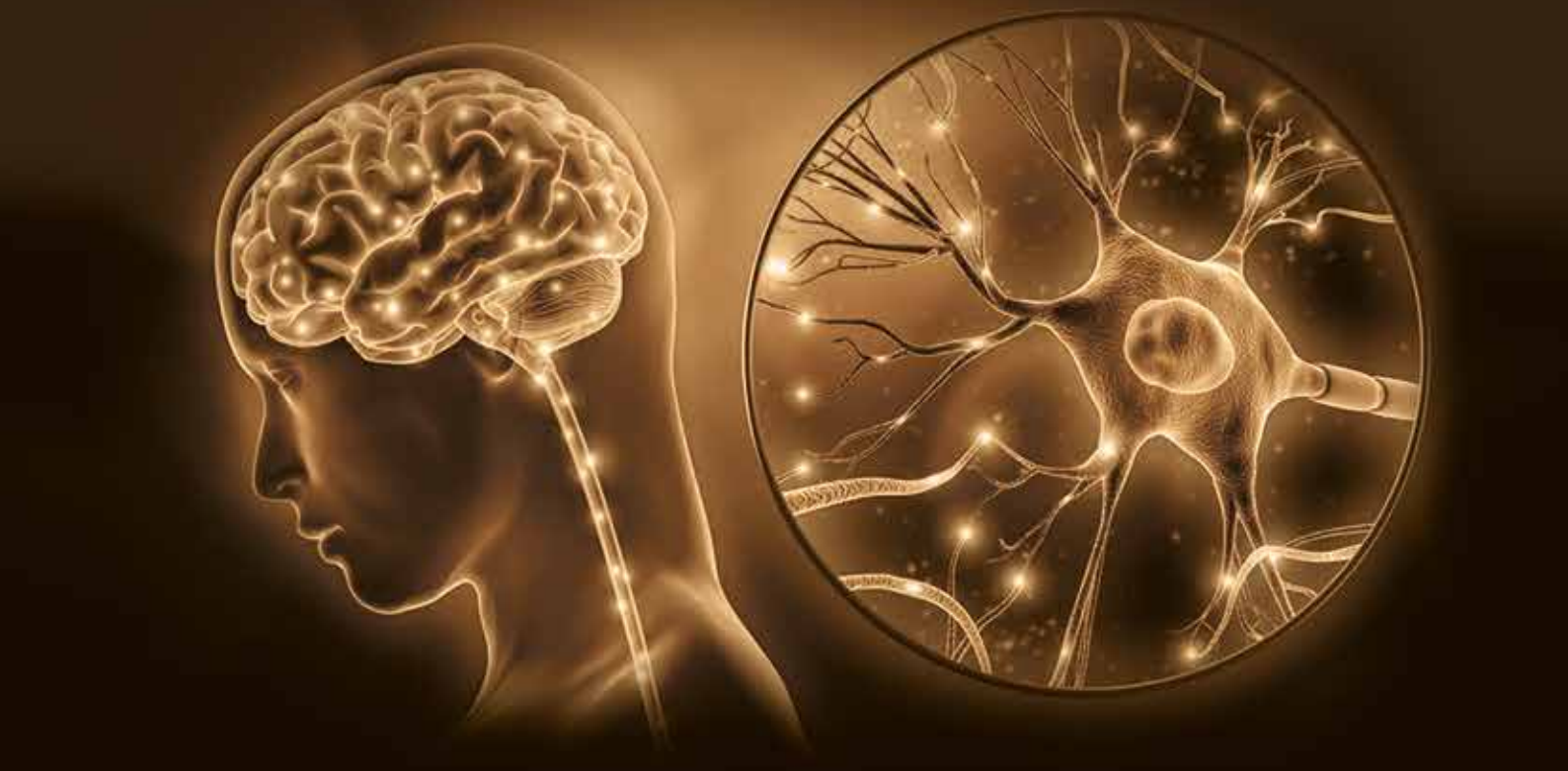


Figure 17. Top 5 patent classes filed in the Chinese Mainland patent office

With leading regional innovation capabilities, multiple PolyU research projects have been awarded funds from the Innovation and Technology Commission's Research, Academic and Industry Sectors One-plus Scheme (RAISe+).[18] The RAISe+ was launched by the Government of the HKSAR in 2023 to facilitate collaborations among the Government, industry, university, and research sectors, enabling universities to transform and commercialise research outcomes. Six PolyU projects were awarded RAISe+ funding in the 2024 and 2025 rounds.[19,20] This achievement demonstrates PolyU's world-leading expertise in academic research and industry's confidence in the University's research translation capabilities. Using an interdisciplinary approach, the funded projects focus on solving pressing global challenges, including energy storage, artificial intelligence infrastructures and neurodegenerative diseases. Specifically, **Professor Simon Ming-yuen LEE**, Chair Professor of Biomedical Sciences in the Department of Food Science and Nutrition, is leading an interdisciplinary research project across biomedical sciences, Chinese medicine, genomics and computer science. The project develops novel drugs derived from natural resources for treating debilitating diseases such as Alzheimer's and Parkinson's diseases. The LifeChip technology platform developed by this research group combines next-generation DNA sequencing and AI-powered drug discovery. Their discovery, Oxyphylla®, has already been granted six global patents in the United States, European Union, Spain, Japan and the Chinese Mainland, and is anticipated to be a disease-modifying therapy offering a breakthrough in neurological health.



18 PolyU's cutting-edge research projects awarded funding from government's RAISe+ Scheme, https://www.polyu.edu.hk/publications/pulse-polyu/issue/202406/research-knowledge-transfer/polyu-s-cutting-edge-research-projects-awarded-funding-from-government-s-raise-scheme

19 PolyU research projects receive funding from RAISe+ Scheme 2024, https://www.polyu.edu.hk/pair/publications/issue-11/pp01---polyu-research-projects-receive-funding-from-raise-scheme/

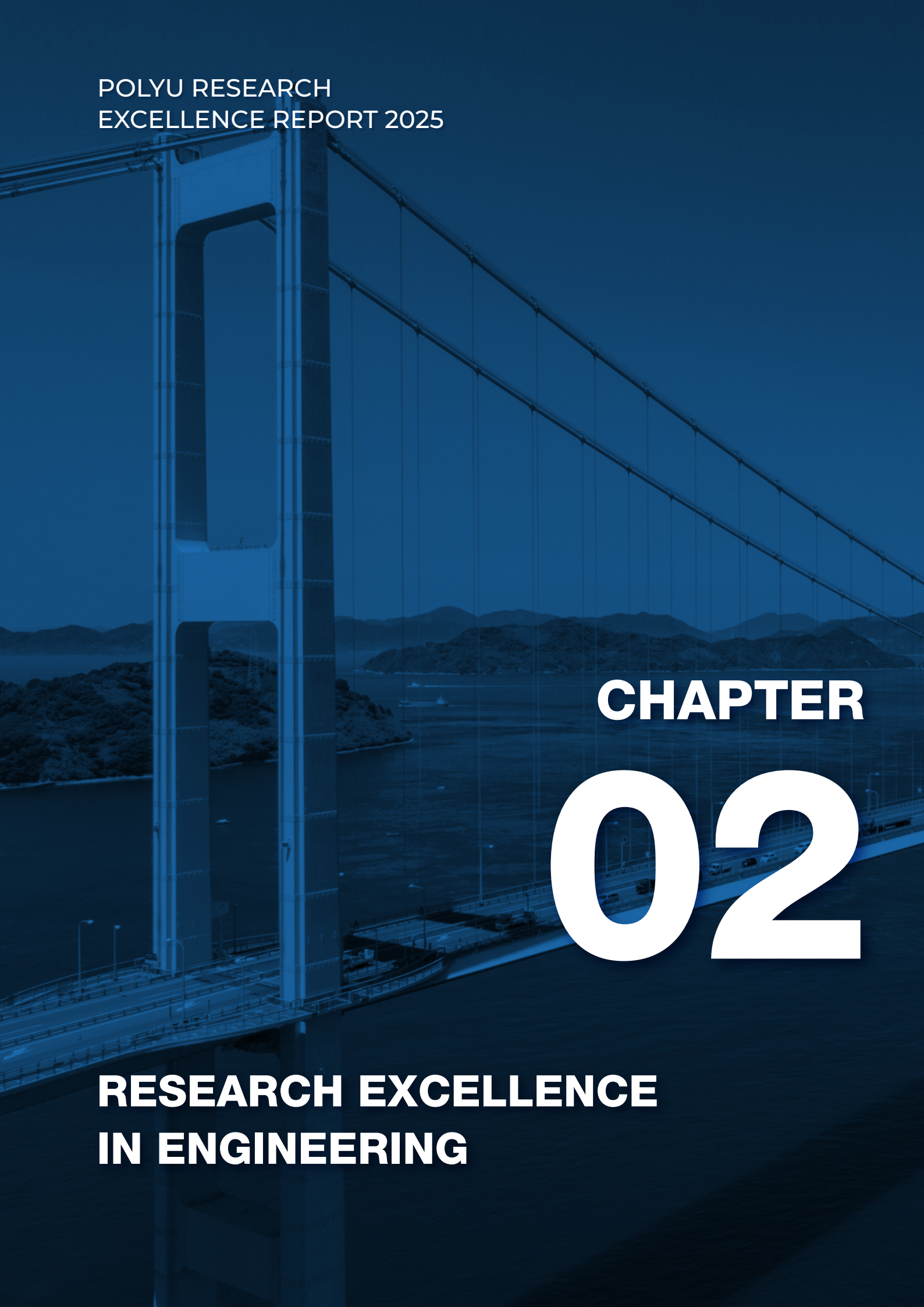
20 PolyU research projects win funding support from RAISe+ Scheme 2025, https://www.polyu.edu.hk/en/media/media-releases/2025/0620_polyu-research-projects-win-funding-support-from-raise-scheme/

PolyU's innovations have been pivotal in supporting several national priority projects. Its advanced manufacturing and surveying technology have been applied to space instruments for the Nation's Moon and Mars exploration missions. Through interdisciplinary research that combines advanced manufacturing technologies with clinical expertise and in partnership with industry leaders like ZEISS, PolyU has developed innovative lenses designed to slow myopia progression. Partnering with industry leaders such as Huawei Technologies Co., Ltd (Huawei) and Alibaba Group Holding Ltd (Alibaba), PolyU has made groundbreaking innovations readily available for implementation, bolstering domestic companies' global competitiveness throughout the 5G network rollout. PolyU and Huawei have recently signed strategic collaboration agreements to enhance the knowledge translation of AI, foster incubator platforms to strengthen their impact in the wider APAC region and provide students with the opportunity to engage in real-world projects.

In addition to collaborating with established partners, PolyU's entrepreneurial support is further demonstrated by promoting innovation and entrepreneurship through campus. PolyU also now supports more than 500 active start-up firms.[21] Three of them were listed in the Forbes Asia 100 to Watch 2023 report,[22] and two were included in the Forbes 30 Under 30 Asia 2025 list.[23,24] Three have achieved "Unicorn" status (USD 1 billion+ valuation), and two have been publicly listed. These Unicorns have created over 5,000 international job opportunities. Adopted by millions worldwide, these innovations have driven transformative solutions across industries and highlighted the broad societal and economic impact of PolyU's innovation ecosystem.

Striving to become an innovative world-class university, PolyU continues to shape the frontiers of knowledge and generate real-world impact both regionally and internationally. The report will discuss PolyU's achievements in engineering, AI-driven medical research and unique disciplines in the following sections.

21 PolyU celebrates achievements of start-ups supported by PolyVentures and kicks off inaugural International Future Challenge, https://www.polyu.edu.hk/en/media/media-releases/2025/0225_polyu-celebrates-achievements-of-startups-supported-by-polyventures/
22 Forbes Asia 100 to Watch 2023, https://www.forbes.com/sites/forbesasiateam/2023/08/28/forbes-asia-100-to-watch-2023/
23 Forbes 30 Under 30 Asia 2025 list, https://www.forbes.com/30-under-30/2025/asia/
24 PolyU-nurtured start-ups earn spots on Forbes 30 Under 30 Asia 2025, https://www.polyu.edu.hk/publications/pulse-polyu/issue/202506/achievements/polyu-nurtured-startups-earn-spots-on-forbes-30-under-30-asia-2025



CHAPTER

02

RESEARCH EXCELLENCE IN ENGINEERING

CHAPTER 2
RESEARCH EXCELLENCE IN ENGINEERING

PolyU is globally acclaimed for its engineering excellence. By reimagining and shaping technology development in promoting sustainable engineering, PolyU has consistently ranked among the Top 10 institutions for engineering globally.

2.1 OVERVIEW OF POLYU ENGINEERING

This chapter will explore PolyU's overall performance in engineering, as well as detail some of its achievements in civil engineering, built environment, advanced manufacturing and geomatics research.

Global ranking

Since its founding, PolyU has become a leading institution for engineering education and research both locally and internationally. In **the U.S. News & World Report Best Global Universities Rankings 2025-2026, PolyU ranked sixth globally in Engineering**.[25] The two faculties, the Faculty of Engineering and the Faculty of Construction and Environment, with their nine departments, are dedicated to advancing knowledge in various research areas within engineering.

Scholarly output and impact

Between 2020 and 2024, PolyU increased its number of publications in engineering by 68%. This increase has surpassed the growth rate for engineering-related publications in Hong Kong and APAC. By 2024, PolyU contributed to 38% of Hong Kong publications in engineering (Figure 18).

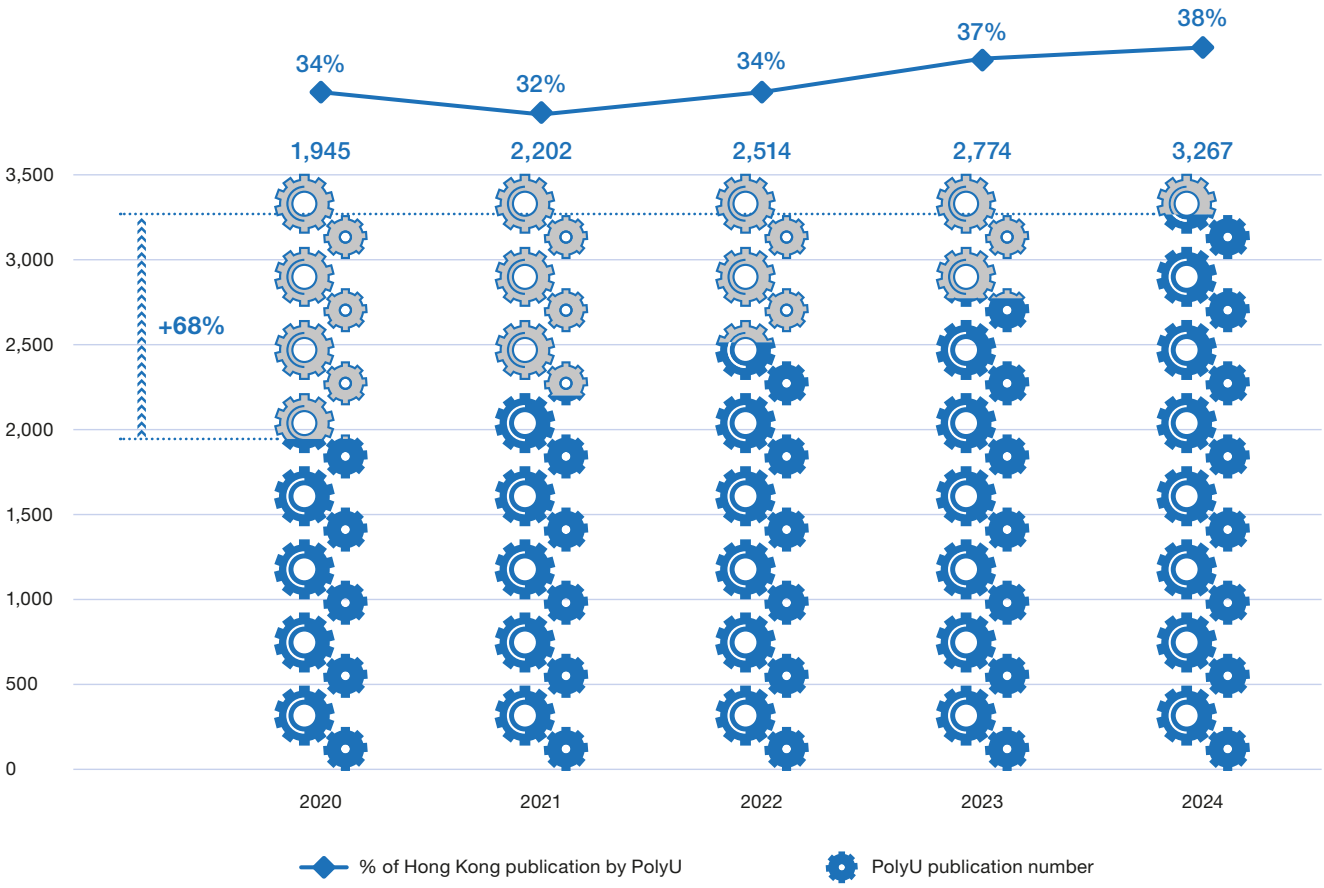


Figure 18. PolyU publication trends in engineering

25 U.S. News & World Report Best Global Universities Rankings 2025-2026, https://www.usnews.com/education/best-global-universities/hong-kong-polytechnic-university-500421

The University's publications in engineering have achieved excellent performance both in volume and citation impact. Category Normalized Citation Impact (CNCI) indicates how influential a publication is by comparing the citation rate with other publications in the same field.

Between 2020 and 2024, PolyU's CNCI for engineering publications slightly surpassed the overall performance of Hong Kong institutions and significantly exceeded both the APAC and global averages (Figure 19).

Highly Cited Papers are selected by Clarivate based on publications that have achieved Top 1% citations within their respective research area. Between 2020 and 2024, despite the considerable detrimental effect of the COVID-19 pandemic, the percentage of PolyU publications that met the Highly Cited Paper standard was nearly triple the global average (1%), and more than double the APAC average (Figure 20).

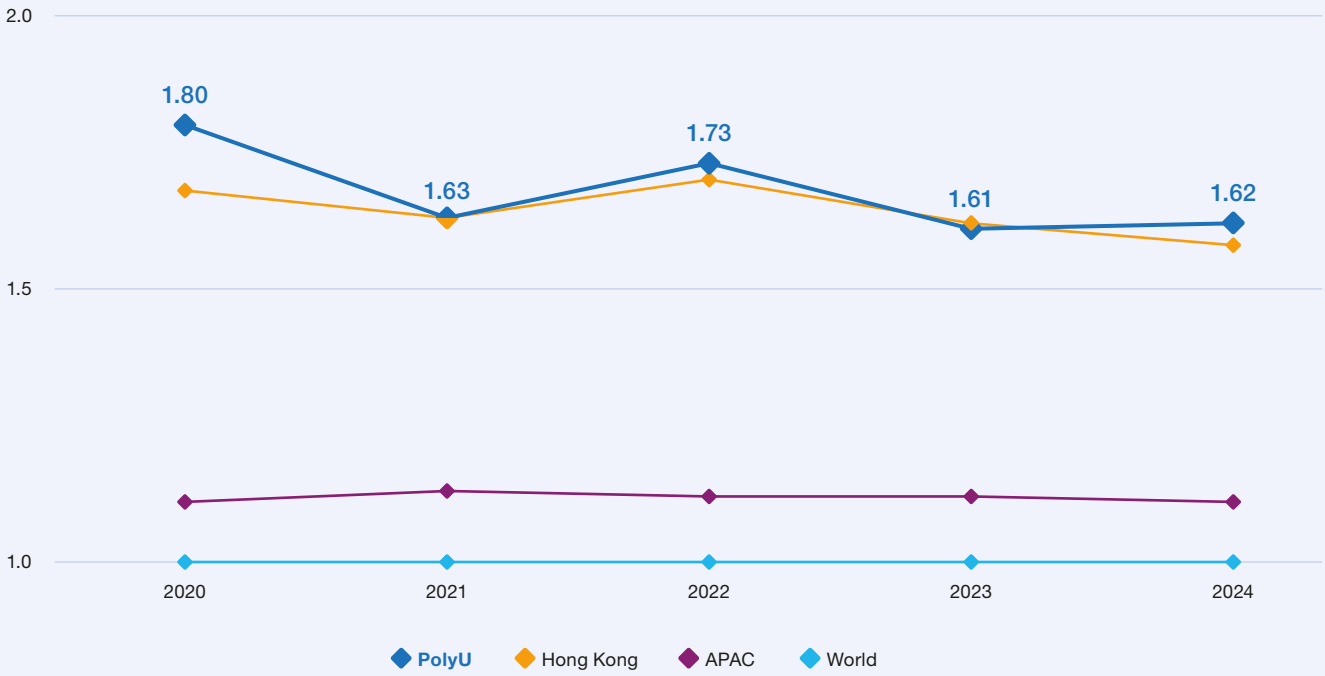


Figure 19. Category Normalized Citation Impact for publications in engineering: PolyU, Hong Kong, APAC, and world

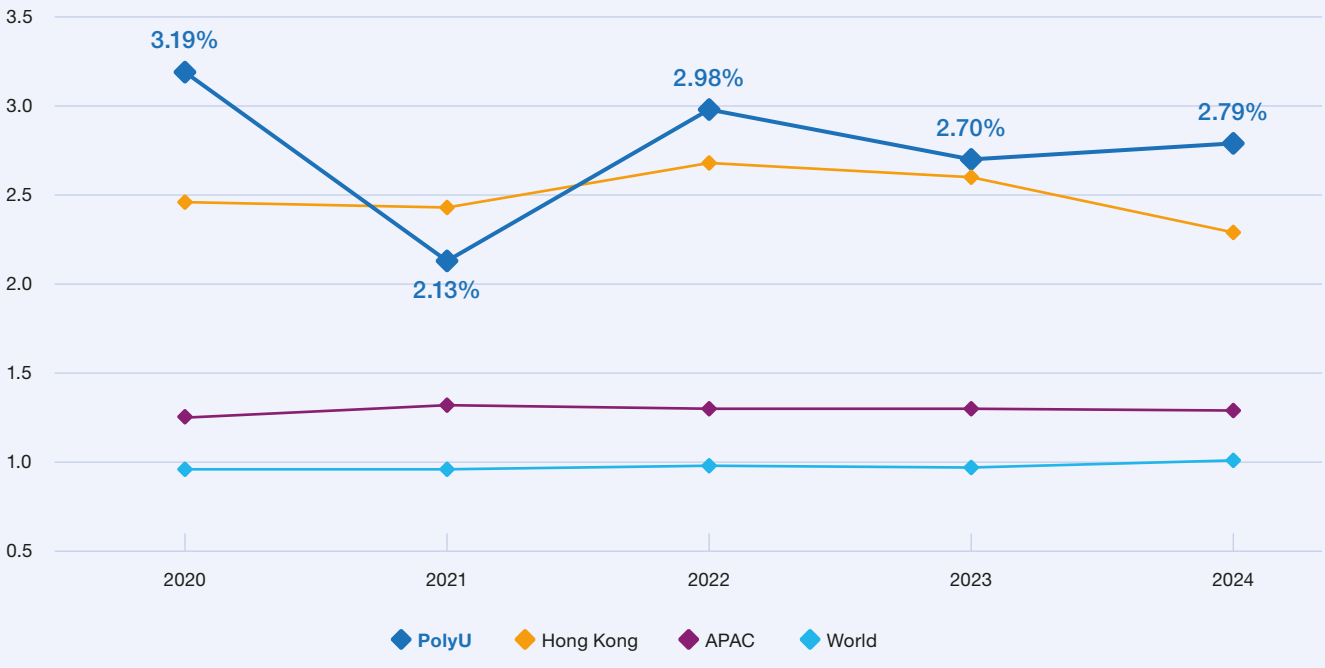


Figure 20. Share of Highly Cited Papers in engineering: PolyU, Hong Kong, APAC, and world

Research collaboration

PolyU's strong performance in engineering has placed it in a prime position to collaborate with other leading institutions around the globe. The University collaborated with other academic institutions in 10,876 engineering publications, with nearly 30% of these being the result of collaborative efforts with QS Top 50 universities worldwide.

In addition to academic collaboration, PolyU expertise in engineering is widely recognised by industry, where it has partnered with key multinational organisations such as Google, Alibaba, Huawei and multiple state grid corporations in research and development (Figure 21).

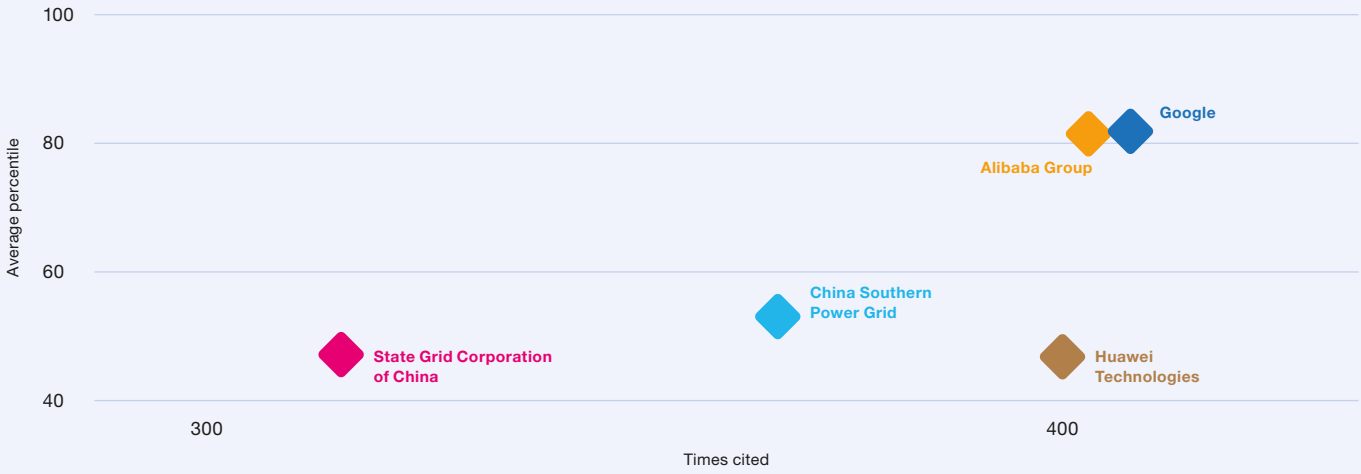


Figure 21. Key PolyU industry collaborators in engineering

Knowledge transfer

Beyond direct industry partnerships, PolyU has engaged in knowledge transfer and the utilisation of intellectual property at local, regional and global levels. Between 2020 and 2024, PolyU had nearly a fourfold growth in the number of granted patents in engineering. With a total of 554 granted patents across countries in Asia, Europe, North America and the Middle East (Figure 22), PolyU is rapidly expanding its global footprint and leadership in engineering-related inventions.

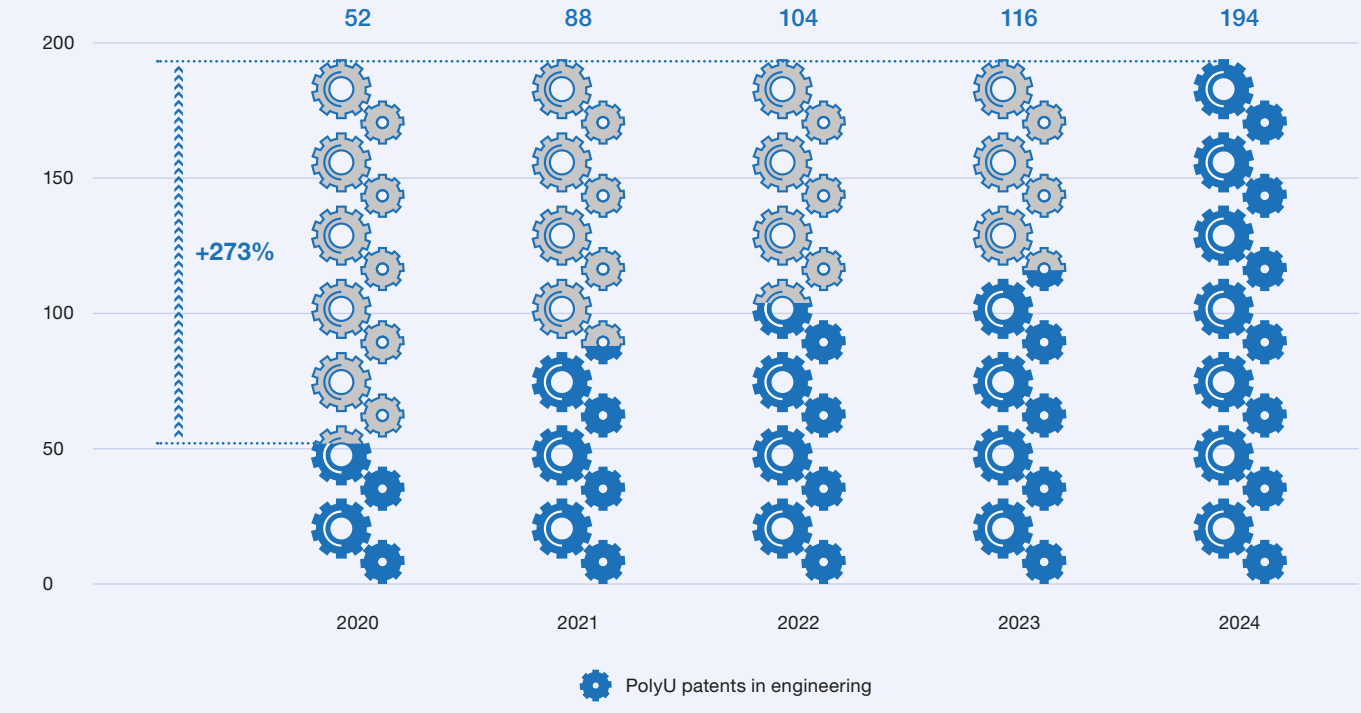


Figure 22. PolyU granted patents in engineering

Apart from PolyU's own inventions, its research has informed and been cited by numerous subsequent patents. PolyU's publications in engineering were cited by 195 patents across disciplines (Figure 23). The patents were developed by leading multinational companies such as International Business Machines Corporation (IBM), Toyota Motor Corporation, Nokia Corporation and Adobe Inc..

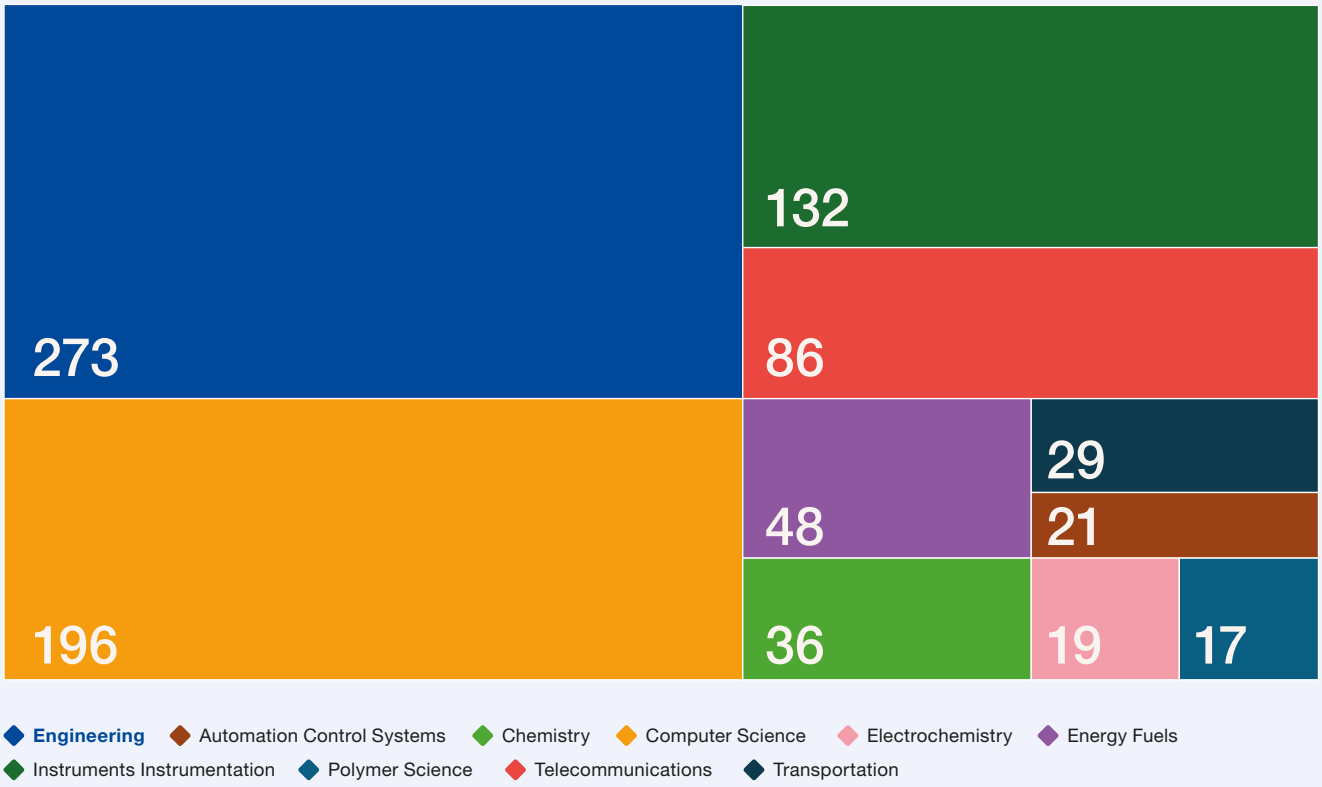


Figure 23. Top 10 patent subject areas citing PolyU engineering publications (with times cited) (2020 - 2024)

Top scholars

With their high-quality research, many PolyU academic staff members are recognised for their significant and broad influence in their field of research. The Essential Science Indicators (ESI) by Clarivate identifies the number of citations required to become one of the Top 1% most cited researchers (Top 1%) within respective research fields. From 2014 to 2024, PolyU ranked first in Hong Kong for the number of Top 1% researchers in Engineering. Among the 322 Top 1% engineering researchers (by citation) in Hong Kong, over 27% were from PolyU, 6% and 7% higher than the second- and third- ranked universities.

These achievements are driven by leadership from key researchers. **Professor Jerry Jin-yue YAN**, Chair Professor of Energy and Buildings in the Department of Building Environment and Energy Engineering, has 577 publications indexed by the Web of Science, with over 24,000 citations and more than 10 patents. His world-leading research performance was recognised by Clarivate, and he was awarded the title of Highly Cited Researcher in 2025, placing him among the Top 1% of researchers worldwide based on citation metrics. His leadership has also been recognised by his peers, being elected as a Fellow of the Hong Kong Academy of Engineering in 2023.

Professor YAN's research focuses on renewable energy and the mitigation of climate change. His most recent invention, the Intelligent Humidity Control and Atmospheric Water Collection Films (IHAC films), can manage humidity and supply fresh water at net-zero cost and is both scalable and durable in various conditions.

In recent years, Professor YAN has also been leading interdisciplinary integration of renewable energy. His keynote speech, "Energy Nexus: Research and Innovations without Borders – Interdisciplinary Research on Energy Transition", delivered at an international conference in 2023, highlighted that future energy development would be driven by interdisciplinary input led by engineering.

2.2 CIVIL ENGINEERING

Global ranking

PolyU's outstanding performance in civil engineering is recognised by multiple global rankings: **It ranked second globally in Civil Engineering in the U.S. News & World Report Best Global Universities Rankings 2025-2026, and third in ShanghaiRanking's Global Ranking of Academic Subjects 2025**.[26,27] It also ranked 17th in Civil and Structural Engineering in the QS World University Rankings by Subject 2025.[28]

With an interdisciplinary approach, PolyU has integrated structural, geotechnical, transportation, and environmental engineering into its civil engineering research and education. Such interdisciplinary integration has earned PolyU the ranking of **first best university for Transportation Science and Technology in the ShanghaiRanking's Global Ranking of Academic Subjects 2025**.[29]

Scholarly output and impact

Between 2020 and 2024, PolyU doubled its publication count in civil engineering. As Hong Kong's leading civil engineering institution, PolyU has produced a substantial share of the region's publications in this field. By 2024, nearly 60% of Hong Kong's publications in civil engineering were affiliated with PolyU (Figure 24).

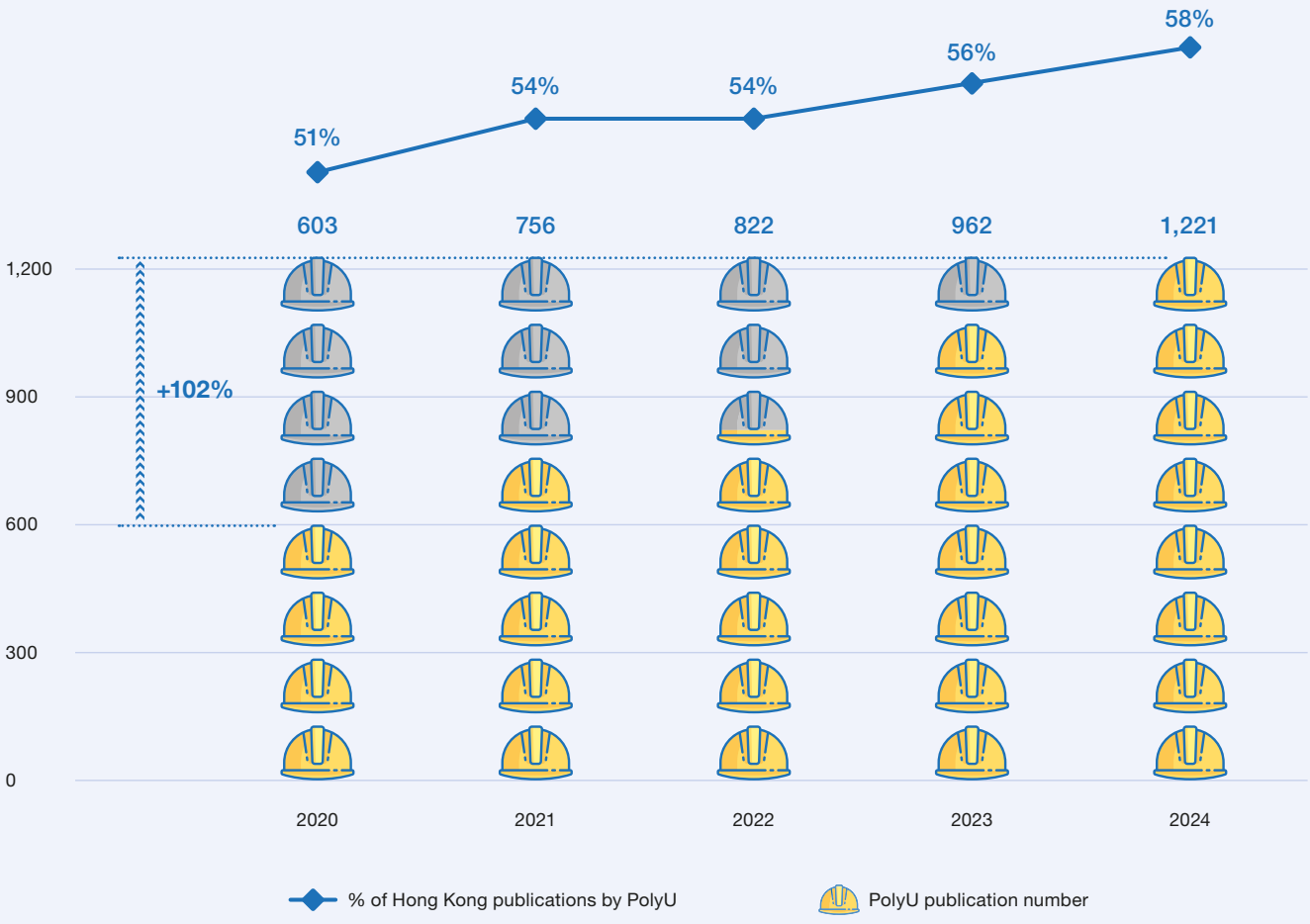


Figure 24. PolyU publication trends in civil engineering

26 U.S. News & World Report Best Global Universities Rankings 2025-2026, https://www.usnews.com/education/best-global-universities/hong-kong-polytechnic-university-500421
27 ShanghaiRanking's Global Ranking of Academic Subjects 2025, https://www.shanghairanking.com/institution/the-hong-kong-polytechnic-university
28 QS World University Rankings by Subject 2025, https://www.topuniversities.com/university-subject-rankings/civil-structural-engineering?search=polytechnic
29 ShanghaiRanking's Global Ranking of Academic Subjects 2025, https://www.shanghairanking.com/institution/the-hong-kong-polytechnic-university

The number of Highly Cited Papers in civil engineering has increased alongside the volume of publications (Figure 25). **The number of Highly Cited Papers increased by sixfold during this period, surpassing the rate of increase in Hong Kong, APAC and the world** (Figure 26).

The increase in Highly Cited Papers in Hong Kong was also primarily attributable to PolyU: in 2024, 79% of Hong Kong's Highly Cited Papers in civil engineering were affiliated with PolyU.

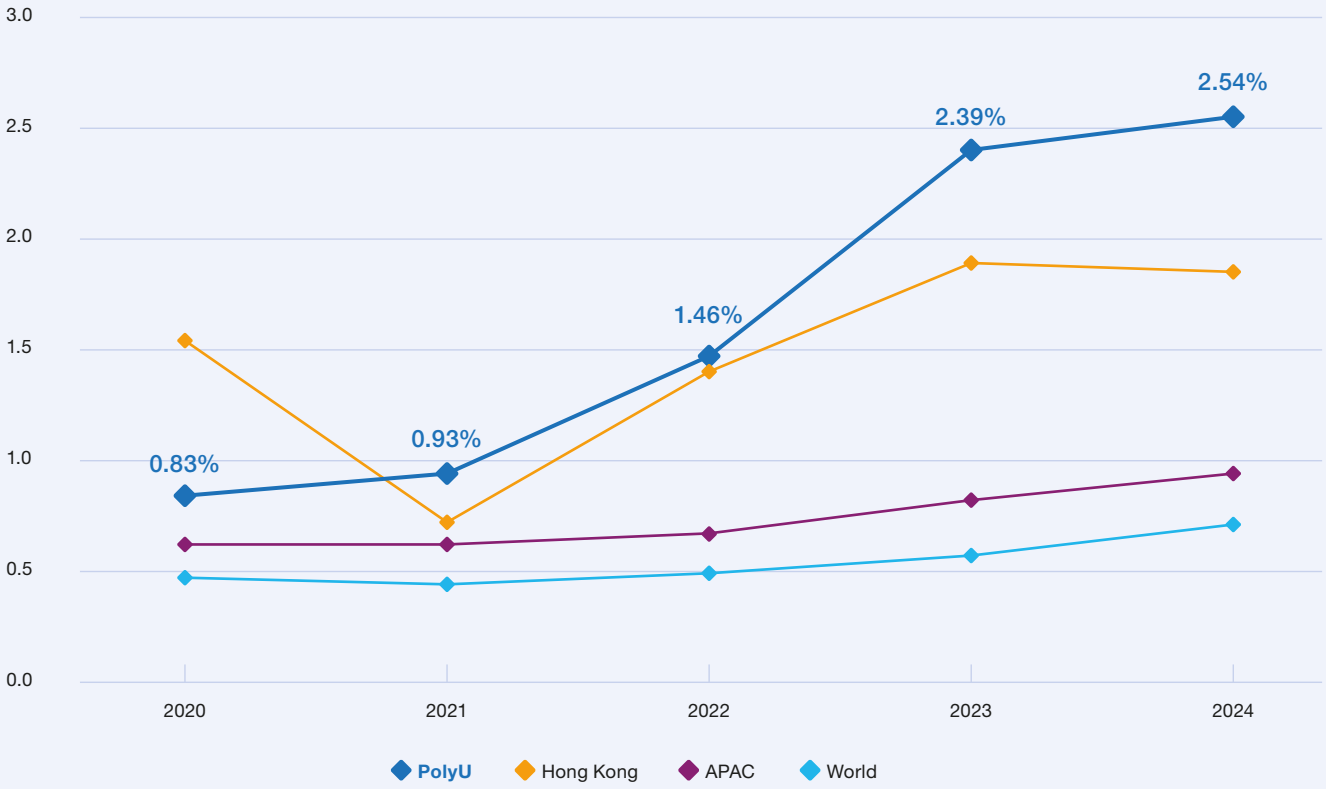


Figure 25. Share of Highly Cited Papers in civil engineering: PolyU, Hong Kong, APAC, and world

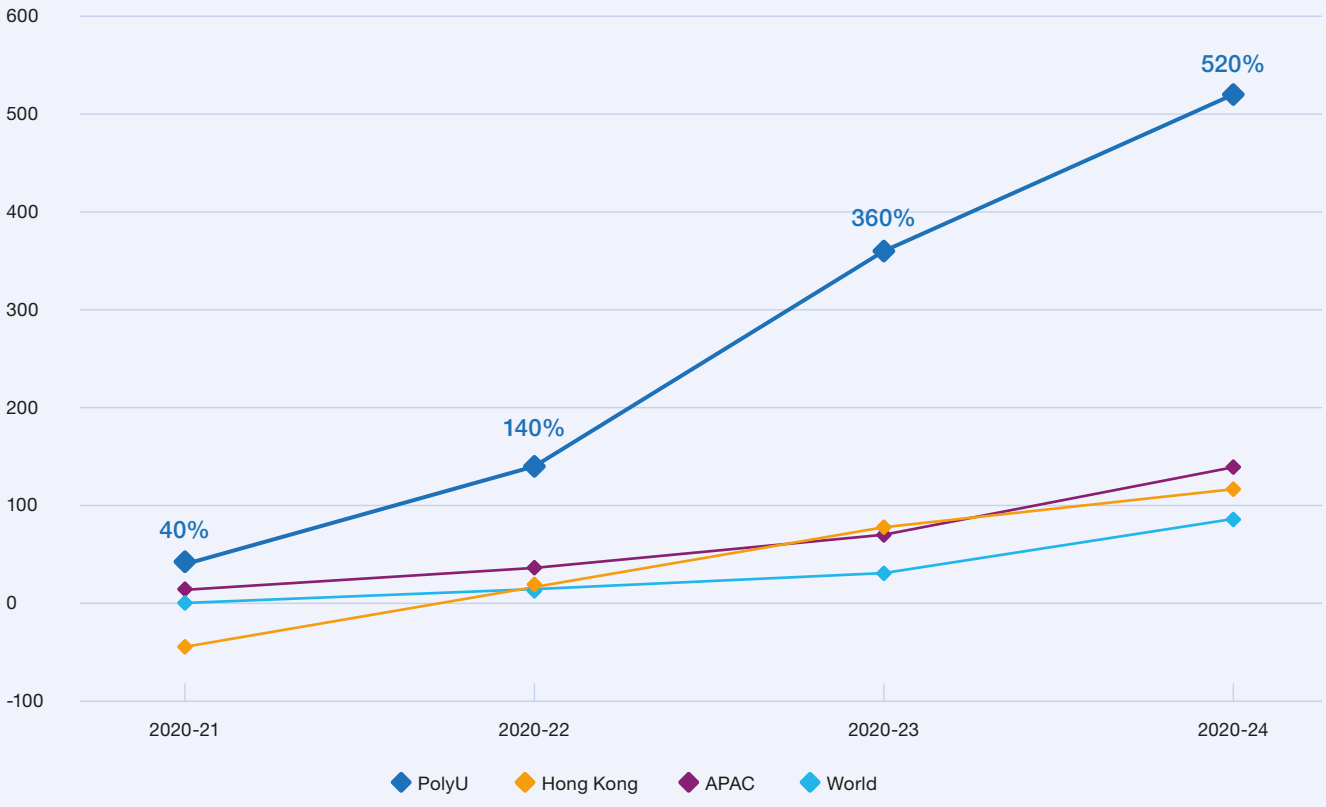


Figure 26. Cumulative growth of Highly Cited Papers in civil engineering: PolyU, Hong Kong, APAC, and world

Societal impact

Recognising PolyU's research excellence and successful technology transfer experiences in civil engineering, in 2015 the State Ministry of Science and Technology approved the establishment by PolyU of two Hong Kong branches of Chinese National Engineering Research Centres (CNERCs): the Hong Kong Branch of the National Rail Transit Electrification and Automation Engineering Technology Research Center (CNERC-Rail), and the Hong Kong Branch of the National Engineering Research Centre for Steel Construction (CNERC-Steel).

Marking 10 years since their establishment in 2025, these two research centres have promoted sustainable infrastructure development and advancements in structural engineering for modern steel constructions. By September 2025, CNERC-Rail alone had been awarded 26 patents.[30] The implementation of this translational research has brought significant benefits to society.

With the rapid expansion of the Chinese Mainland's high-speed rail network, CNERC-Rail focuses its research on developing cutting-edge rail technologies to enhance the safety, reliability and comfort of high-speed rail. Facilitating knowledge translation, CNERC-Rail has formed collaborations with various enterprises, research institutions and universities. In 2022, CNERC-Rail was granted a patent for a noise reduction method in steel rail operation, the implementation of which is being further explored by the PolyU-Hangzhou Technology and Innovation Research Institute. This technology is key in supporting railway development as part of the Chinese Mainland's Belt and Road Initiative.

During the construction of the Cross Bay Link between 2018 and 2022, CNERC-Steel's expertise in high strength S690 steel contributed significantly to achieving a high level of structural adequacy combined with a high level of welding productivity. The innovative engineering solution was record-breaking in Hong Kong and the Chinese Mainland, shortening construction time and saving approximately HKD 100 million in overall costs. The advanced construction process also resulted in lowering carbon emissions by 12,000 tons.[31]

Beyond infrastructure construction, PolyU's civil engineering research also encompasses environmental studies. **Professor Tao WANG**, Chair Professor of Atmospheric Environment in the Department of Civil and Environmental Engineering, has led efforts to improve air quality by targeting ozone pollution — a threat to both human health and crop production that also significantly contributes to global warming. His team's research informed the development of a regional ozone mitigation strategy, which was outlined in the Clean Air Plan for Hong Kong 2035. The advanced modelling techniques and diverse datasets developed from this research have facilitated measures that control key ozone-producing chemicals in more than 10 cities across the Chinese Mainland, with a total population exceeding 92 million.

30 National Rail Transit Electrification and Automation Engineering Technology Research Center (Hong Kong Branch), Awards & Patents, https://www.polyu.edu.hk/cnerc-rail/achievements/awards-and-patents/

31 High strength S690 steel in construction, https://www.polyu.edu.hk/cnercsteel/achievements/research-societal-impact/engineering-applications-of-high-strength-s690-steel-in-construction/

2.3 BUILT ENVIRONMENT

Expanded urbanisation has highlighted the need for a more sustainable, high-quality living environment. PolyU has made significant contributions to promoting smart urban design through technological advancements in building energy, environmental sustainability and building resilience.

Global ranking

PolyU's strong commitment to sustainability, demonstrated through its innovative research and impactful initiatives, has earned it international recognition. The University ranked **11th globally in Green and Sustainable Science and Technology and 18th globally for Environmental Engineering in the U.S. News & World Report Best Global Universities Rankings 2025-2026;**[32] **17th globally for Architecture and Built Environment, 27th globally for Environmental Sciences in the QS World University Rankings by Subject 2025;**[33] **and eighth globally for Energy Science and Engineering in ShanghaiRanking's Global Ranking of Academic Subjects 2025.**[34]

Scholarly output and impact

With a 60% increase in the number of publications in built environment, PolyU contributed to over 30% of Hong Kong's publications in this field between 2020 and 2024. This growth also elevated PolyU's global presence, where it had a 49% increase in its share of global publication in built environment (Figure 27) in the same period.

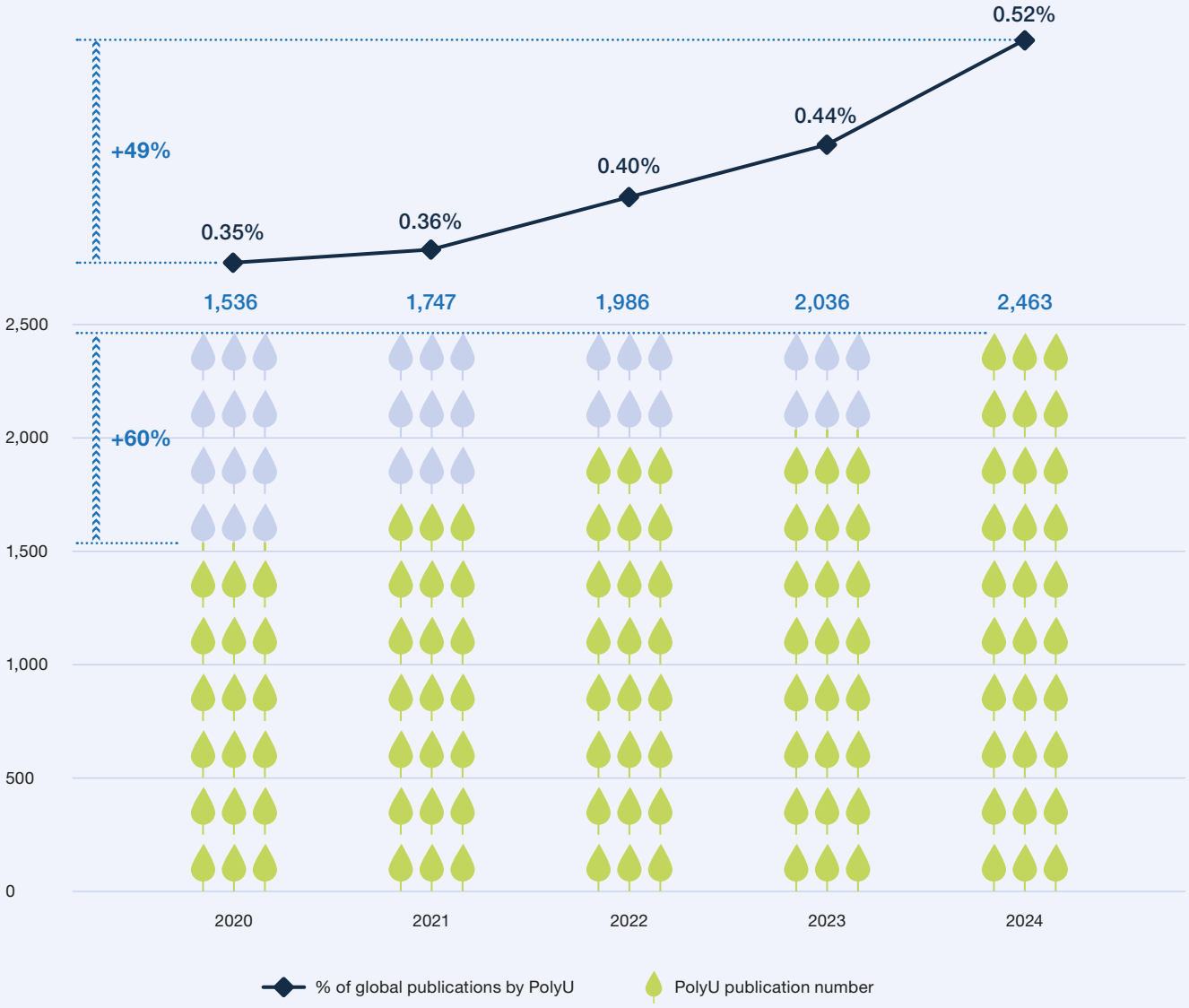


Figure 27. PolyU publication trends in built environment

32 U.S. News & World Report Best Global Universities Rankings 2025-2026, https://www.usnews.com/education/best-global-universities/hong-kong-polytechnic-university-500421
33 QS World University Rankings by Subject 2025, https://www.topuniversities.com/subject-rankings
34 ShanghaiRanking's Global Ranking of Academic Subjects 2025, https://www.shanghairanking.com/institution/the-hong-kong-polytechnic-university

Alongside PolyU's increasing global presence, the CNCI for PolyU's publications in built environment is also nearly double the average for APAC and the world (Figure 28), indicating the high global prestige the publications have earned.

PolyU contributed over 40% of Hong Kong's Highly Cited Papers in the built environment and outperformed both the APAC and global averages in the share of publications that are Highly Cited Papers (Figure 29).

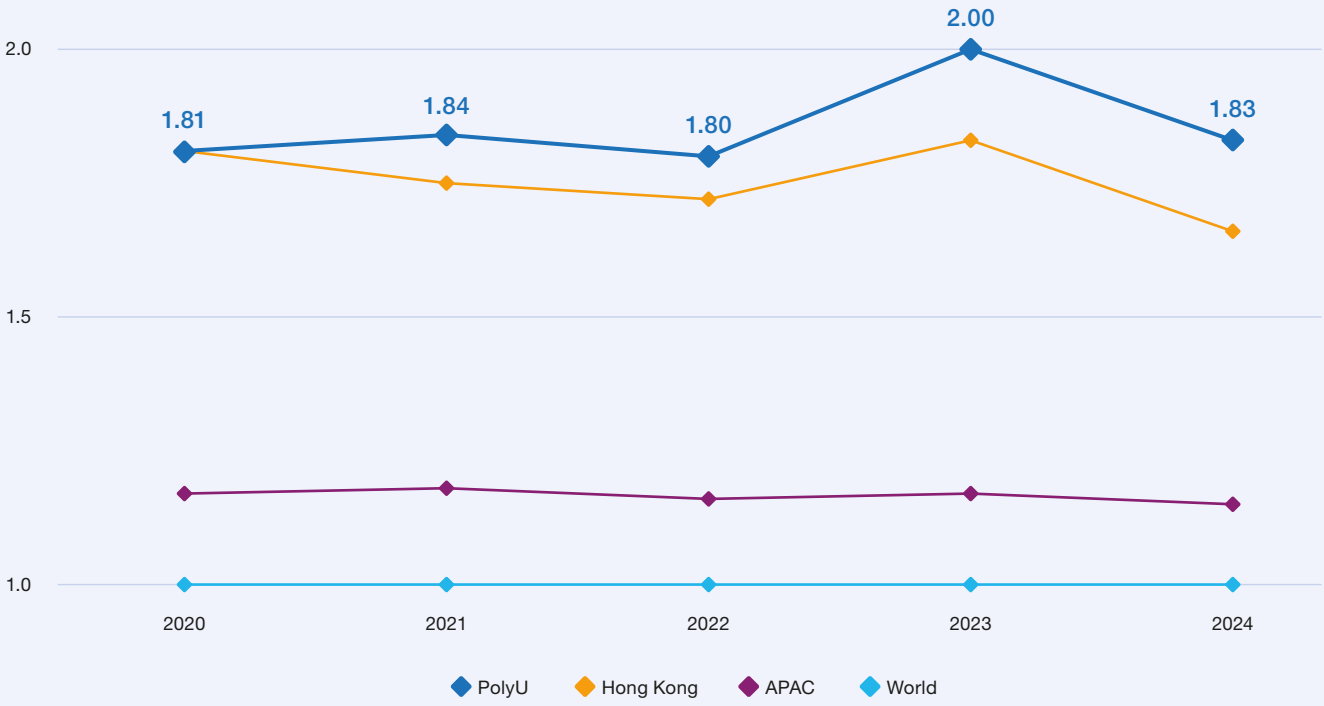


Figure 28. Category Normalized Citation Impact for publications in built environment: PolyU, Hong Kong, APAC, and world

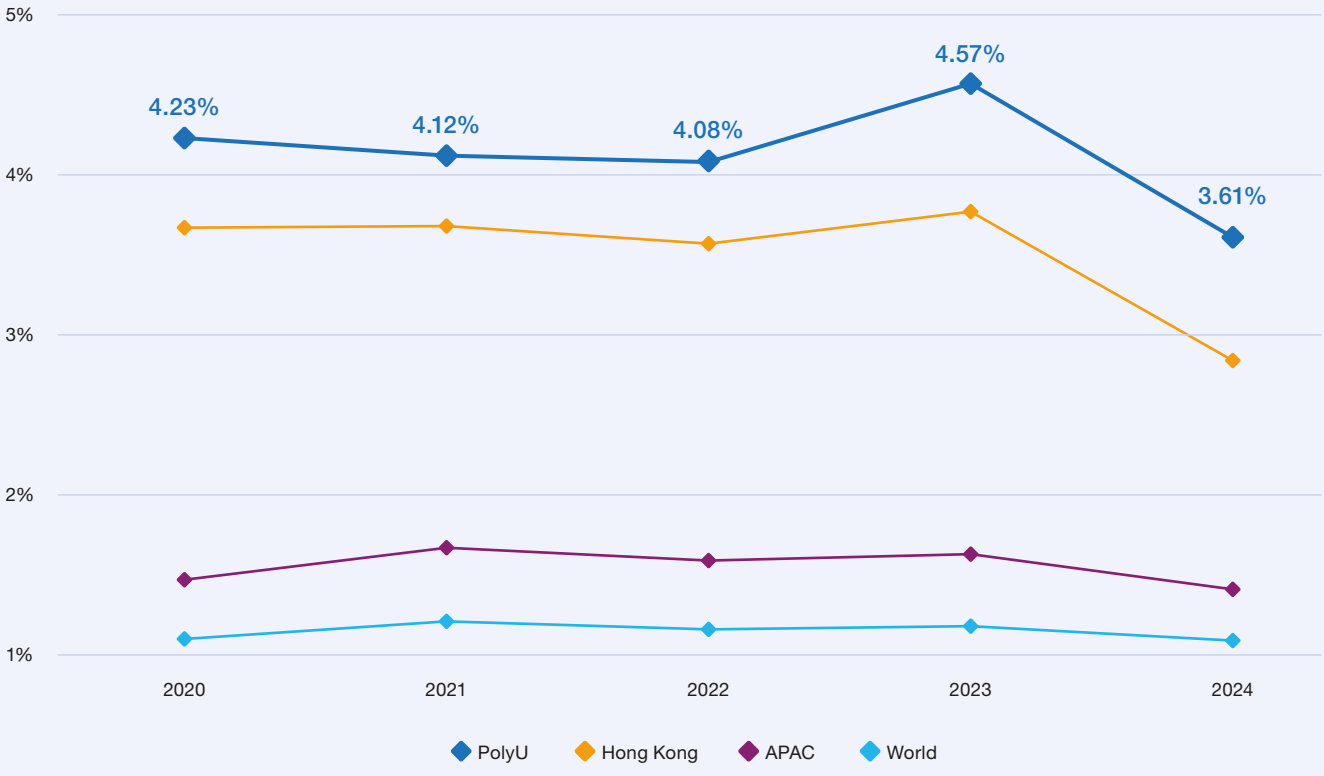


Figure 29. Share of Highly Cited Papers in built environment: PolyU, Hong Kong, APAC, and world

Societal impact

Accelerating research translation to make a positive impact in people's daily lives, PolyU and SenseTime Group Inc. formed the Colour, Imaging, and Metaverse Research Centre, led by **Professor Tommy Min-chen WEI**, Professor and Associate Head of the Department of Building Environment and Energy Engineering. The Centre's focus is on developing metaverse technologies and autonomous driving applications. In 2023, Professor WEI won the Hong Kong Engineering Science and Technology Award from the Hong Kong Academy of Engineering for his contribution to colour and imaging science. Many of his research findings have been incorporated into commercially available products, and his research recommendations have been adopted as international and national standards.

One of Professor WEI's inventions is a six-channel RGBACL (red, green, blue, amber, cyan and lime) lighting module and control algorithm, which enhances the colour presentation of LED lighting systems. By investigating the underlying mechanisms of the human visual system, the technology boosted display calibration and colour management for imaging systems, and it has been commercially utilised by cinema lighting manufacturers and in the production of Hollywood movies and TV series. His other artificial intelligence-powered inventions enhance the colours captured in photos and videos taken by digital cameras under various environments. These technologies have been adopted by world-class smartphone and XR device manufacturers.

To enhance energy efficiency, PolyU established the Otto Poon Charitable Foundation Research Institute for Smart Energy (RISE) in 2020 and the Research Centre for Resources Engineering towards Carbon Neutrality (RCRE) in 2021. These centres foster multidisciplinary research to develop innovative technologies and solutions to meet the worldwide challenges in energy efficiency and environmental sustainability.

Researchers from RISE have achieved a significant impact in their research fields: 11 RISE members were recognised by Clarivate as Highly Cited Researchers in 2025. This prestigious recognition is awarded to researchers who achieve a Top 1% citation among their peers in their respective research areas. **Professor Sheng-wei WANG**, Director of RISE and Chair Professor of Building Energy and Automation of the Department of Building Environment and Energy Engineering, was recently awarded the ASHRAE Hong Kong Chapter Technology Award 2025. Professor WANG led the collaboration with the International Commerce Centre management team and implemented lifecycle retro-commissioning technologies that upgrade energy performance for large and complex air-conditioning systems in buildings. This technology enabled the International Commerce Centre (ICC) to gain approximately 39% in energy savings within one year of implementation.[35]

Top scholars

RCRE has excelled both in academic research and in driving innovation. Two of its researchers, **Professor Hai-tao HUANG**, Professor of the Department of Applied Physics, and **Professor Xiao ZHANG**, Assistant Professor of the Department of Mechanical Engineering, were recognised as Highly Cited Researchers by Clarivate Analytics, ranking in the Top 1% globally by citations in their fields. This also means that Professor ZHANG has been recognised as a Highly Cited Researcher for six consecutive years. In addition to achievements in scientific publications, RCRE has been awarded 17 patents since its inception in 2021, demonstrating its research translation.[36]

PolyU's continuous efforts in technological advancement have attracted globally leading talent to join its workforce. **Professor Lian-zhou WANG**, who was recognised as a Highly Cited Researcher for seven consecutive years between 2019 and 2025, recently joined PolyU as the Chair Professor of Energy Materials in the Department of Applied Biology and Chemical Technology. With over 670 publications indexed by Web of Science and more than 54,000 citations, Professor WANG's pioneering research focuses on the synthesis and application of semiconductor nanomaterials for renewable energy conversion and storage systems, including long-life rechargeable batteries and eco-friendly low-cost solar cells. His expertise will significantly advance the University's technological progress in building a greener future through engineering.

35 Prof. Shengwei WANG, Director of RISE has been awarded the "ASHRAE Hong Kong Chapter Technology Award 2025 in the category of "Commercial Buildings (Existing)", https://www.polyu.edu.hk/rise/news-and-events/news/2025/ashrae-hong-kong-chapter-technology-award-2025/

36 Research Centre for Resources Engineering Towards Carbon Neutrality, Knowledge Transfer Activities, https://www.polyu.edu.hk/rcre/publications/knowledge-transfer-activities/

2.4 ADVANCED MANUFACTURING

As part of its efforts to develop eco-friendly solutions in engineering, PolyU has been leading the technology transformation in the often pollution-heavy traditional manufacturing sector. By developing and implementing advanced technologies and digital solutions, the advanced manufacturing industry will continue to support economic growth while becoming increasingly environmentally friendly.

PolyU has Hong Kong's strongest team in advanced manufacturing. Experts are drawn from multiple departments and research laboratories, including Department of Industrial and Systems Engineering, Department of Mechanical Engineering, Department of Aeronautical and Aviation Engineering, Department of Electrical and Electronic Engineering, State Key Laboratory of Ultra-precision Machining Technology (SKL-UPMT), Research Institute for Advanced Manufacturing (RIAM), and the University Research Facility in 3D Printing.

Scholarly output and impact

From 2020 to 2024, despite the significant impact of the COVID-19 pandemic and the disruption to advanced manufacturing research globally, PolyU maintained steady growth in the number of publications in advanced manufacturing, surpassing the growth rates for Hong Kong, APAC and the world (Figure 30). By 2023, over 30% of Hong Kong's publications in advanced manufacturing were affiliated with PolyU.

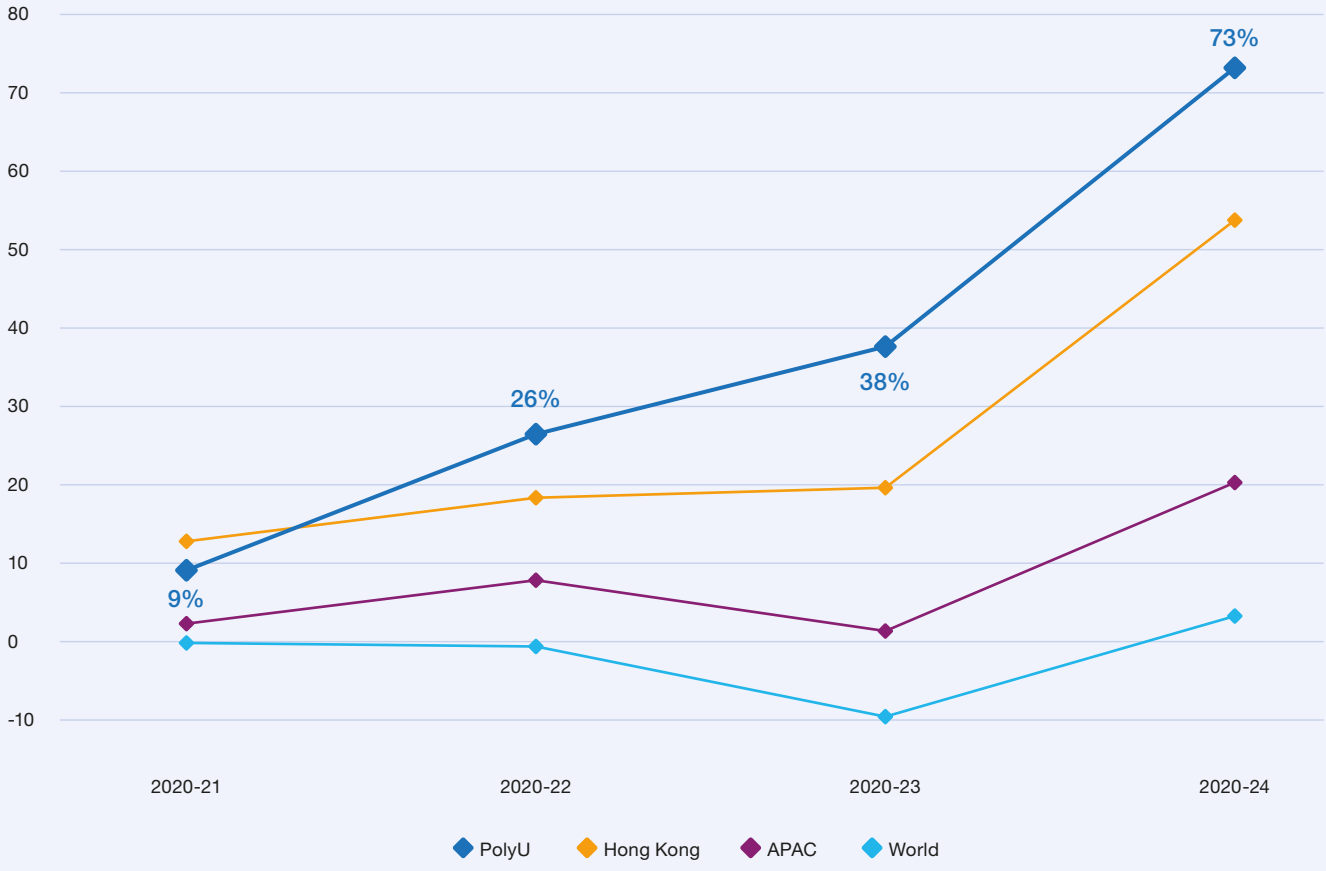


Figure 30. Cumulative growth of publications in advanced manufacturing: PolyU, Hong Kong, APAC, and world

Alongside rapid growth in the number of publications, PolyU has also seen an increase in its share of the world's Top 1% publications in advanced manufacturing (Figure 31). While the world average saw a decrease in the number of Top 1% publications in advanced manufacturing, PolyU's global share grew by 63% between 2020 and 2024. High-quality research has yielded a significant number of patents, with PolyU being granted 108 patents in the advanced manufacturing field.

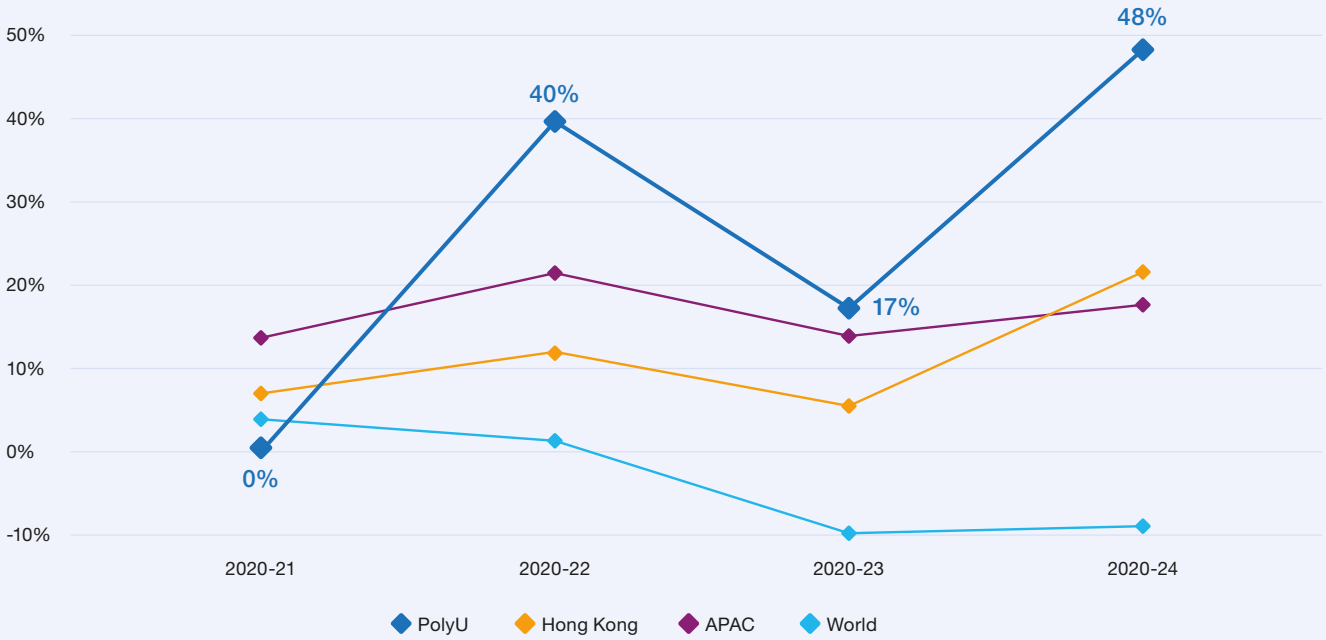


Figure 31. Cumulative growth of Top 1% publications in advanced manufacturing: PolyU, Hong Kong, APAC, and world

Societal impact

A key driver in the University's development in advanced manufacturing is bringing interdisciplinary talent together. PolyU's SKL-UPMT and RIAM not only rely on world-leading researchers with diverse academic backgrounds but also bring in industrial leaders and policy makers to facilitate the translation of research into real-world implementation.

With the booming expansion in telecommunications over the past decades, PolyU has established a successful track record of research excellence in optical communications. Among the leading researchers, **Professor Chao LU**, Chair Professor of Fiber Optics of the Department of Electrical and Electronic Engineering, leads the Photonics Research Institute (PRI) in advancing photonic technology. Under his leadership, PRI has driven developments in optical communications, sensing, energy, imaging and other biomedical applications.

Collaborating with tech giants such as Huawei and Alibaba, PolyU's research groups have developed solutions that enhance the competitiveness of Huawei and Alibaba in the rapidly evolving 5G market. In collaboration since 2007, PolyU and Huawei have jointly invested in areas such as telecommunications, big data, mobile networks, algorithms and materials. PolyU's discoveries in optical networks have also supported Alibaba Cloud data centres and cloud services worldwide. **Professor Alan Pak-tao LAU** of the Department of Electrical and Electronic Engineering, and his team developed a scheme that improves the estimation accuracy of signal-to-noise ratio (SNR) for optical signals travelling through a network. This research has increased fibre-optic network connection speeds and allowed them to be deployed more flexibly, with no loss of reliability. It has created economic benefits, helped to improve the operational efficiency of its clients' services and enhanced the end-user experience. With five million corporate customers including around 190 Fortune Global 500 companies, Alibaba Cloud has deployed the technique in their data centres across 15 countries/regions, benefiting billions of end-users worldwide and making a positive impact in supporting increasingly diverse and demanding customer connection requests.

Other breakthroughs by PolyU researchers in technology infrastructure include the research led by **Professor Zuan-kai WANG**, Associate Vice President (Research) and Chair Professor of Nature-Inspired Engineering in the Department of Mechanical Engineering. His prominent discoveries of the structured thermal armour and a new way of steering directional liquid flow have led to his new project being awarded funding under the National Key Programme by the National Natural Science Foundation of China in 2023. The Project "Flow Boiling Technology under Extremely High-Temperature Environment: from Fundamental Mechanisms to Vital Materials" aims at addressing one of the key limitations for advanced manufacturing in aviation engines, the nuclear industry, and defence technologies.[37]

Another project, "Energy-efficient Liquid Cooling System for Data Centres", was among the first to receive funding from the prestigious RAISe+ Scheme in 2024,[38] demonstrating its significance and recognition by the Government of the HKSAR and the industry. In addition to making a global impact, many PolyU inventions have driven local economic growth. **Professor Yuen-hong TSANG** of the Department of Applied Physics, led two industry-funded projects that developed high-power ultrafast laser stabilising technology and beam quality control, which revolutionised the laser industry. This technology enhances the safety, productivity and efficiency of battery production and has been adopted by the industry.

During the COVID-19 pandemic, cutting-edge PolyU manufacturing technology played a crucial role in the timely development of infection control measures. Supported by the University Research Facility in 3D Printing and with funding of HKD 2 million from the Innovation and Technology Fund, **Professor Chris Kwan-yu LO** of the Department of Logistics and Maritime Studies, developed an antiviral 3D printing technology to combat operational disruption due to a lack of effective long-lasting infection control during the pandemic. The technology was commercialised via Immune Materials Limited and has since expanded to nine materials (e.g., artificial leathers and plastics) applications used by hospitals (e.g., Intensive Care Unit), homes for the elderly and shopping malls in Hong Kong, the Chinese Mainland and Japan.

A research team led by **Professor Pei LI** of the Department of Applied Biology and Chemical Technology has developed CareCoatex™, a non-toxic, eco-friendly antimicrobial and antiviral coating. This innovative product, made from chitosan derived from food waste, is based on Professor LI's patented core-shell particle technology, ensuring safety, effectiveness and environmental sustainability. CareCoatex™ can eliminate 99% of common pathogens on various surfaces for up to six months, making it a significant advancement for public health. As the first eco-friendly anti-COVID-19 coating, CareCoatex™ has been adopted by ISI, a leading public facility management company, and is now used in major public locations such as museums, the MTR, and commercial buildings, as well as extensively across the PolyU campus. Professor LI's start-up, established to commercialise this technology, has created 10 jobs and generated nearly HKD 1.8 million in sales.

2.5 GEOMATICS

PolyU's Department of Land Surveying and Geo-Informatics has experienced fast and extensive development in the past decade. With this development, the Department has expanded beyond traditional land surveying into the advanced spatial information sciences and technologies space. This progress has positioned the Department as a key partner contributing to multiple national space explorations, including the BeiDou and lunar exploration missions. In addition to its contributions to the Nation's programme, the Department's research outcomes have positively impacted society's daily life, such as through the design of smart cities and the development of improved in-car navigation systems.

37 Three PolyU scholars awarded funding under national key programme and 52 young scientists honoured by NSFC, https://www.polyu.edu.hk/media/media-releases/2023/0915_3-polyu-scholars-awarded-under-national-key-programme-and-52-young-scientists-honoured-by-nsfc/
38 Energy-Efficient Liquid Cooling System for Data Centres, https://www.polyu.edu.hk/me/knowledge-transfer/energy-efficient-liquid-cooling-system-for-data-centres/

Global ranking

The advancements have helped establish PolyU as a leading institution in geomatics, **ranking 31st globally for Remote Sensing in the ShanghaiRanking's Global Ranking of Academic Subjects 2025,[39] and 37th for Geography in the QS World University Rankings by Subject 2025.[40]**

Scholarly output and impact

The Department's strong growth correlates with an increase in PolyU's publications in surveying, specifically an 84% rise between 2020 and 2024. PolyU has contributed to 30-40% of Hong Kong's publications in surveying in this period. This also represents a 56% growth in the share of global publications in surveying, indicating a growing global presence (Figure 32).

While increasing in number, PolyU's publications in surveying have also achieved high citation impact in their respective research areas. PolyU not only doubled its number of Top 1% most-cited papers, but also more than doubled its global share of such papers (Figure 33).

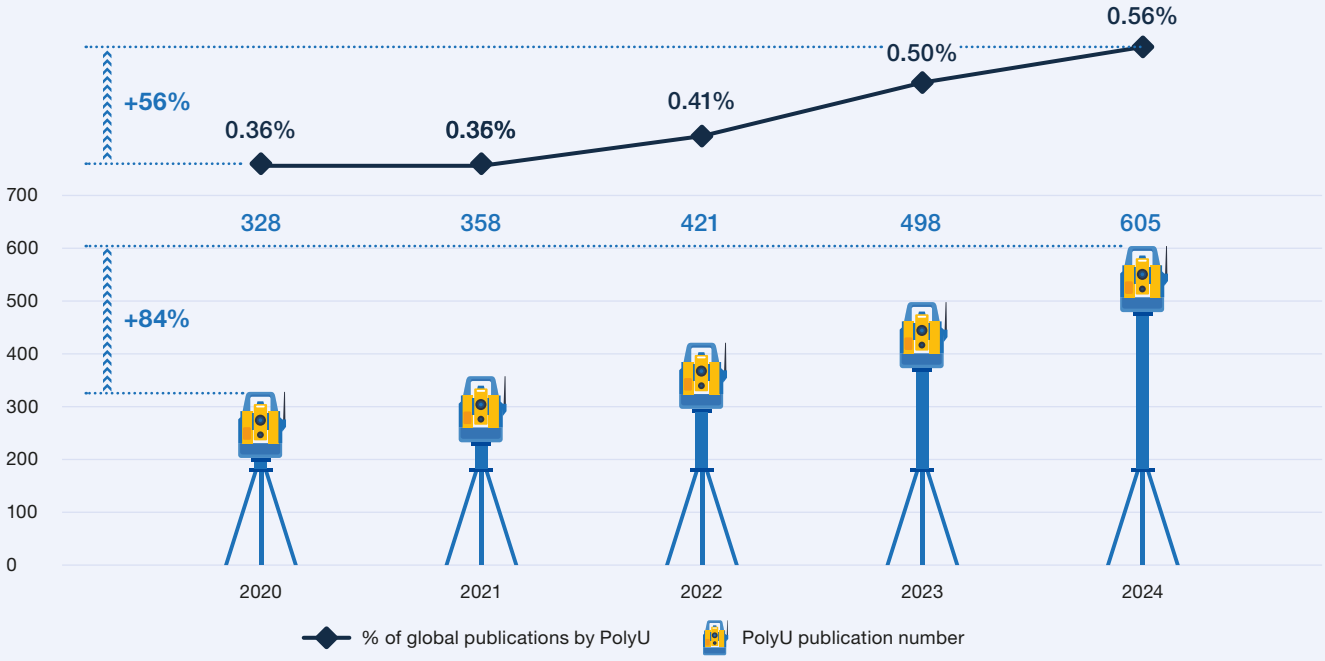


Figure 32. PolyU publication trends in surveying

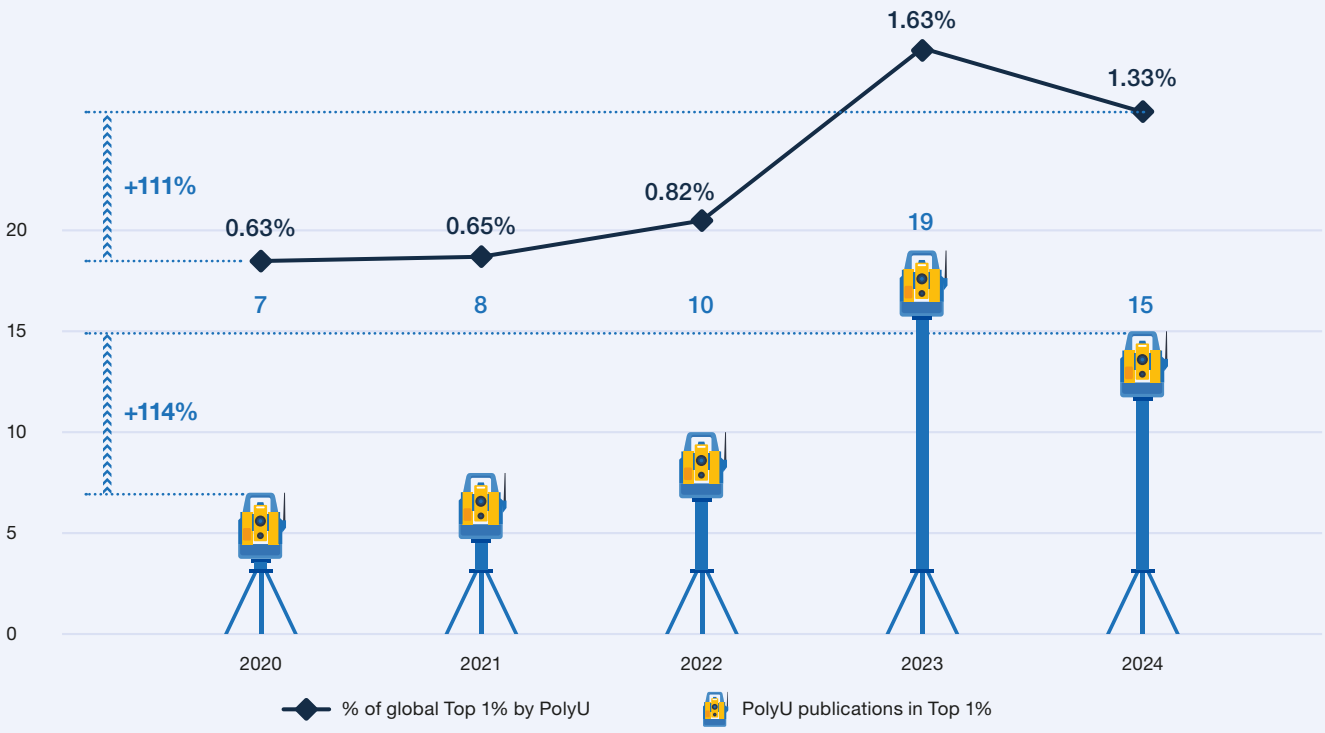


Figure 33. PolyU Top 1% publications in surveying

39 ShanghaiRanking's Global Ranking of Academic Subjects 2025, https://www.shanghairanking.com/institution/the-hong-kong-polytechnic-university
40 QS World University Rankings by Subject 2025: Geography, https://www.topuniversities.com/university-subject-rankings/geography

This increase has been accompanied by a rapid growth in the percentage of PolyU's publications in surveying, achieving the Highly Cited Papers status (Figure 34). The growth rate far exceeded that of Hong Kong, APAC, and the world. With nearly triple the number of Highly Cited Papers, in 2023 and 2024, over 40% of Hong Kong's Highly Cited Papers in surveying were affiliated with PolyU.

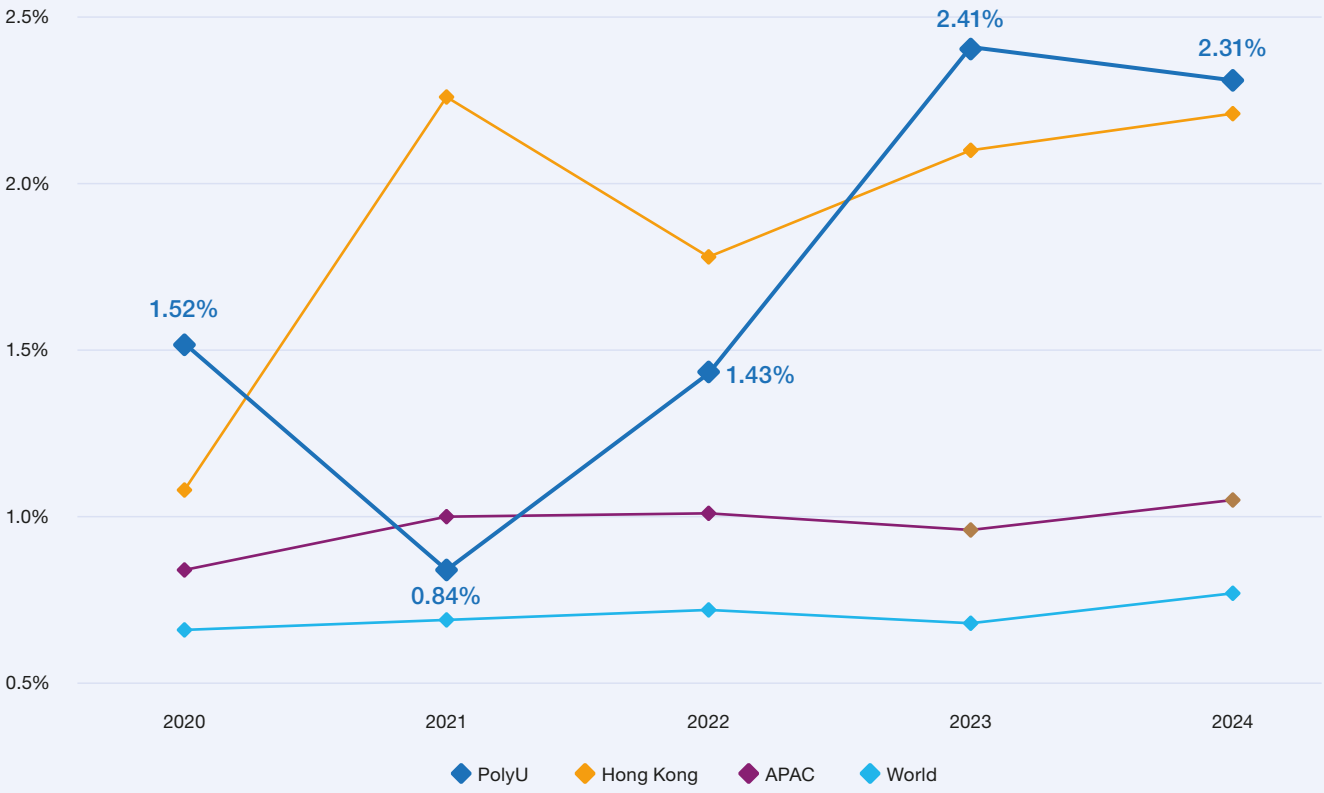


Figure 34. Share of Highly Cited Papers in surveying: PolyU, Hong Kong, APAC, and world

Societal impact

Over the past 30 years, PolyU has built cutting-edge research and engineering capabilities in deep space research, making it the only tertiary institution in Hong Kong to have participated in multiple national space missions. Established in 2021, PolyU's Research Centre for Deep Space Explorations (RCDSE) is a leading interdisciplinary research centre that supports the Nation's space exploration missions.

Professor Bo WU, Associate Director of RCDSE and Professor of the Department of Land Surveying and Geo-Informatics, has led the PolyU research group in systematically investigating planetary remote sensing and mapping over the past decades. Their integrated 3D topographic mapping model and AI-powered geomorphological mapping techniques have advanced state-of-the-art planetary mapping, contributing to the landing site mapping and selection for the Chang'e-4 lunar far-side landing mission and the Tianwen-1 Mars mission. The "Surface Sampling and Packing System", developed and manufactured by **Ir Professor Kai-leung YUNG**, Director of RCDSE, Chair Professor of Precision Engineering of the Department of Industrial and Systems Engineering, assisted the Nation in completing its first lunar sample return mission, Chang'e-5, in 2020, and the world's first lunar far-side sampling for the Chang'e-6 lunar exploration mission in 2024. These successes safeguarded the RMB 4 billion investment by the China National Space Administration for these missions. The returned sample showed volcanic activity on the lunar far-side more than 2.8 billion years ago and has been recognised as one of the 2024 Top 10 Scientific Advances in China.

The topographic and geomorphological mapping technologies developed by Professor WU along with the sophisticated "Mars Landing Surveillance Camera" developed by Professor YUNG contributed significantly to the Nation's first Mars exploration mission, Tianwen-1 in 2021. Professor WU's novel mapping technologies helped identify critical landing regions for the safe landing of the Zhurong Mars rover, earning recognition through an Outstanding Award from the China National Space Administration. The Mars camera's ultra-wide-angle images and its strong durability in tough conditions provided critical information for the successful movement of the Zhurong rover on the surface of Mars.

In November 2024, Professor WU and his research team published the article “A Probable Ancient Nearshore Zone in Southern Utopia on Mars Unveiled from Observations at the Zhurong Landing Area”. It was recognised as one of the most downloaded physics papers of 2024 and included in the “Physics Top 100 of 2024” collection. This highlights the significance of this research and its contribution to a discussion on the probable evolutionary scenario on Mars for the first time.

Professor WU and his research team are now actively engaged in the Chang’e-7 and Tianwen-2 missions and will continue to collaborate with institutions across the Nation to drive advancement in space exploration.

While advancing remote sensing technologies and supporting national space exploration, PolyU has also established various research centres that support urban development using advanced technology. The Research Institute for Land and Space (RILS), established in 2021, has a research focus on creating economical and environmentally friendly land and space in Hong Kong, the Greater Bay Area and beyond. **Professor Qi-hao WENG**, Associate Director of RILS, and Chair Professor of Geomatics and Artificial Intelligence of the Department of Land Surveying and Geo-Informatics was awarded the Lifetime Achievement Honor Award and the Wilbanks Prize for Transformational Research in Geography award by the American Association of Geographers in 2024. His recent groundbreaking study, published in the journal Nexus of Cell Press, addressed the need for developing global heatwave frameworks to effectively identify dangerous outdoor conditions across diverse climatic and geographic regions.

Through world-class research, industry-leading scholars, impactful collaboration, and a strong emphasis on translational outcomes, PolyU is regarded as a global leader in engineering by both research community and industry partners. By integrating advanced technologies with practical application, PolyU’s research has made a meaningful impact on society and people’s daily lives. The strong research and translation capability in its engineering disciplines also drives innovation and application in other disciplines.

CHAPTER

03

AI-DRIVEN MEDICAL RESEARCH

CHAPTER 3
AI-DRIVEN MEDICAL RESEARCH

PolyU is transforming healthcare by transcending disciplinary boundaries and integrating cutting-edge research with people-centred design. Having created a robust innovation ecosystem, PolyU has driven the development of AI-powered diagnostic technologies, personalised rehabilitation robotics and smart monitoring systems. These tools enhance the quality and accessibility of care for those with special needs. They reaffirm PolyU's commitment to creating societal benefit through research.

3.1 OVERVIEW OF POLYU COMPUTER SCIENCE AND MEDICAL RESEARCH

PolyU's AI and medicine-engineering synergy is supported by multiple state key laboratories and research institutes, including the State Key Laboratory of Ultra-precision Machining Technology (SKL-UPMT) and the PolyU Academy for Artificial Intelligence (PAAI), as well as numerous research centres. This collaborative ecosystem has enabled PolyU to successfully translate many cutting-edge innovations into real-world healthcare solutions, significantly enhancing clinical outcomes and patient quality of life. Between 2020 and 2024, PolyU was granted a total of 261 patents in 21 regions globally, in areas such as computer science, imaging, applied mathematics, biomedical engineering, biotechnology, health technology and informatics, nursing, optometry, and rehabilitation science. While the Top three regions for granted patents are the Chinese Mainland, Europe and the United States, there is an increasing footprint in Hong Kong, Taiwan, China and Southeast Asia.

This chapter will explore how PolyU's interdisciplinary integration has driven life-changing inventions in computer science and various medical disciplines, including optometry, biomedical engineering, rehabilitation sciences and nursing.

3.2 COMPUTER SCIENCE AND ARTIFICIAL INTELLIGENCE

Computer science, particularly Artificial Intelligence (AI) and big data technologies, has undergone rapid development, making a significant impact on both society and industry in recent years.

Global ranking

As a world-leading university for technology advancement, **PolyU ranked 16th globally in Artificial Intelligence in the ShanghaiRanking's Global Ranking of Academic Subjects 2025,[41] 25th globally in Computer Science in the U.S. News & World Report Best Global Universities Rankings 2025-2026,[42] and 40th globally for Data Science and Artificial Intelligence,[43] and 11th in China for Mathematics by the QS World University Rankings by Subject 2025.[44]** The high achievement in world ranking is a result of both PolyU's research excellence in relevant fields, as well as its commitment to enhancing teaching facilities in response to the increasing demand for educating future talent.

41 ShanghaiRanking's Global Ranking of Academic Subjects 2025: Artificial Intelligence, https://www.shanghairanking.com/rankings/gras/2025/AS0229
42 U.S. News & World Report Best Global Universities Rankings 2025-2026: Computer Science, https://www.usnews.com/education/best-global-universities/computer-science
43 QS World University Rankings by Subject 2025: Data Science and Artificial Intelligence, https://www.topuniversities.com/university-subject-rankings/data-science-artificial-intelligence?search=hong%20kong
44 QS World University Rankings by Subject 2025: Mathematics, https://www.qschina.cn/en/university-rankings/university-subject-rankings/2025/mathematics

New Faculty of Computer and Mathematical Sciences

PolyU's Department of Data Science and Artificial Intelligence was established in July 2024 with a vision: To position PolyU as a regional and global leader in data science and AI. The Department's remit is to shape future innovators through immersive, interdisciplinary education and to advance impactful research in areas such as Machine Learning, Biometrics and Human Language Processing, Computer Vision and Graphics, Data Technologies and Governance, Statistical Learning and Optimisation Methods, and AI + X (Science, Healthcare, Neuroscience, etc.). It has already achieved high-ranking positions in global subject ranking, highlighting the Department's rise as a hub of excellence in research and innovation.

In January 2025, the Faculty of Computer and Mathematical Sciences (FCMS) was established as part of the University's response to increasing societal demands for the future workforce in the emerging area of AI and computer science. The Faculty comprises three departments: Department of Data Science and Artificial Intelligence, Department of Applied Mathematics and Department of Computing. This academic structure aims at promoting interdisciplinarity and collaboration between mathematics and computer science, which are both essential for advancing AI and big data technologies.

To meet the strategic objective, FCMS offers new curricula, including the Bachelor of Science (Honours) in Data Science and Artificial Intelligence from the 2025/26 academic year. Restructuring has also been undertaken in existing curricula, such as, the introduction of the Master of Science in Quantitative Finance and Fintech.

Scholarly output and impact

The establishment of FCMS reflects PolyU's strong growth in computer science and AI in recent years. Between 2020 and 2024, it consistently increased its publication footprint in computer science: a 123% increase in the number of publications and 77% increase in global presence (Figure 35). Having more than doubled its publications in this research area, this growth rate far exceeded the growth in Hong Kong, APAC and globally within the same period (Figure 36). By 2024, 26% of Hong Kong's computer science publications were affiliated with PolyU.

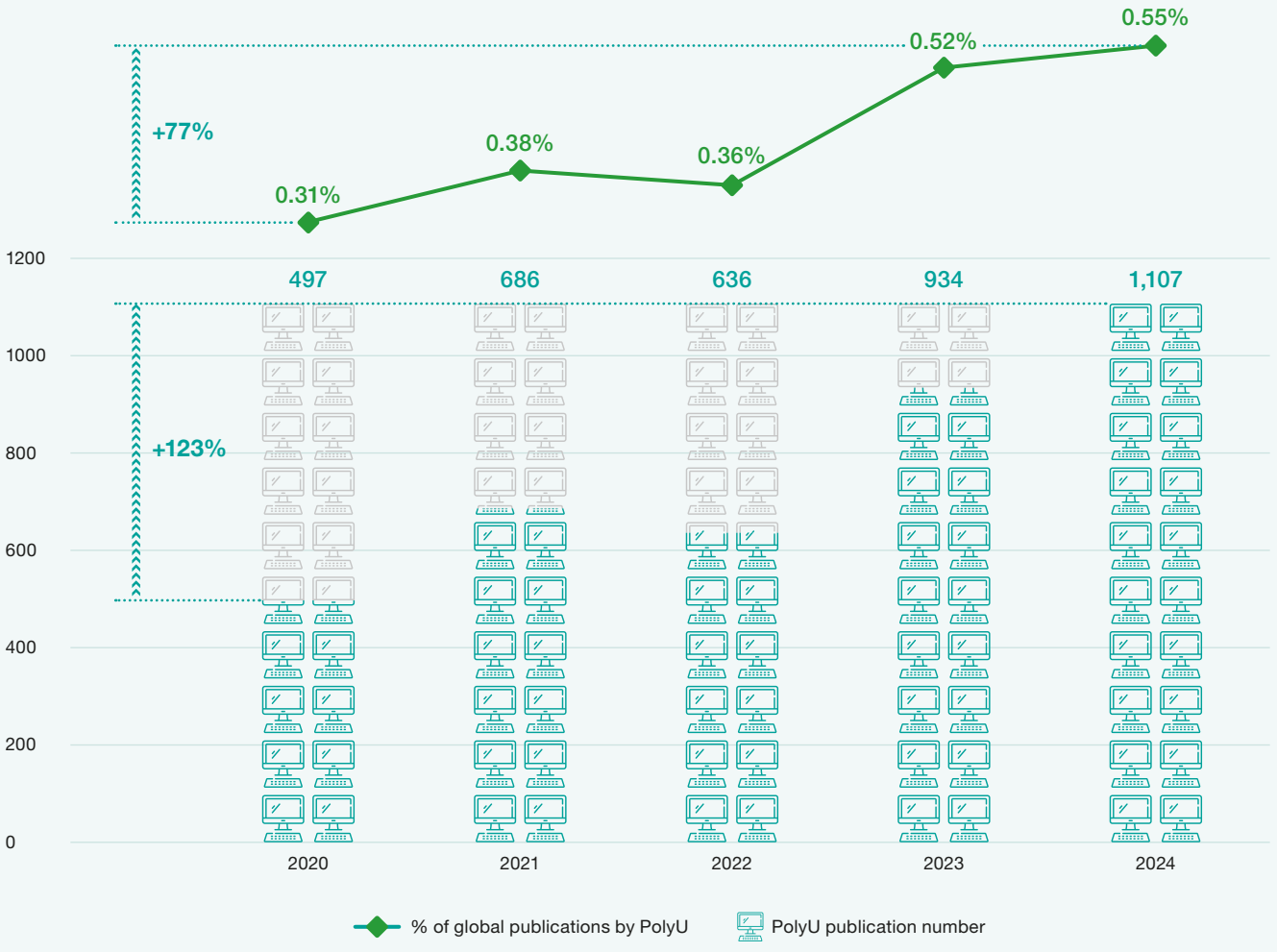


Figure 35. PolyU publication trends in computer science

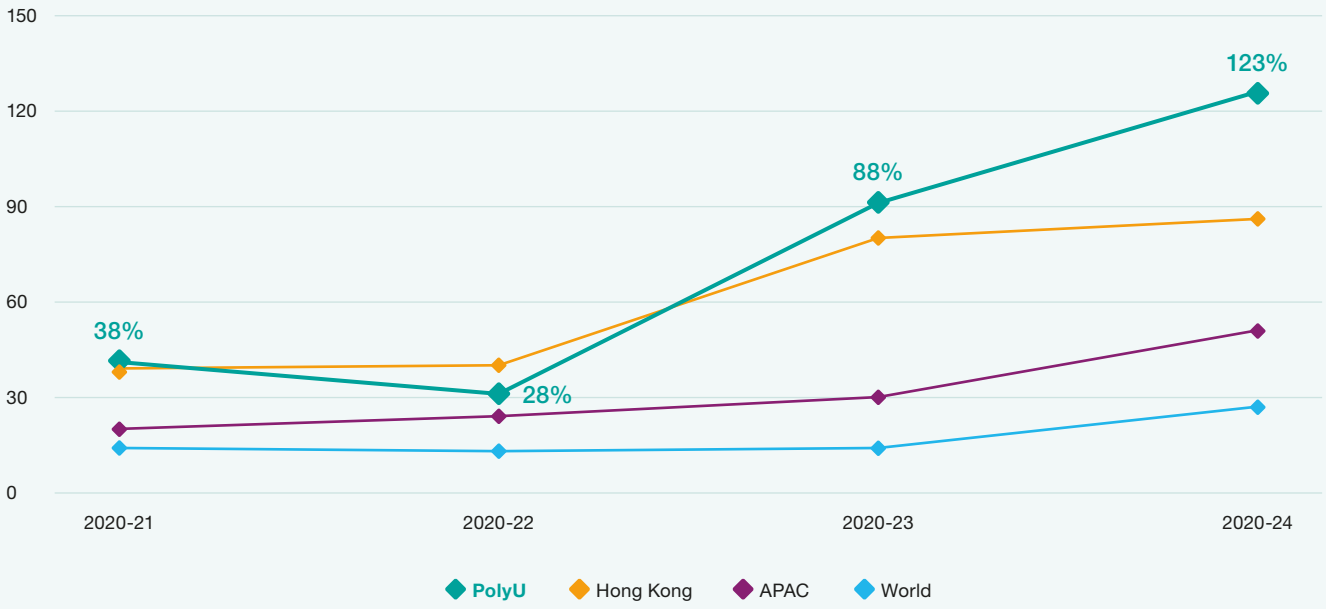


Figure 36. Cumulative growth of publications in computer science: PolyU, Hong Kong, APAC, and world

In addition to a high number of research outputs, PolyU's publications also demonstrated their high quality with consistent and accelerated growth in the number of Highly Cited Papers. The growth rate of 90% far surpassed that of Hong Kong, APAC and the global average (Figure 37).

Having doubled the number of publications achieving Top 1% globally by citations, the Top 1% publications affiliated with PolyU in computer science and AI also increased its global share by 173% (Figure 38).

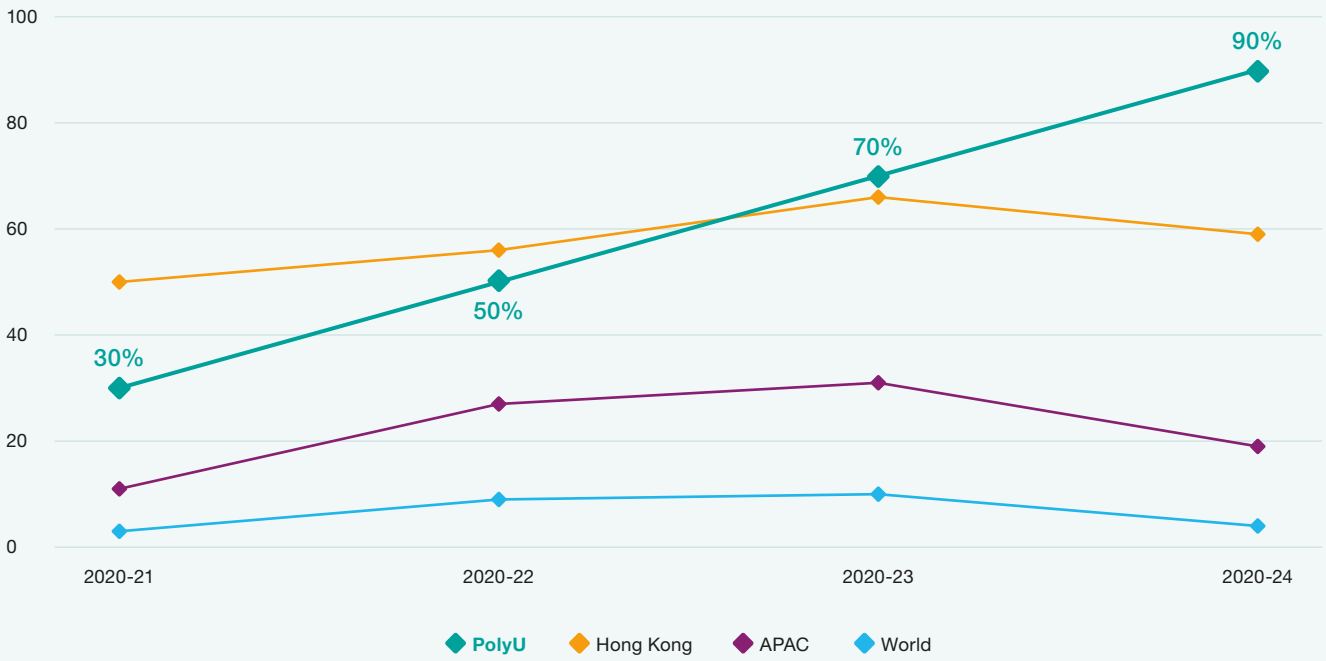


Figure 37. Cumulative growth of Highly Cited Papers in computer science: PolyU, Hong Kong, APAC, and world

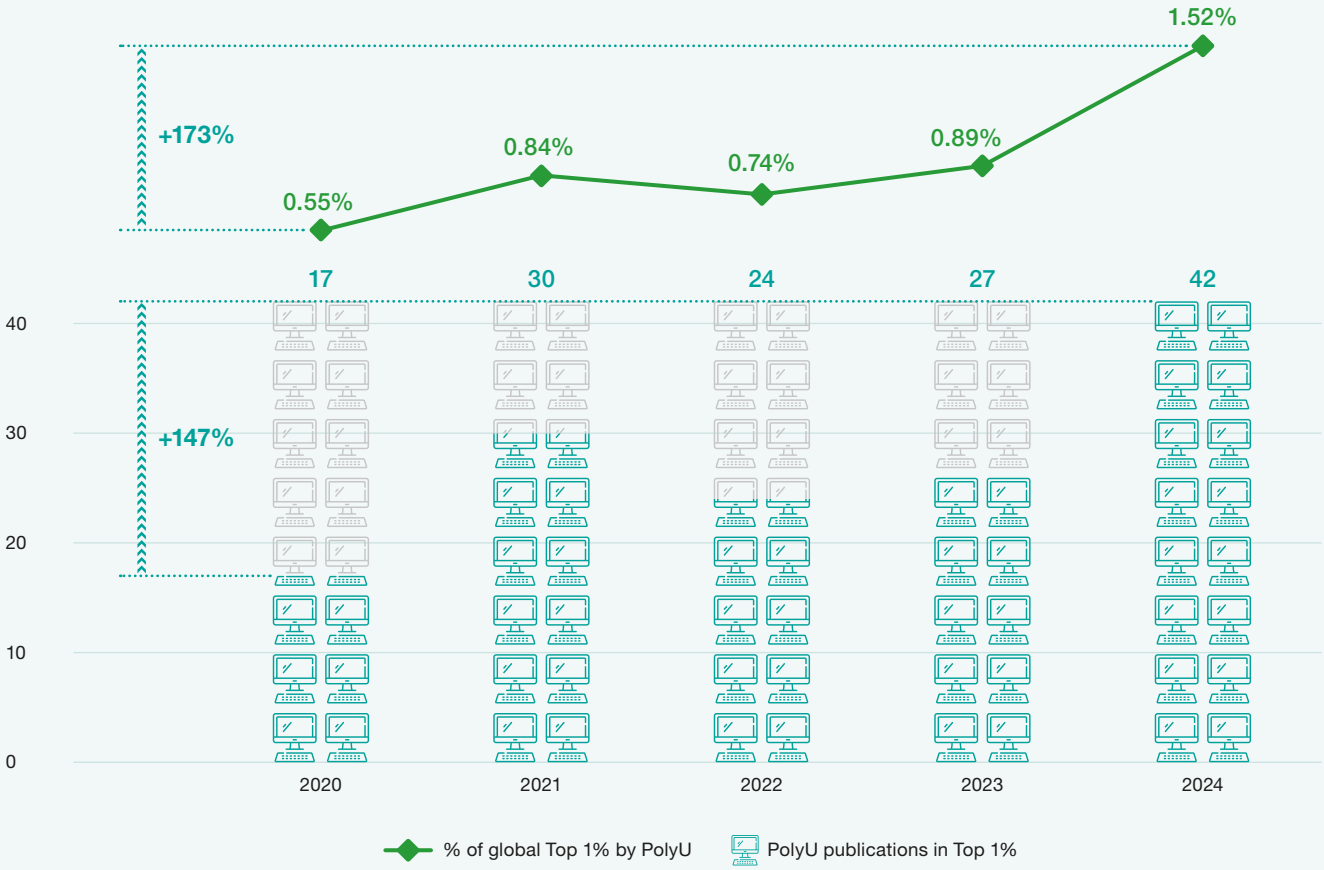


Figure 38. PolyU Top 1% publications in computer science

Top scholars

A growing community of world-class researchers pushing the boundaries of intelligent technologies and data-driven solutions is the driver of this rapid growth in scholarly output and impact. One of the leading women in technology, **Professor Hong-xia YANG**, Executive Director of the PolyU Academy for Artificial Intelligence (PAAI), Associate Dean of FCMS, was recently named by CoinDesk as one of the Top 50 Women in Web3 and AI for driving innovation and ethical frameworks in emerging technologies.[45] Professor YANG's experience spans industry and academia. Joining PolyU after being a leading AI scientist at Alibaba Academy for Discovery, Adventure, Momentum and Outlook (DAMO Academy) and ByteDance, she is an advocate of a decentralised approach to AI. Her innovative work enhances the accessibility and efficiency of large language models, facilitating the practical applications of AI across various industries, from healthcare to finance.

Professor YANG recently received a total of HKD 62.6 million in funding from the Research Grants Council's Theme-based Research Scheme 2025/26 for her pioneering project "Collaborative Generative AI (Co-GenAI)".[46] The Project aims to reduce AI development's reliance on massive centralised computational resources and limitations posed by GPU monopolies. Co-GenAI's architecture will bring over 90% resource saving and allow the use of ordinary computing resources to train large models by integrating small models, which will significantly enhance Hong Kong's competitiveness in AI technology. This model also enables more discipline-specific learning using industry and scientific data so that the AI can produce better output than open-source models – which addresses the current challenges of having limited internet data accessibility and the high cost of open-source models that AI can be trained on.[47] Facilitating wide implementation of this technology in

45 PolyU scholar named "Top 50 Women in Web3 & AI" by CoinDesk, https://www.polyu.edu.hk/rio/news/2025/20250613---polyu-scholar-named-top-50-women-in-web3-ai-by-coindesk/
46 Prof. YANG Hongxia Secures Theme-based RGC Funding for Groundbreaking Collaborative Generative AI Project, https://www.polyu.edu.hk/comp/news-and-events/news/2025/0711_yang-hongxia-rgc-fund/
47 PAIR Public Forum for Research and Innovation: Prof. YANG Hongxia of PolyU delivers "DeepSeek and Beyond", https://www.polyu.edu.hk/pair/news-and-events/upcoming-events/2025/3/20250311-pair-public-forum-on-deepseek-and-beyond/

the future, Professor YANG established collaboration with leading industry and healthcare partners, including Cyberport, Alibaba, and Hong Kong Science & Technology Parks Corporation, Huashan Hospital and Sun Yat-sen University Cancer Centre, for the training and testing of this model in different use cases. As the centre for this research, PAAI will serve as a decentralised Co-GenAI platform that fosters collaborative research and applications of GenAI across diverse fields, including urban energy, business transformation, smart manufacturing, robotics, intelligent clinical reasoning, grid modernisation, smart construction and smart materials.

In 2025, two out of nine Highly Cited Researchers in Hong Kong in Computer Science were affiliated with PolyU.[48] This reflects FCMS's global research excellence and its critical contributions to areas such as evolutionary computation, artificial intelligence and machine learning. Among them, **Professor John Lei ZHANG**, who is the Chair Professor of Computer Vision and Image Analysis of the Department of Computing, has been recognised as a Highly Cited Researcher for 11 consecutive years since 2015. He has 472 publications indexed in Web of Science, and his research has been cited over 64,000 times. **Professor Kay-chen TAN**, Chair Professor and Head of Computational Intelligence of the Department of Data Science and Artificial Intelligence, also stands out as a leading figure. His distinction not only affirms his personal impact but also underscores DSAI's leadership in shaping the future of data science and AI, both regionally and internationally.

To further strengthen PolyU's research capability in distributed artificial intelligence and data mining, **Professor Cheng-qi ZHANG** has been with DSAI since 2024. He is one of the Chinese Mainland's earliest researchers in artificial intelligence, with work in the field dating back to 1982. In 2024, he was elected Conference Chair for the International Joint Conference on Artificial Intelligence. Serving as the Director of the PolyU Shenzhen Research Institute (SZRI), Professor ZHANG brings a wealth of knowledge and expertise to the University, as well as strong leadership in nurturing the next generation of talent for technological advancement.

Societal impact

PolyU's strong development in computer science and AI lies in its dynamic cross-sector network. Close collaboration both within the University and with leading external research entities has strengthened PolyU's research capability and knowledge transfer. The results of successful external collaboration can be seen in the establishment of PAAI, the CITIC-PolyU Interdisciplinary Mathematical Digital AI Joint Laboratory (AIJLab), the Research Institute for Artificial Intelligence of Things (RIAIoT), the InnoHK Research Centres, the PolyU-Nanjing Technology and Innovation Research Institute, the Research Centre for Artificial Intelligence in Geomatics (RCAIG), the Research Centre for Data Science and Artificial Intelligence (RC-DSAI), and the University Research Facility in Big Data Analytics (UBDA). These strategic alliances foster cutting-edge innovation and accelerate the translation of research into real-world solutions, positioning PolyU at the forefront of smart, sustainable, and socially responsible AI development.

48 Highly Cited Researchers 2025, https://clarivate.com/highly-cited-researchers/?action=clv_hcr_members_filter&clv-paged=1&clv-category=Computer%20Science&clv-institution=&clv-region=&clv-name=

In September 2025, PAAI jointly issued the "White Paper on AI-RAN (Artificial Intelligence for Radio Access Network) Commercial Outlook for Vertical Industries" with AsiaInfo Technologies Ltd, Intel Corporation, the Institute for AI Industry Research (AIR) at Tsinghua University and the Institute of Electrical and Electronics Engineers (IEEE). AI-RAN integrates communication, sensing, computing power and intelligence, which makes it the core evolution path for 6G. This white paper used scenario-driven quantitative modelling and assessed the commercial feasibility of Private AI-RAN. As the first report globally to systematically examine the strategic and commercial value of Private AI-RAN, this white paper shared an important direction for the future restructuring of global network infrastructure.[49]

Empowering innovations through interdisciplinary partnerships, PAAI drives innovation in healthcare with AI, medicine and engineering integration, and has attracted notable funding opportunities. 14 PolyU projects were awarded funding from the Collaborative Research Fund under the Research Grants Council in its 2024/25 exercise. This means PolyU ranked first in Hong Kong for both having the highest number of projects funded and the highest amount of funding received under this scheme.[50]

A recent PolyU AI-powered innovation that addresses pressing challenges in lung cancer treatment is LungRT Pro, developed by **Professor Jing CAI**, Professor and Head of the Department of Health Technology and Informatics. It is an advanced radiotherapy support system that harnesses AI techniques and automates the analysis of patient CT images without the need for contrast agents. With 3D visualisation capabilities, the lung ventilation and perfusion maps created can provide clinicians with a comprehensive visual representation of lung function. Beyond significantly enhancing accuracy and consistency, the mapping identifies high-functioning lung areas for clinicians to avoid when administering lung cancer radiotherapy. This approach can reduce radiation damage to patients' lungs and improve post-operative quality of life. CT images from hundreds of patients have been collected to train the AI system. It is currently being tested in clinical trials at multiple hospitals, both within Hong Kong and in the Chinese Mainland.[51]

Building on this research momentum, PolyU has also engaged in extensive knowledge translation in the field of computer science. Between 2020 and 2024, PolyU was granted a total of 291 patents in Computer and Control (Figure 39). This increase in patented inventions has strengthened confidence in PolyU's research capabilities and attracted key collaborative opportunities with leading industry partners.

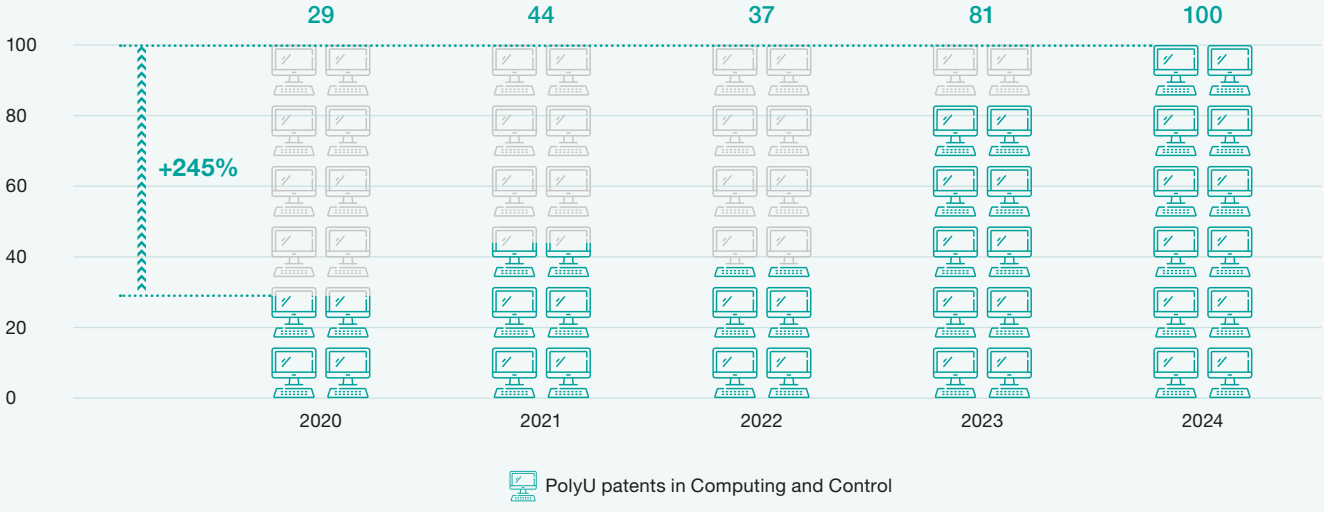


Figure 39. PolyU granted patents in Computer and Control

49 Global First! AsiaInfo Technologies, Intel, Tsinghua AIR, HKPU and IEEE Release White Paper on AI-RAN Commercial Outlook for Vertical Industries, https://www.asiainfo.com/en_us/content_4955.html
50 PolyU's AI and medicine-engineering integration empowers a new era of medical excellence, https://www.polyu.edu.hk/pair/news-and-events/news/2025/20250428-polyus-ai-and-medicine-engineering-integration-empowers/
51 LungRT Pro: Advanced Radiotherapy Support System, https://www.polyu.edu.hk/kteo/knowledge-transfer/innovations-and-technologies/technology-search/award-winning/a202504_22/

Between 2020 and 2024, the percentage of PolyU affiliated publications in computer science and AI that were in collaboration with industry partners was nearly 10 percentage points higher than that of the global average. Some of PolyU's closest collaborative industry partners include Huawei, Microsoft, Amazon, Alibaba, Tencent and Google. Publications with industry were well cited and generated very high impact – the collaboration between PolyU and eBay achieved a CNCI that is 45 times higher than the global average. The University's collaborative efforts with industry partners have played a crucial role in facilitating knowledge transfer.

Professor De-feng SUN, Chair Professor of Applied Optimization and Operations Research and Head of the Department of Applied Mathematics, RGC Senior Research Fellow, whose pioneering optimisation algorithms have become the core decision-making engine of Huawei's global supply chain and enterprise systems, raising operational efficiency by 17%. Embedded in Huawei's commercial OptVerse AI Solver, these innovations generate substantial cost savings—amounting to hundreds of millions of RMB annually—and support industrial clients, including the Chinese Mainland's second-largest port, where ship dwell times have been reduced by 10%. In recognition of his contributions, Professor SUN has received prestigious awards from Huawei.

In the field of intelligent imaging, **Professor Qing LI**, Chair Professor of Data Science and Head, and **Professor John Lei ZHANG**, Chair Professor of Computer Vision and Image Analysis of the Department of Computing, have developed AI-powered enhancement technologies now integrated into globally marketed consumer electronics. Their collaboration with Da-Jiang Innovations Science and Technology Co., Ltd (DJI) led to the deployment of image super-resolution and adaptive 3D-LUT algorithms in Zenmuse H20N thermal cameras and the Mavic drone series. Meanwhile, its partnership with OPPO enabled the integration of its AI-driven image signal processing technologies into flagship smartphones, including the Find X6, X7 and X8, thereby elevating mobile photography to new standards of quality.

Together, these achievements highlight FCMS's role as a catalyst for breakthrough innovation. This demonstrates that FCMS continues to advance AI-driven solutions that respond to global and local challenges, delivering lasting societal impact.

3.3 OPTOMETRY

Established in 1978, the School of Optometry enhances global eye care by nurturing professional optometrists and advancing research in eye and vision care. To date, PolyU remains the only university in Hong Kong that offers optometry training. In 2024, PolyU launched the Doctor of Optometry programme, which blends advanced coursework with research. This initiative demonstrates PolyU's commitment to driving optometry advancement both clinically and academically.

Scholarly output and impact

Between 2020 and 2024, PolyU nearly tripled its number of publications in the field of optometry. By 2024, publications affiliated with PolyU accounted for 40% of published output in Optometry in Hong Kong. This was paralleled by a 2.5-fold increase in PolyU's global presence in optometry (Figure 40).

While experiencing rapid growth in research output, PolyU also had a 110% increase in the number of optometry publications, achieving the Top 10% citation globally. In 2024, over 40% of Hong Kong's Top 10% publications in optometry were affiliated with PolyU. At the same time, the percentage of global Top 10% publications contributed by PolyU also had a 2.5-fold increase. PolyU's strong growth surpassed that of Hong Kong and the world (Figure 41).

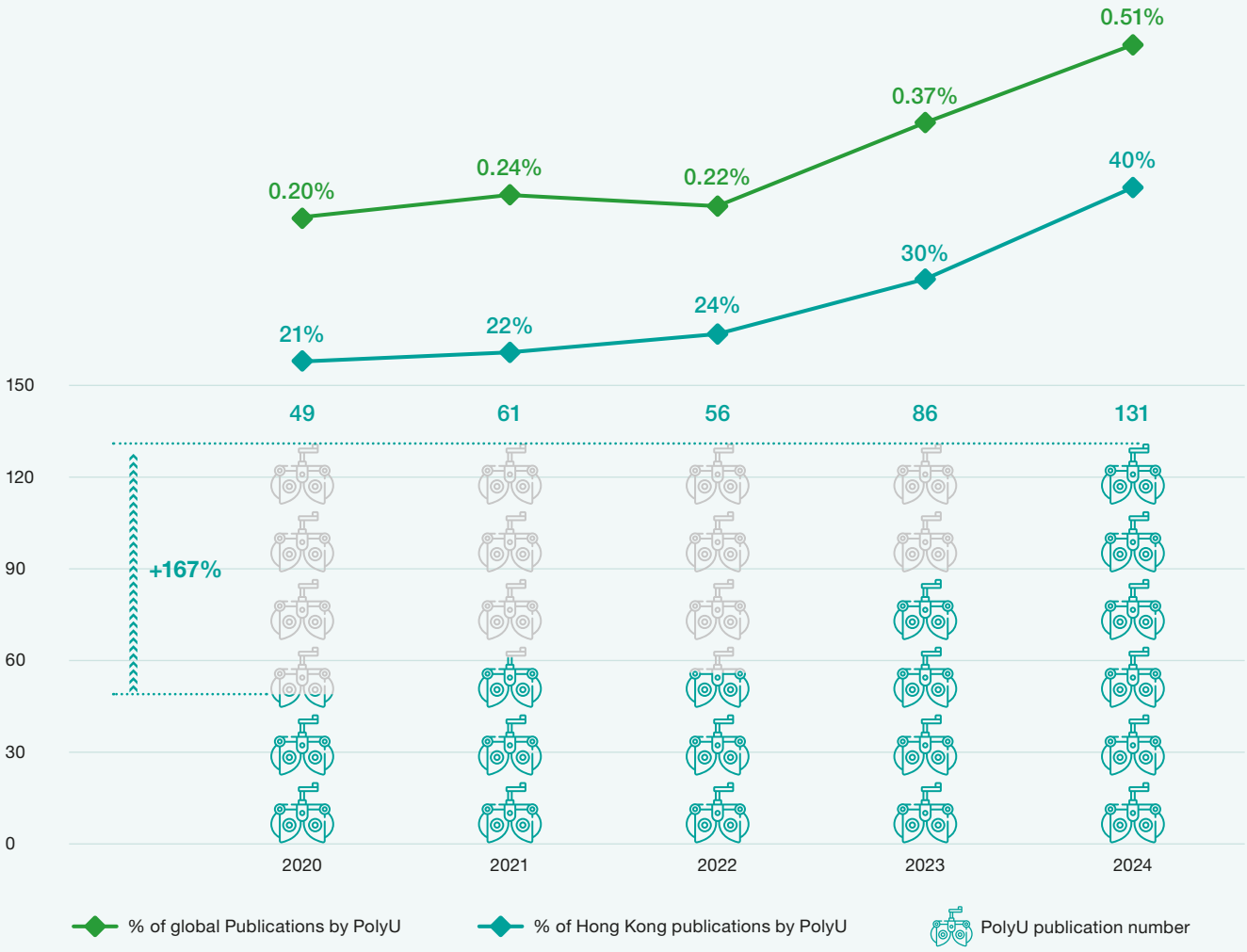


Figure 40. PolyU publication trends in optometry

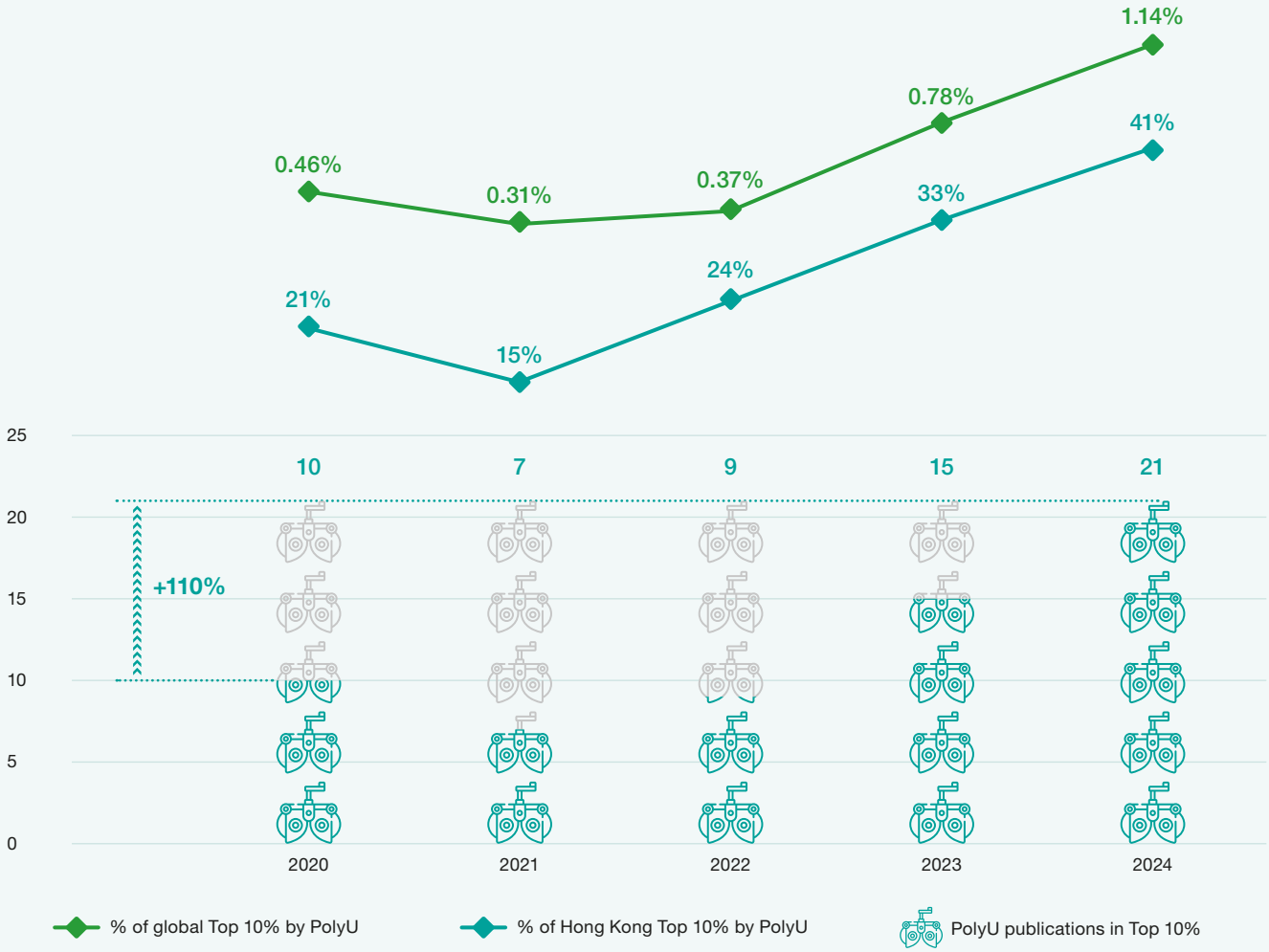


Figure 41. PolyU Top 10% publications in optometry

Societal impact

The School of Optometry has consistently delivered impactful solutions that address pressing ophthalmic challenges. High myopia is more than needing stronger glasses – it poses serious risks of pathologic conditions such as myopic macular degeneration, retinal detachment, glaucoma, and cataracts, all of which can lead to irreversible vision loss. **Adjunct Professor Carly Siu-yin LAM**, **Visiting Chair Professor Chi-ho TO**, and **Associate Professor Dennis Yan-yin TSE** have developed therapeutic optical devices that slow myopia progression in school children. The patented Defocus Incorporated Soft Contact (DISC) lens and Defocus Incorporated Multiple Segments (DIMS) spectacle lens use a myopic-defocus method based on the eye's natural homeostatic mechanisms. This method produces a clear image on the retina while simultaneously creating a defocused image in front of the retina, enabling clear vision and helping to control myopia progression. Clinical trials have demonstrated that these lenses can slow myopia progression by up to 60%.

Interdisciplinary collaboration has driven prompt knowledge translation and generated significant societal impact. Institutions associated with the School, including the State Key Laboratory of Ultra-precision Machining Technology (SKL-UPMT), PolyU-Nanjing Technology and Innovation Research Institute, PolyU-Wuhan Technology and Innovation Research Institute, Research Centre for SHARP Vision (RCSV) and Centre for Eye and Vision Research (CEVR), all approach optometry problems with multidisciplinary input. For example, Professor LAM, Professor TO and Professor TSE developed the groundbreaking Nano Multi-ring Defocus Incorporated Spectacle Lens in collaboration with SKL-UPMT and one of its supported start-ups, Vision Science and Technology Co. Ltd. The research team translated DISC contact lens technology to spectacle lens production. The new spectacle lens provides added comfort and more stable vision, and its non-invasive design is well suited for children across different ages.

These devices, based on myopic-defocus technology, have been successfully commercialised and are now in use in Hong Kong and worldwide. From 2020 to 2024, the technology reached approximately 6.4 million users and is estimated to have reduced the risk of ocular complications in about 121,600 individuals.

Among the AI-powered innovations, "Seeing the Invisible: Generating Non-invasive Angiography as an Alternative to Invasive Retinal Examinations", a groundbreaking project led by **Professor Ming-guang HE**, Director of Research Centre for SHARP Vision (RCSV), Chair Professor of Experimental Ophthalmology, and **Dr Dan-li SHI**, Research Assistant Professor of the School, transforms the landscape of retinal imaging through artificial intelligence. Eliminating the need for contrast agents and specialised imaging equipment, its impact is especially profound in expanding access to diabetic retinopathy and retinal vascular screening in remote or underserved communities.

The School of Optometry and the Department of Computing also joined forces and used AI to improve accessibility for optometry examinations. STARS, a Smartphone AI Refraction System, was designed by RCSV members **Professor Chi-wai DO** and **Professor Grace NGAI**, Associate Professors of the School of Optometry and the Department of Computing respectively to provide early detection and simplified monitoring of myopia, lazy eye risks and strabismus for children. Building on more than 30,000 real-life clinical eye profiles, STARS transforms eye tests – from using bulky instruments to mobile phones. With an integrated, user-friendly, and multi-lingual interface, STARS brings affordable and accessible vision screening to underserved communities, especially those in rural and remote areas.[52]

52 STARS: Smartphone AI Refraction System, https://www.polyu.edu.hk/kteo/knowledge-transfer/innovations-and-technologies/technology-search/award-winning/a202504_26/

3.4 BIOMEDICAL ENGINEERING AND REHABILITATION SCIENCES

PolyU's integration of engineering expertise in medical research and application is further reflected by work in biomedical engineering and rehabilitation sciences. Through dedicated efforts to address technical challenges in the biomedical context, Departments of Biomedical Engineering, Health Technology and Informatics, and Rehabilitation Sciences have collaborated to influence research and development in health promotion, health assessment, medical diagnosis, medical and surgical interventions, and rehabilitation.

Their collaborative efforts have played a pivotal role in several key inventions in rehabilitation engineering, prosthetics and orthotics, and medical imaging, positioning PolyU as a regional leader in advancing human health and well-being.

Scholarly output and impact

The continuous effort in driving research excellence has led to a 91% increase in the number of PolyU publications in the biomedical engineering field between 2020 and 2024. There has also been an 86% increase in global biomedical engineering publications that are affiliated with PolyU (Figure 42). The sharp increase experienced between 2022 and 2023 surpassed the growth rate for Hong Kong, APAC and globally, where PolyU continues to grow quickly in biomedical engineering, while APAC and the world both experienced a decrease in growth rate between 2022-2024 (Figure 43).

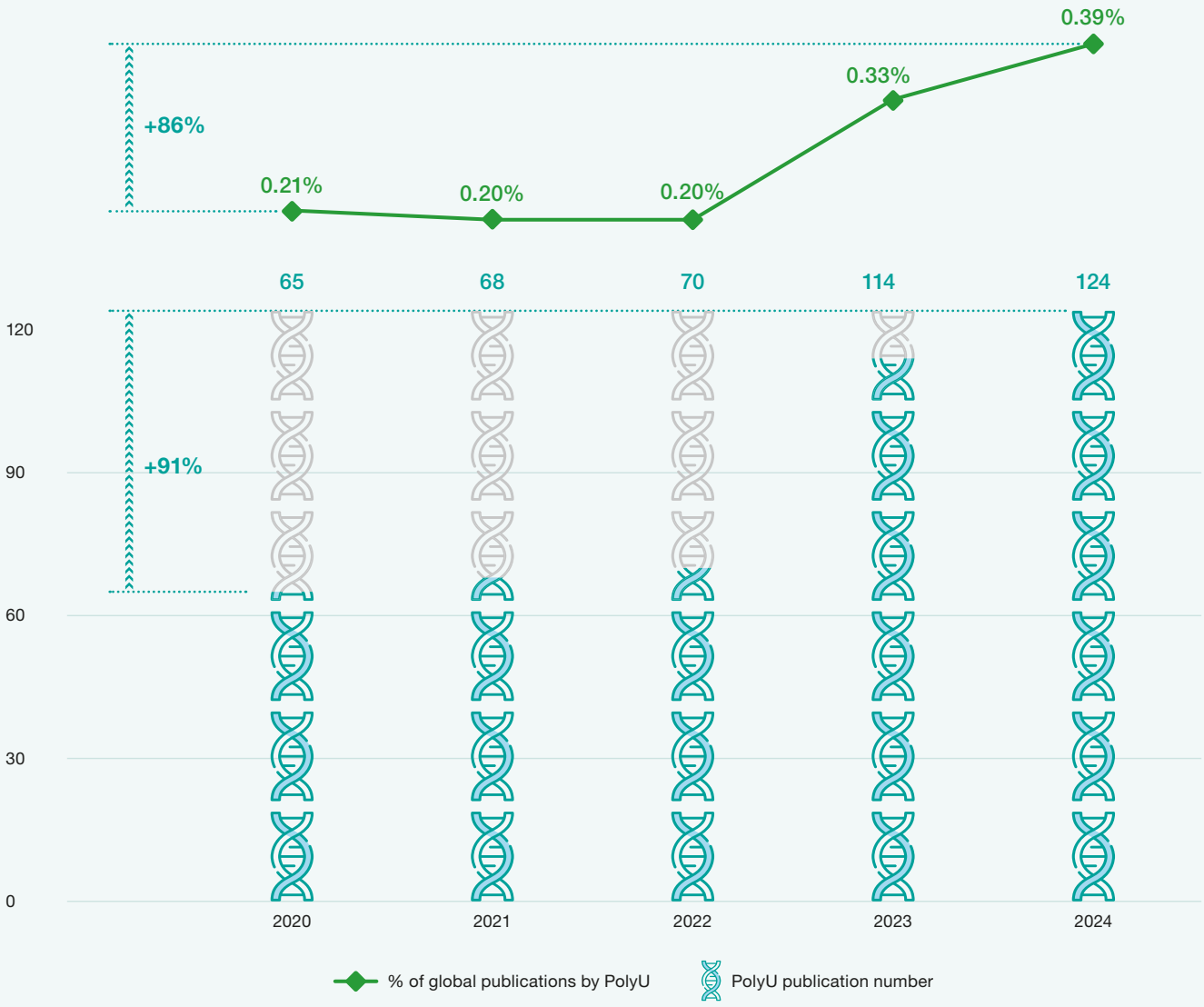


Figure 42. PolyU publications trends in biomedical engineering

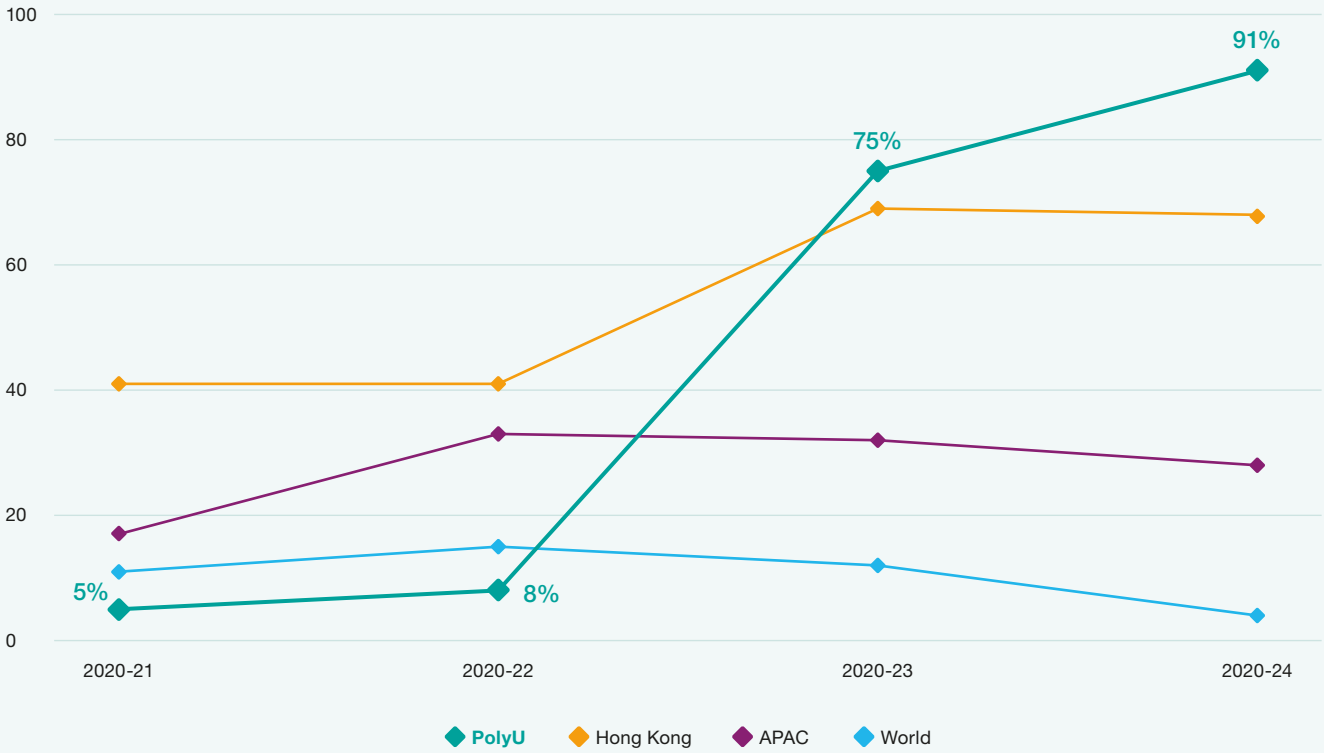


Figure 43. Cumulative growth of publications in biomedical engineering: PolyU, Hong Kong, APAC, and world

During the same period, PolyU's publications in rehabilitation sciences had a sharp rise in CNCI, doubling the world average in 2024 (Figure 44). Although the number of publications only experienced a modest increase of 13% (Figure 45), the significant increase in CNCI demonstrates the impact of the work in the field globally.

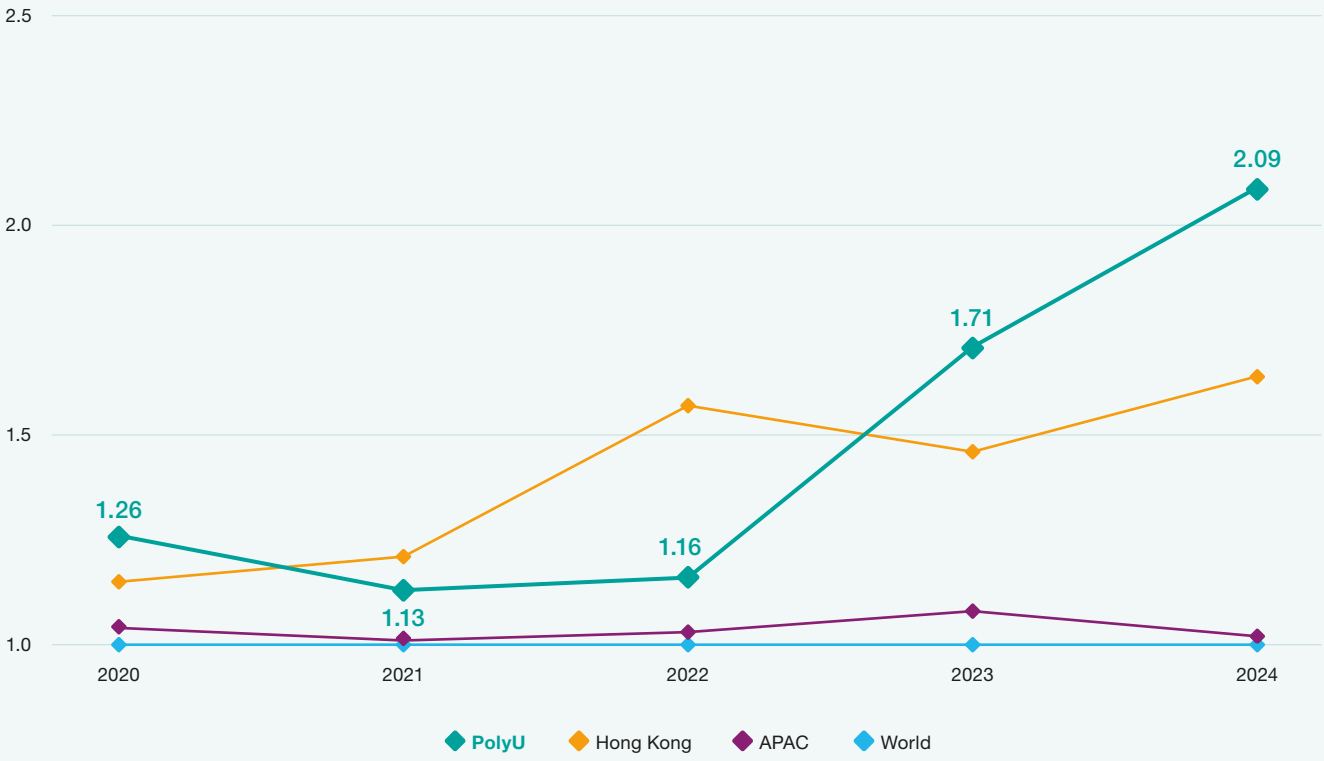


Figure 44. Category Normalized Citation Impact for publications in rehabilitation sciences: PolyU, Hong Kong, APAC, and world

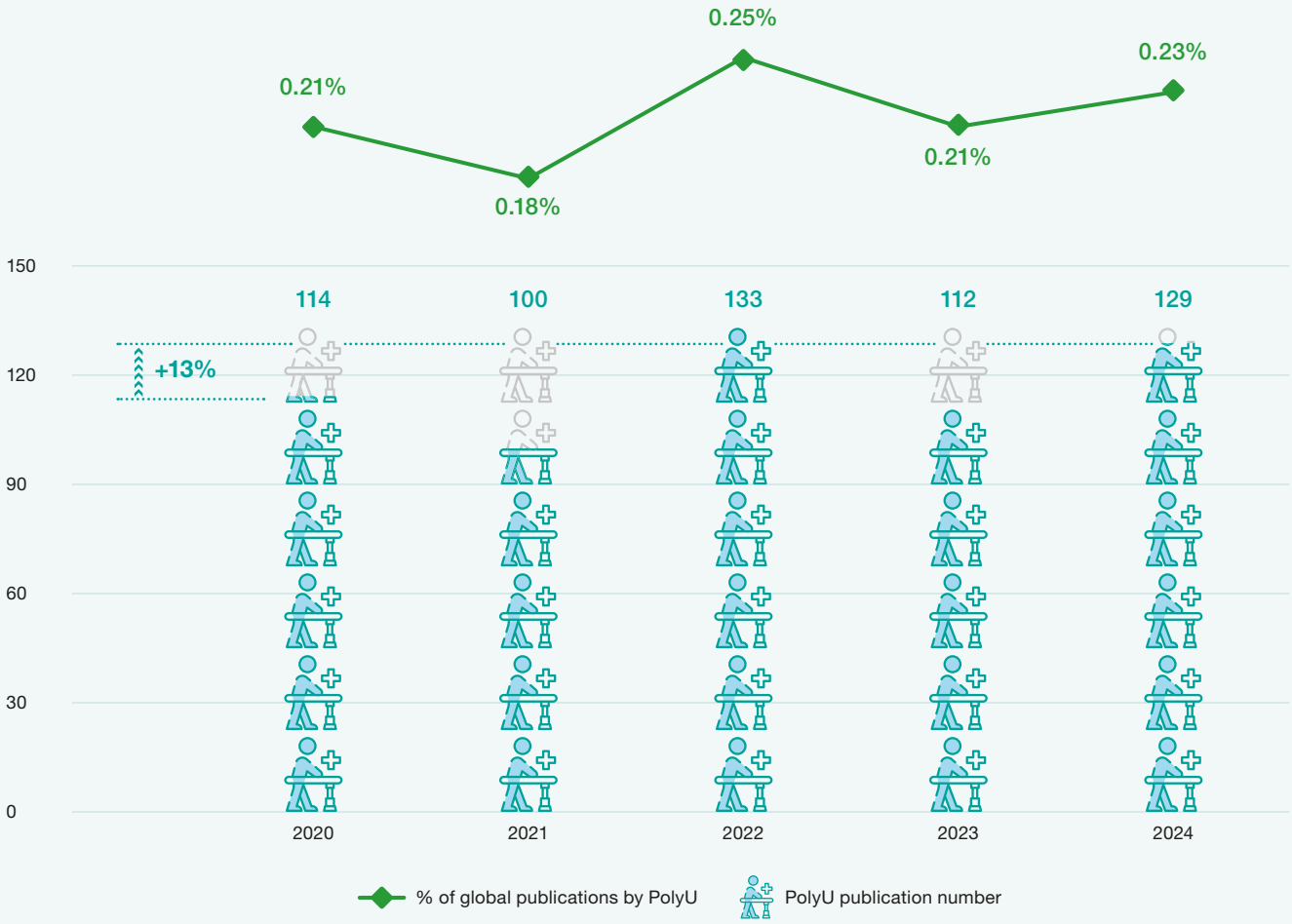


Figure 45. PolyU publication trends in rehabilitation sciences

Top scholars

Interdisciplinary effort is key to many medical research breakthroughs. **Professor An-qi QIU**, Director of the Mental Health Research Centre (MHRC), and Professor of the Department of Health Technology and Informatics, was recently recognised as one of the Top 50 Asia Women Tech Leaders 2025 for her interdisciplinary work.[53] Professor QIU's groundbreaking innovations utilise advanced neuroimaging, biomedical engineering and computational techniques to advance research in multiple areas. Her recent discovery of early brain development introduced critical reform in prenatal mental health screening. Her other influential work includes setting new field standards for MRI safety among paediatric patients using non-invasive imaging methods and uncovering the impact of obesity on cognitive health. Being an inspiring female STEM scholar, Professor QIU continues to empower the next generation of female STEM researchers.

Societal impact

Driving innovation to solve health problems with cutting-edge engineering technologies, **Ir Professor Yong-ping ZHENG**, Director of the Research Institute for Smart Ageing (RISA) and Chair Professor of the Department of Biomedical Engineering, received the Most Active Patents Filing Award in 2023.[54] Professor ZHENG's research focuses on diagnostic technologies. The radiation-free system, Scolioscan®, is a 3D ultrasound imaging technology for diagnosing Adolescent Idiopathic Scoliosis. Unlike traditional X-ray methods, this system utilises 3D ultrasound imaging to assess the lateral and rotational angles of the spine, allowing for frequent, safe and mobile monitoring – especially beneficial for children and adolescents. This device also leverages AI algorithms to improve accuracy of measurement and efficiency of diagnosis. Its portability and real-time imaging capabilities make it ideal for both clinical and community-based screening. The technology has earned multiple international accolades and is now successfully

53 PolyU scholar honoured among Top 50 Asia Women Tech Leaders 2025 for advancing mental health and brain research, https://www.polyu.edu.hk/rio/news/2025/20250519---polyu-scholar-honoured-among-top-50-asia-women-tech-leaders-2025/

54 PolyU BME and Ir Professor Yongping ZHENG receive PolyU Patents Achievement Award 2023 as Department and Inventor respectively, https://www.polyu.edu.hk/bme/news-and-events/news/2024/patent-award-2023/

commercialised and being adopted clinically worldwide. With the success of Scolioscan®, Professor ZHENG has developed Liverscan®, which uses AI technology to non-invasively assess multiple chronic hepatic diseases. This device has received approval from the U.S. Food and Drug Administration (FDA) and China's National Medical Products Administration (NMPA) and is currently being adopted in multiple clinical settings.

Interdisciplinary integration has also led to many other notable innovations. Among them, the Mobile Ankle-foot Exoneuromusculoskeleton, a wearable robotic device designed by **Professor Xiao-ling HU** of the Department of Biomedical Engineering, in collaboration with the Department of Computing and the School of Fashion and Textiles, earned the Consumer Electronics Show 2025 Innovation Award.[55] This device supports long-term home-based rehabilitation for stroke survivors to regain lower limb function. Sensory feedback, electric stimulation and the built-in incentive schemes can significantly reduce patients' reliance on in-person training, offering flexibility and cost efficiency.

Alongside its initiatives attracting international acclaim, PolyU develops solutions addressing pressing local challenges. **Professor Gilman Kit-hang SIU**, Associate Head of the Department of Health Technology and Informatics, and his team played a pivotal role in Hong Kong's response to the COVID-19 pandemic. A rapid whole-genome sequencing platform developed by the team enabled the sequencing of over 20,000 COVID-19 cases to track SARS-CoV-2 transmission in real-time. This platform was instrumental in identifying hidden transmission links, tracking sources of community and hospital outbreaks, and confirming that asymptomatic carriers could drive the spread of the disease. It also uncovered Hong Kong's first local Delta variant case, tracing its origin to inbound travellers. Their real-time genomic insights directly influenced public health policy, including the implementation of designated quarantine hotels in December 2020. In addition to surveillance, Professor SIU's lab delivered on-site training at public hospitals, sharing sequencing protocols and bioinformatics tools. This enabled earlier diagnosis of acute invasive infections and allowed clinicians to initiate targeted antibiotic treatments a full day faster than when relying on traditional methods. His contributions not only helped contain the local spread of COVID-19 but also provided critical scientific support for Hong Kong's broader anti-pandemic strategy. In recognition, he was named a Limin Endowed Young Scholar in Medical Laboratory Science and received the Outstanding Project Team Award for COVID-19 Research.[56]

To address the increasing challenge presented by an ageing population, **Professor Xue BAI** of the Department of Applied Social Sciences, led a research team within the Research Centre for Gerontology and Family Studies (RCGFS) and developed a later-life planning intervention. Professor BAI's research revealed a significant lack of preparedness among older adults in Hong Kong, driven by fear, insecurity and low motivation to plan for ageing-related transitions. In response, her team designed evidence-based programmes, including motivational interviewing and intergenerational education, that have now been implemented in over 40 community centres across the city. This has reduced the risk of isolation, financial hardship and inadequate care amongst the elderly, while enhancing preparedness and quality of life for approximately 24,800 ageing families. The work has shaped public policy and sparked citywide dialogue on ageing, inspiring families and younger generations to take a proactive role in later-life preparation.

By turning research into practical and inclusive solutions, PolyU continues to create a positive impact across and beyond Hong Kong. These achievements reflect PolyU's commitment to transforming pioneering research into meaningful societal outcomes.

55 PolyU-invented Mobile Ankle-foot Exoneuromusculoskeleton wins CES 2025 Innovation Award in US, https://www.polyu.edu.hk/pair/news-and-events/news/2025/20250108-polyu-invented-mobile-ankle-foot-exoneuromusculoskeleton-wins-ces-2025/

56 Professor Gilman SIU bestowed with Outstanding PolyU Young Alumni Award 2022 in Scholarly Achievement, https://www.polyu.edu.hk/fhss/news-and-events/news-and-events/2022/20221031/

3.5 NURSING

Global ranking

Established in 1977, PolyU's School of Nursing was one of the first institutions in Hong Kong to offer nursing programmes. Recognising the need to provide education and career development opportunities, PolyU became the first institution in Hong Kong to offer comprehensive tertiary-level nursing education in 1990. Since then, the School has firmly established itself as a global leader in nursing education and research. In the **QS World University Rankings by Subject 2025, PolyU ranked 16th globally in Nursing, up from 31st in 2024.**[57] **This places PolyU as the second best nursing school in Hong Kong and third best in Asia**. This upward trajectory reflects its growing international influence and academic excellence. Complementing this success, **the School also ranked 19th globally in Nursing in the ShanghaiRanking's Global Ranking of Academic Subjects 2025**,[58] placing it among the Top 20 nursing schools worldwide and one of only three institutions in Asia to earn this distinction.

Scholarly output and impact

This global recognition is largely attributable to the School's strength in high-impact research, digital health innovation and interdisciplinary collaboration. Between 2020 and 2024, the School achieved a 52% increase in the number of publications in nursing. This surpasses the global growth rate for publications in this area, giving PolyU an over 31% increase in its global share (Figure 46).

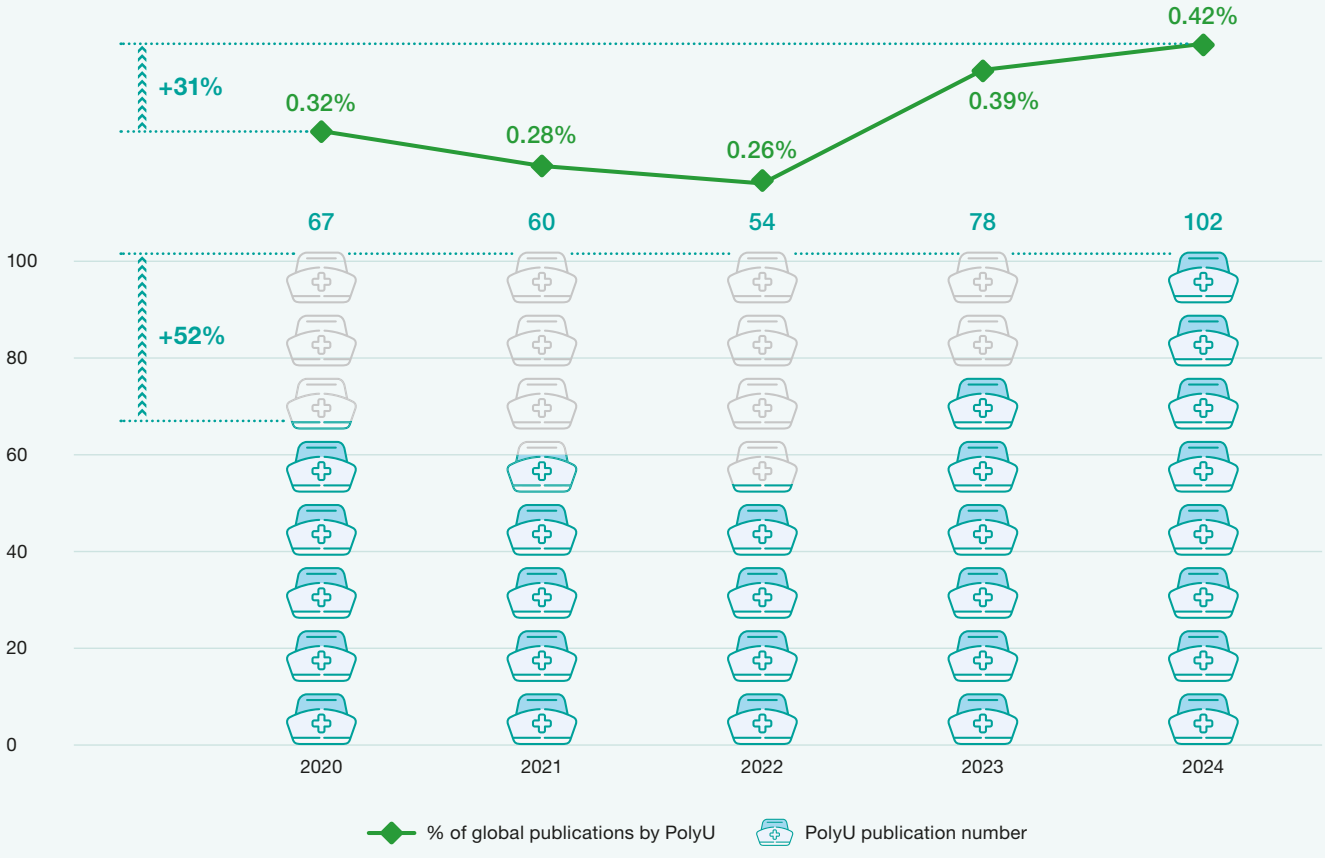


Figure 46. PolyU publication trends in nursing

Top scholars

The School hosts a diverse community of leading researchers whose work shapes healthcare policy, clinical practice and community well-being, both locally and globally. These scholars conduct research in critical areas, including mental health, ageing, chronic disease management and health systems innovation.

Among them, **Professor Teris Cheuk-chi CHEUNG**, Assistant Professor, who was recognised by the Clarivate Highly Cited Researchers 2024 list — an honour reserved for scholars whose work ranks in the Top 1% worldwide by citations. With over 200 publications and over 9,000 citations, this recognition reflects her influential contributions to mental health research, particularly in areas that include depression, psychosocial well-being and youth mental health. Professor CHEUNG exemplifies the School's commitment to evidence-based excellence and meaningful societal impact. Her research continues to inform health practices and policy, reinforcing PolyU's role as a regional leader in nursing and health sciences innovation.

57 QS World University Rankings by Subject 2025: Nursing, https://www.topuniversities.com/university-subject-rankings/nursing
58 ShanghaiRanking's Global Ranking of Academic Subjects 2025: Nursing, https://www.shanghairanking.com/rankings/gras/2025/AS0404

Societal impact

The School's vision in integrating technology, evidence-based practice and community relevance to create meaningful health outcomes, especially for ageing populations and cancer care, forms the foundation for many of its projects. Notable examples of these include the Immersive Virtual Reality (IVR) Motor-Cognitive Training System, developed by **Professor Justina Yat-wa LIU**, Associate Head of the School, which uses interactive virtual reality exercises to enhance physical and cognitive function in older adults.[59] Commercialised and adopted by local elderly service providers, it represents a model of successful research-to-practice translation.

The School's patient-centred approach and technology focus are also exemplified in a cancer care innovation led by **Professor Janelle YORKE**, Chair Professor and Head of the School. The invention introduced the electronic Patient-Reported Outcome Measures (ePROMs) in clinical settings. This digital tool captures patients' symptoms in real-time and improves clinician-patient communication, enabling more personalised, responsive care.[60] These people-centric innovations have impacted thousands of lives across Hong Kong, reinforcing the School's leadership in driving a healthier, more connected society.

In addition to its contributions to health innovation, PolyU makes significant contributions to social equity and family well-being. **Professor Edward Ko-ling CHAN**, RGC Senior Research Fellow and Chair Professor of Child and Family Welfare of the Department of Applied Social Sciences, led groundbreaking research on Family Polyvictimisation that has reshaped how family violence is identified and addressed in Hong Kong and the Chinese Mainland. His team developed whole-family risk assessment tools, now deployed across three Po Leung Kuk refuges for victims of family violence, enabling early prevention and strengthening risk assessment and case management for more than 9,000 women and children. Since 2022, Professor CHAN has trained over 1,500 health and social services practitioners in Shanghai, Zhengzhou, Sanya, Changsha and Qingdao, accelerating frontline adoption and impact.

Commissioned by the Labour and Welfare Bureau of the Government of the HKSAR, Professor CHAN also led a pivotal evaluation of the Child Development Fund. His evidence-based recommendations prompted increased government investment, expanding coverage to 10% of children from low-income families with enhanced financial assistance and supportive infrastructure to promote their development and safety.

Together, these initiatives illustrate how PolyU is not only advancing global standards in research and education but also delivering transformative, evidence-based solutions that address the real needs of the local community.

With its commitment to societal well-being, PolyU has developed meaningful healthcare solutions at both the individual and policy levels. PolyU will continue to shape the future of healthcare by integrating advanced computer science and artificial intelligence into medical research.

59 IVR Motor-Cognitive Training System is commercialised, https://www.polyu.edu.hk/sn/news-and-events/features/2024/20241105/

60 Transforming nursing education through digital healthcare integration, https://www.polyu.edu.hk/publications/pulse-polyu/issue/202502/research-knowledge-transfer/transforming-nursing-education-through-digital-healthcare-integration

CHAPTER

04

UNIQUE DISCIPLINES: HOTEL AND TOURISM MANAGEMENT, FASHION AND TEXTILES, AND DESIGN

CHAPTER 4

UNIQUE DISCIPLINES: HOTEL AND TOURISM MANAGEMENT, FASHION AND TEXTILES, AND DESIGN

Fusing creativity with industrial innovation, PolyU has achieved a profound impact in many unique disciplines over the years. The globally acclaimed School of Hotel and Tourism Management has developed tourism management tools that guide policy development. The School of Fashion and Textiles has developed smart wearables to improve care for the elderly, and the School of Design has supported community rebuilding towards a more sustainable future. These achievements reflect PolyU's inclusive research, which delivers a meaningful impact across diverse communities.

4.1 HOTEL AND TOURISM MANAGEMENT

Global ranking

Founded in 1979, PolyU's School of Hotel and Tourism Management has grown into one of Asia's largest institutions in its field and consistently ranks among the world's leading hospitality and tourism schools. With a strong international team, the School is now a global centre of excellence in hospitality and tourism education and research. This exceptional achievement has been recognised in global ranking evaluations. **PolyU ranked first globally in Hospitality and Tourism Management in the ShanghaiRanking's Global Ranking of Academic Subjects 2025,[61] and ranked 11th in Hospitality and Leisure Management in the QS World University Rankings by Subject 2025.[62]** Among the approximately 100 faculty members in the School, 14 have achieved the Top 1% citation rate among their global peers in the Social Sciences category of the Essential Science Indicators (ESI).

Scholarly output and impact

Between 2020 and 2024, PolyU ranked second globally by publication volume in the field of hospitality and tourism. During this period, PolyU accounted for around 80% of all Hong Kong publications in this research area (Figure 47), demonstrating its leadership locally and internationally.

Beyond ranking second in publication volume in this field, PolyU led all institutions in the number of papers placed in the global Top 1% and Top 10%. In 2021, PolyU contributed to 8.5% of the world's Top 1% publications in the field of hospitality and tourism. Between 2020 and 2024, while the industry experienced a decline in research output, PolyU maintained a high number of publications in the Top 10%, further strengthening its global presence in high-quality research (Figure 48). With high recognition from peers, PolyU's publications in hospitality and tourism received the highest number of citations in the field during this period.

61 ShanghaiRanking's Global Ranking of Academic Subjects 2025, https://www.shanghairanking.com/institution/the-hong-kong-polytechnic-university
62 QS World University Rankings by Subject 2025: Hospitality & Leisure Management, https://www.topuniversities.com/university-subject-rankings/hospitality-leisure-management

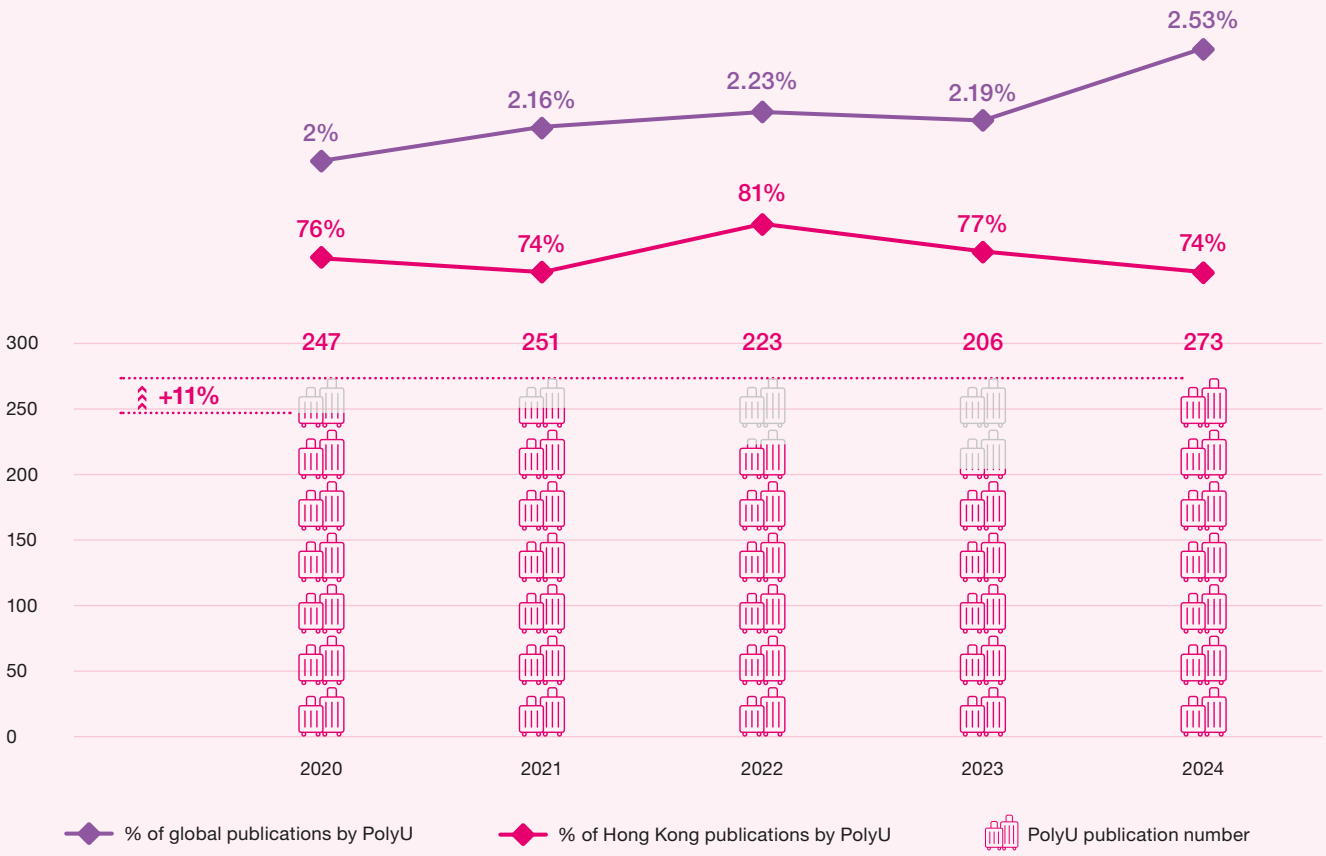


Figure 47. PolyU publication trends in hospitality and tourism

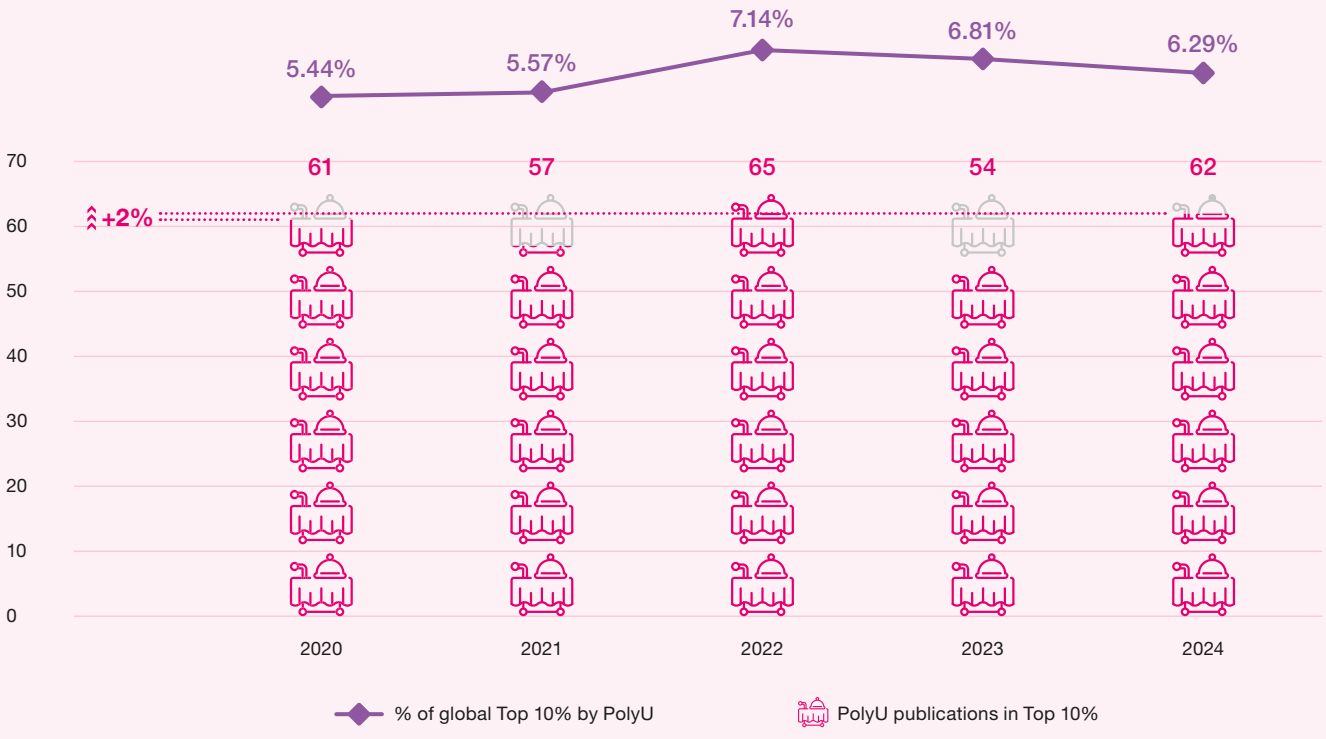


Figure 48. PolyU Top 10% publications in hospitality and tourism

Societal impact

PolyU has established itself as a leading centre of excellence in hospitality and tourism through innovative teaching and real-world research. Hotel ICON, the world's first fully integrated teaching and research hotel, was built for the School of Hotel and Tourism Management in 2011. The Hotel enables PolyU to conduct in-depth research into the application of advanced concepts in hotel management, including the incorporation of sustainability innovations and digital transformations, for a more dynamic hospitality environment. The Hotel's focus on sustainable operations has also attracted multidisciplinary talent from PolyU, including professionals in the built environment and computer science, to advance practical solutions for smart tourism.

In addition to Hotel ICON, the School also hosts two research centres that lead innovative development: the Hospitality and Tourism Research Centre (HTRC) and the Research Centre for Digital Transformation of Tourism (RCDTT).

Researchers from HTRC have developed several initiatives that improve tourism policy planning and management. Among them, **Professor Cathy Hui-chun HSU**, Chair Professor in the School, who achieved the Top 1% citation globally in the Social Sciences category of the Essential Science Indicators, led the development of TOUROMETER, a dynamic social listening-based platform that measures residents' sentiment towards visitors and tourism development, and visitors' sentiment towards tourism destinations and businesses. This AI-empowered policy and strategy decision-support system can monitor public opinions in a timely and continuous manner. Balancing the interests of residents and tourists, TOUROMETER not only provides critical insights that inform tourism policymaking, but also actively engages the public in sustainable tourism development. TOUROMETER has been recognised by the United Nations World Tourism Organization as an asset to tourism policy planning and management by offering social dynamic intelligence to facilitate decision making, and has been adopted by an international hotel brand, the Chinese Mainland theme park group and a Middle Eastern governmental agency. The analytical methods developed outperform generic large language models and start-of-the-art generative AI tools in more accurately measuring public sentiment.

Leveraging Hong Kong's technological and geographical advantages, **Professor Hai-yan SONG**, Chair Professor and Associate Dean in the School, Director of RCDTT, leads the Centre's interdisciplinary research team with the aim of accelerating the integration of technology in tourism and co-developing feasible smart tourism solutions with industry partners. Recently, RCDTT launched a large language model-based Hong Kong Tourist Satisfaction Index (TSI), which can accurately evaluate Hong Kong's performance and competitiveness as an international tourist destination compared to other regions. The TSIs compiled by the research team will inform Hong Kong's strategic improvement and enhance its overall competitiveness.

Professor SONG also led an interdisciplinary team comprising members from the fields of tourism, economics and computer science, in the development of a digital platform that can enhance the accuracy of tourism demand forecasting. This development was in response to unpredictable events such as the COVID-19 pandemic, where the lack of real data meant traditional forecast models struggled to remain accurate. Using advanced techniques such as scenario forecasting, bagging, forecast combination methods and integration with high-frequency big data sources, the Automated and Self-Adaptive Tourism Demand Forecasting Platform for the Greater Bay Area significantly enhances the adaptability, robustness and accuracy of forecasts. More accurate prediction also informs better recovery planning.

4.2 FASHION AND TEXTILES

PolyU was the first institution in Hong Kong to offer post-secondary education in textiles in 1957. As technology becomes increasingly embedded in everyday life, wearable textiles offer a seamless way to integrate technology into what we wear, with diverse applications in fitness, healthcare, and safety. With nearly 70 years of history, the School of Fashion and Textiles leads the industry, building on its innovative breakthroughs and PolyU's interdisciplinary expertise.

Scholarly output and impact

Between 2020 and 2024, PolyU achieved a 32% increase in the number of publications in textile science, while the research area globally saw a 17% decrease in publications. This resulted in a 59% increase in PolyU's share of global publications in textile science. In 2024, over 90% of Hong Kong's publications in textiles were affiliated with PolyU, highlighting its dominance in the local research landscape (Figure 49).

PolyU's consistent research output in textile science is also reflected in the number of its Top 10% publications. Between 2020 and 2024, it gained a 171% increase in the share of global Top 10% publications in textile science, with up to 80% of Hong Kong's Top 10% publications in this field being affiliated with PolyU during this period (Figure 50).

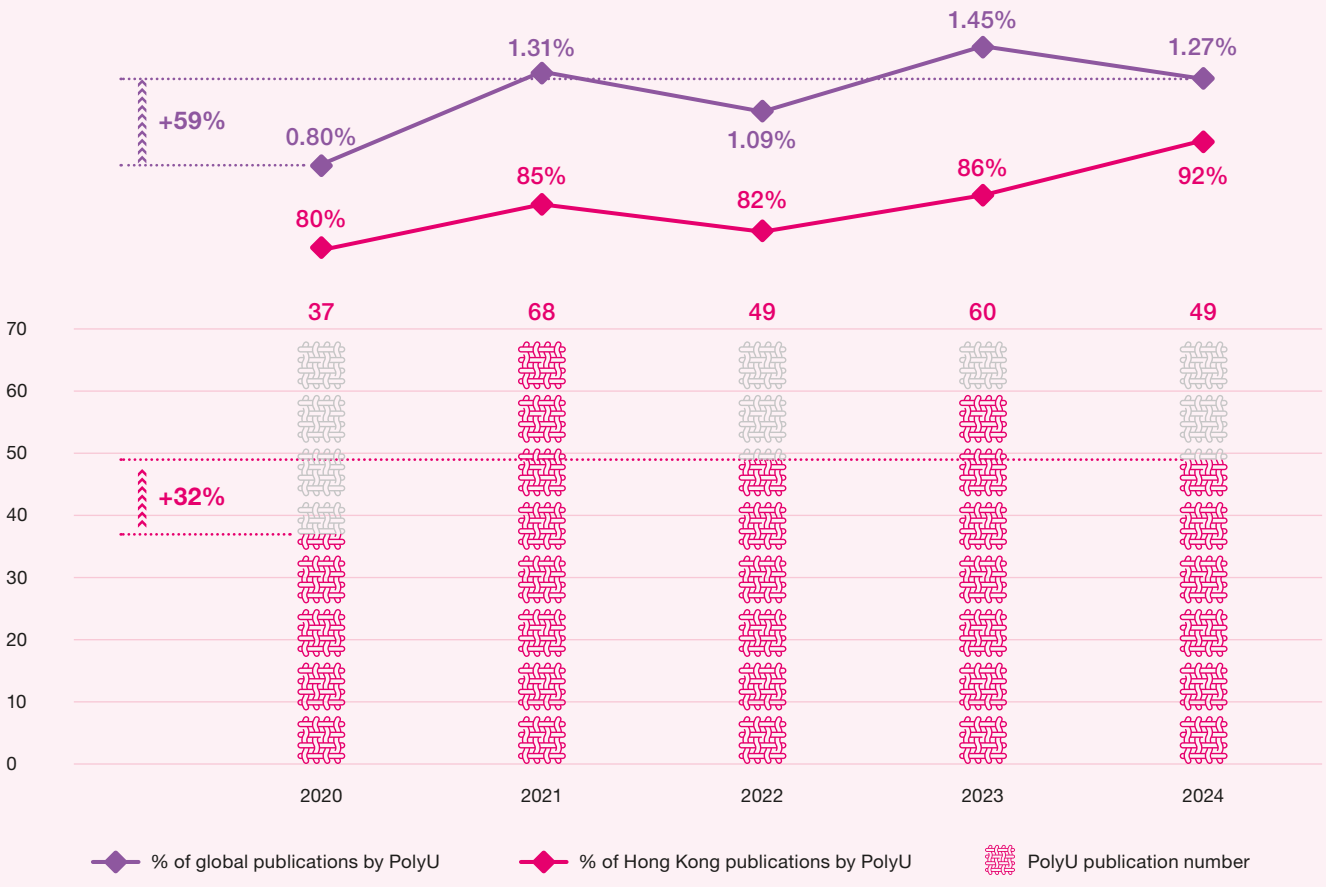


Figure 49. PolyU publication trends in textile science

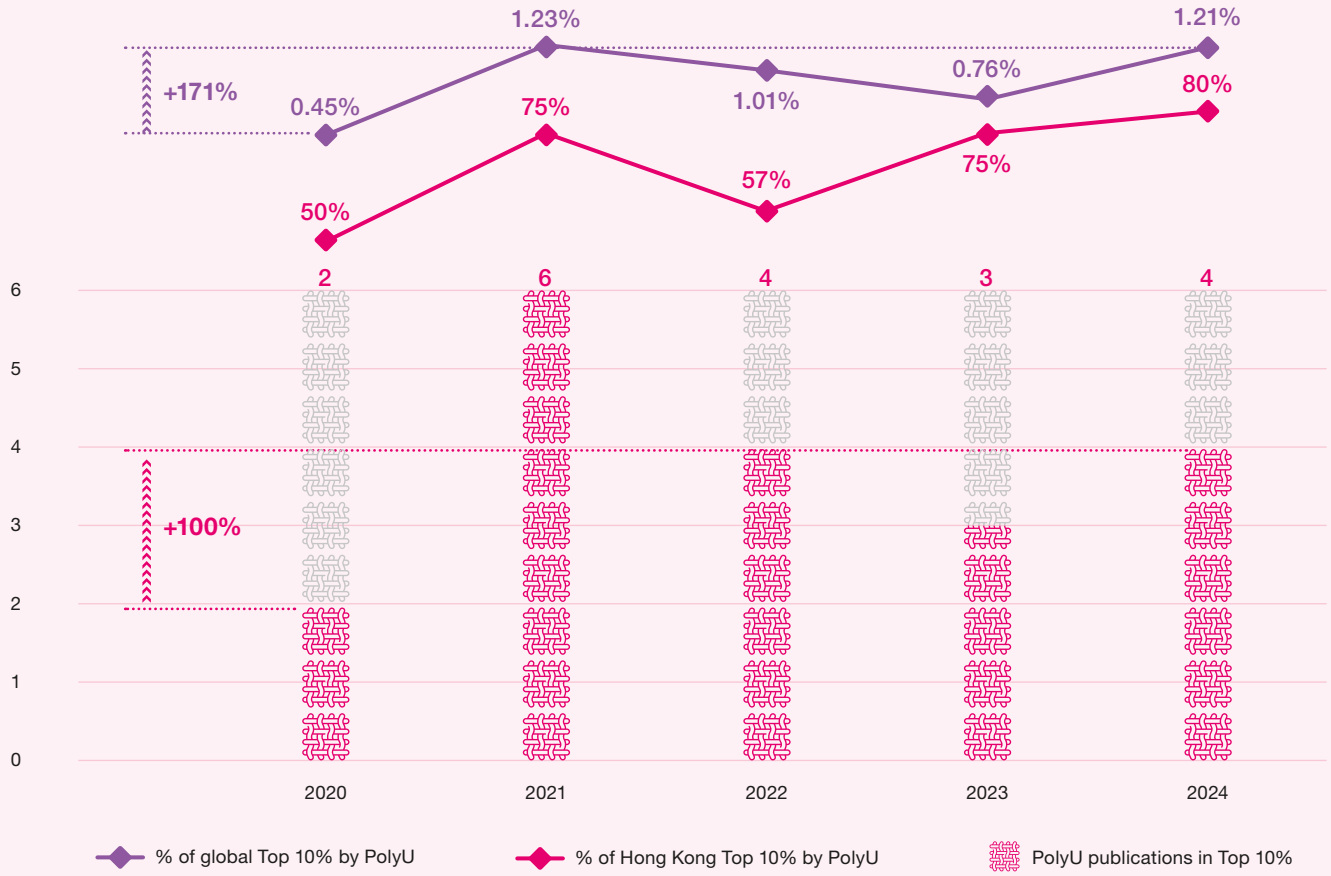


Figure 50. PolyU Top 10% publications in textile science

Societal impact

The Research Centre of Textiles for Future Fashion's (RCTFF) multidisciplinary integration with PolyU's expertise in engineering is at the core of its success in textile science. In the fitness sector, the RCTFF research team, led by **Professor Da-hua SHOU**, Associate Professor, has developed iActive™, an electrically activated sportswear that can be programmed to remove sweat to a dissipater located in the lower area of the sportswear. This enhances an athlete's performance by reducing discomfort caused by sweat accumulation.[63]

Between 2020 and 2024, PolyU was granted 22 patents in textile science. Among the many notable innovations, textile-based electrodes and sensing materials developed by **Professor Xiao-ming TAO**, Chair Professor of Textile Technology, and her team have generated a profound economic impact. Two start-ups were created based on this technology, and two other companies launched flagship products.

Leveraging PolyU's leading expertise in engineering, computing, materials science, textiles and occupational health and safety, Professor TAO, led the establishment of the Research Institute for Intelligent Wearable Systems (RI-IWEAR) in 2021. RI-IWEAR has become a leading research institution through its interdisciplinary research. In 2022, Professor TAO led work leading to a groundbreaking design of a novel intelligent wearable system that could help people with Parkinson's disease overcome Freezing of Gait, a leading cause of falls and disability in this population. The wearable system is powered by a novel pressure-sensing technology, which

63 Dr SHOU Dahua develops intelligent activewear for a dry and comfortable experience, https://www.polyu.edu.hk/sft/news-and-events/news/2024/0715-dr-shou-develops-intelligent-activewear-for-a-dry-and-comfortable-experience/

allows accurate and timely detection of gait initiation.[64] Her passion in applying intelligent wearables for rehabilitation has further led to the new development of COOLWEAR. The device is a first-of-its-kind wearable system with rapid contrast-temperature therapy for the recovery of elite athletes, which also has the potential to be used more widely in rehabilitation for conditions beyond those experienced by elite athletes. To recognise her research excellence, Professor TAO was elected a Fellow of the 2025 Hong Kong Academy of Engineering for her innovation and leadership in integrating engineering solutions in wearables.[65]

Professor Zi-jian ZHENG, Associate Director of RI-IWEAR, Chair Professor of Soft Materials and Devices of the Department of Applied Biology and Chemical Technology, is another prominent researcher whose research has revolutionised soft electronics for wearable and implantable electronic applications. One of his inventions, the "ICU-Grade Wireless Breathable Cardiac Electronic Skin", won the Semi-Grand Prize and Gold Medal at the 2024 Silicon Valley International Inventions Festival.[66] This invention will revolutionise cardiac monitoring for patients in intensive care by significantly reducing the risk of infections and improving comfort. To further advance soft electronics and its related energy storage, Professor ZHENG led the project "Pilot and Mass Production of Next-Generation Composite Current Collectors for Mobility and Energy Storage Batteries (New Materials and New Energy)", which was one of the first batch of awardees for the prestigious RAISe+ funding scheme in 2024.[67]

4.3 DESIGN

Global ranking

Initially established in the 1960s as a part-time evening course, the School of Design (PolyU Design) has nurtured and empowered thousands of design graduates over six decades. Recently, **PolyU Design ranked 22nd globally in Art and Design in the QS World University Rankings by Subject 2025**.[68]

Scholarly output and impact

Between 2020 and 2024, PolyU ranked third among APAC universities by publication volume in the research area of art, first in Asia. At the same time, PolyU publications achieved a Category Normalized Citation Impact of 1.77, which is 77% higher than the global average of 1, highlighting PolyU's combination of research output and quality (Figure 51).

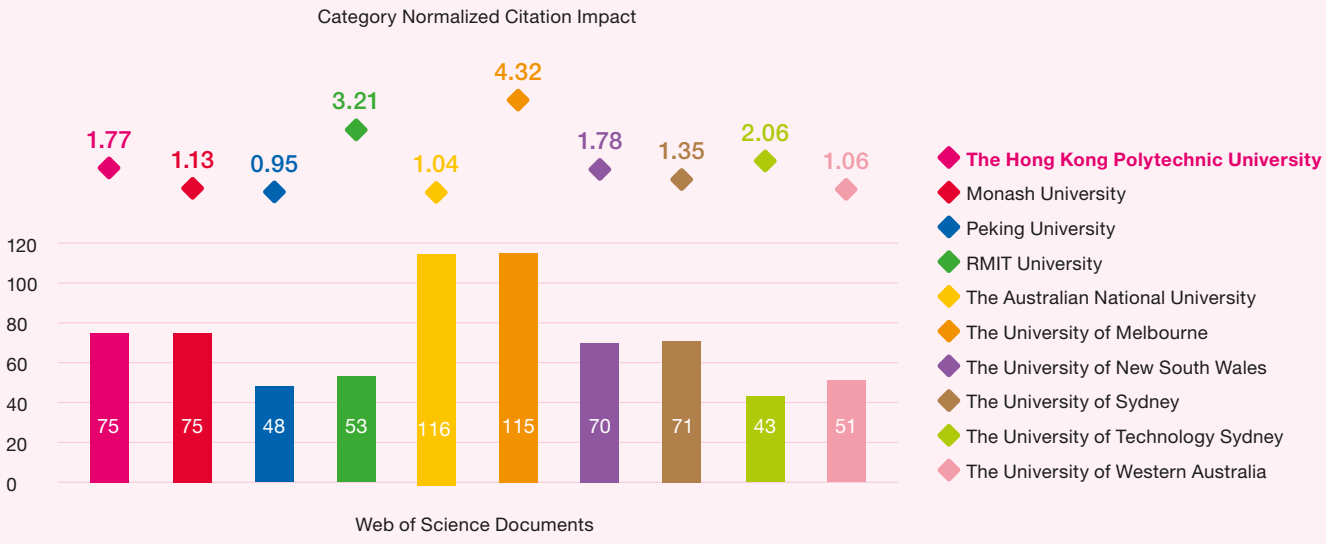


Figure 51. Number of art publications: Top 10 APAC institutions and their Category Normalized Citation Impact (2020 - 2024)

64 Novel Intelligent Wearable System improves mobility for Parkinson's Disease patients, https://www.polyu.edu.hk/publications/excelximpact/issue/202212/interdisciplinary-research/novel-intelligent-wearable-system-improves-mobility-for-parkinson-s-disease-patients?

65 Professor TAO Xiao-ming elected as 2025 HKAE Fellows, https://www.polyu.edu.hk/sft/news-and-events/news/2025/0121-hkae-fellows/

66 PolyU Science Scholars garnered five awards at Silicon Valley International Inventions Festival 2024, https://www.polyu.edu.hk/fs/news-and-events/polyu-science-in-the-news/2024/polyu-science-scholars-garnered-five-awards/

67 Professor Zijian ZHENG's project receives funding from RAISe+ Scheme, https://www.polyu.edu.hk/rise/news-and-events/news/2024/prof-zijian-zheng_raise/

68 QS World University Rankings by Subject 2025: Art and Design, https://www.topuniversities.com/university-subject-rankings/art-design?search=hong

Societal impact

Building on PolyU's expertise in STEM subjects, the Research Centre for Future (Caring) Mobility embodies the University's vision of integrating STEM with art and design for an innovative approach to addressing real-world challenges. Collaborating with leading industry partners, including Huawei and electric vehicle manufacturers, the Centre's interdisciplinary team, comprising researchers from computer science, rehabilitation sciences and design, is developing life-changing innovations, such as virtual reality support for elderly mobility management.

In 2023, the PolyU-NVIDIA Joint Research Centre was established as a collaborative academia-industry research platform. This collaboration allows PolyU's strong applied research skills to access NVIDIA's most advanced computing resources and world-leading AI technology in innovative designs. Recognising the University's decades-long academic excellence and strong commitment to innovation and interdisciplinarity, in 2025, PolyU became Hong Kong's first tertiary institution to receive funding from the prestigious China National Arts Fund 2025 in the Art Talents Training category. The funded Digital Art Curation Talents Training Programme will be launched by the PolyU Research Centre for Cultural and Art Technology (CAT), with support from the PolyU-NVIDIA Joint Research Centre. This initiative will nurture the next generation of talent in digital art curation and enhance Hong Kong's position as a global leader in blending Eastern and Western art.

To further increase its presence and impact in the Chinese Mainland, two key centres have been established in Beijing: the PolyU Creative Technology Centre (Beijing) and the PolyU Policy Research Centre for Innovation and Technology (PReCIT Beijing). These centres will focus on research collaboration in AI, the metaverse and industry-academic partnerships. PolyU Design also forged a new partnership with the Shanghai International College of Design and Innovation at Tongji University to address global challenges and drive social change through innovation.

PolyU Design has expanded its regional and global influence by undertaking numerous cross-disciplinary projects in engineering and architecture. "Insitu Project", a research platform founded by **Professor Peter HASDELL** is an example of such an interdisciplinary approach. "Insitu Project" has enabled innovative new methods for sustainable community development through the introduction of circular material economies utilising local resources, fostering community capacity building and local economies in several diverse communities. The methodologies developed by "Insitu Project" have been applied in the implementation of 12 village projects across eight provinces in the Chinese Mainland, Hong Kong, and Iraq, including the Miaoxia Community Projects (2015-18), House of Dreams (2018-20), and Habibi Community Centre (2021-22), resulting in the co-design and construction of 16 buildings since 2015.[69] In House of Dreams, an award-winning project that revitalised an abandoned cave settlement in Zhoushan Village in Henan Province, zero-mile materials in the form of local construction material waste were used to rebuild the settlement, mitigating the environmental impacts of construction on communities, and aligning with Sustainable Development Goal 11 – Sustainable Cities and Communities. Community participation significantly enhanced shared community benefits to restore and preserve the local culture.

PolyU has contributed to global development while also positively impacting the Hong Kong community. **Professor Michael Kin-wai SIU**, Chair Professor of Public Design, is the founder and leader of the first Public Design Lab and the Director of the Joint-Research Center for Inclusive Environment of PolyU and Harbin Institute of Technology. Having worked closely with the deprived and persons with special needs, Professor SIU advocates for designing public infrastructures with sustainability and inclusivity. His patented invention FlexiBOL® is a bollard system that can be modified easily to fit different landscapes within public spaces and street environments. FlexiBOL® has been widely adopted by the Highways Department of the Government of the HKSAR.

To address the housing demands in Hong Kong, **Professor Brian Yu-hin LEE**, Associate Professor and Assistant Dean, and **Dr Aria Chien-hui YANG**, former Research Assistant Professor, led a multidisciplinary team and developed the "Well-being Design Guide" for the Housing Bureau and the Hong Kong Housing Authority of the Government of the HKSAR. This Guide combines cross-disciplinary expertise in housing innovation and service innovation. The framework outlined eight key well-being factors that should be considered when developing public housing, including health and vitality, green living and sustainability, age-friendliness, intergenerational and inclusive living, family and community connection, urban integration, upward mobility as well as perception and image.[70] This Project will not only influence public housing policies but will also impact evaluation criteria for vendors bidding on public housing projects.

To combat the increasing mental health challenges experienced by Hong Kong residents, the research team

69 In-situ Project, https://research.polyu.edu.hk/en/activities/in-situ-project-external-organisation

70 PolyU interdisciplinary team's Well-being Design Guide for housing policy makers in Hong Kong, https://www.polyu.edu.hk/sd/news-and-events/news/2024/20241018-polyu-interdisciplinary-teams-well-being-design-guide-for-housing-policy/

led by **Professor Johan F. HOORN**, Interfaculty Full Professor of the School of Design and the Department of Computing, was awarded HKD 40.89 million from the RGC Theme-based Research Scheme for his project "Social Robots with Embedded Large Language Models Releasing Stress among the Hong Kong Population".[71] Professor HOORN holds two PhD degrees, one in General Literature and one in Computer Science. His research interests in emotion, creativity and artificial intelligence have brought PolyU Design and the Department of Computing together. Their social and communicative robot aims to alleviate the pressure on community mental health support. The research team will use localised, cultural and personal data to train the human-like social robot to act as a natural interaction partner, which can provide services to vulnerable local communities in need of mental health support. To enhance the robot's ethical practice, the research team will conduct field research and consultation with users to inform the robot about cultural considerations and taboos relevant to Cantonese culture.

Top scholars

Reflecting the impact of their work, staff from PolyU Design have won many awards for their innovative designs and contributions to advancing design education at PolyU. **Ms Rennie KAN**, the School's Senior Marketing Manager, received the Intrapreneurial Lifetime Achievement Award in 2023 from the Global Intrapreneurs Institute.[72] This marks the first time this award has been presented to a recipient from Hong Kong. The recognition reflects the importance of PolyU Design initiatives.

Further emphasising PolyU's impact and leadership in design, **Professor Stephen Jia WANG's** two inventions – EmoFriends, which monitors stress levels via touch, and the Transparent Knee Guard – won the 2025 iF Design Awards, one of the most prestigious international design awards. Winning these awards required the designs to be among the best out of almost 11,000 submissions from around 66 countries. In addition to the iF Design awards, EmoFriends also won the Gold Award in the Hong Kong Techathon+ 2025 and the Global Design Awards. The Transparent Knee Guard was awarded the MicroFund Top Performer, as well as the Good Design US and Global Design Awards.[73]

PolyU's distinctive disciplines integrate creativity with technological expertise, and this integration continues to influence global standards in these dynamic and culturally unique fields.

71 Two PolyU projects awarded RGC Theme-based Research Scheme Funding for sustainable impacts, https://www.polyu.edu.hk/en/media/media-releases/2024/0715_polyu-projects-awarded-rgc-theme-based-research-scheme-funding/

72 PolyU Staff Member Wins Global Intrapreneurial Award, Boosting Hong Kong's Innovation Profile, https://www.polyu.edu.hk/en/recent-focus/20240110_global-intrapreneur-award-by-rennie-kan/

73 PolyU Design Recognised with Multiple Honours in the Prestigious iF Design Award, https://www.polyu.edu.hk/sd/news-and-events/news/2025/20250410-polyu-design-recognised-with-multiple-honours-in-the-prestigious-if-design-award/

POLYU RESEARCH
EXCELLENCE REPORT 2025

APPENDIX

APPENDIX A
DESCRIPTION OF INDICATORS

Average percentile

The percentile of a publication is determined by creating a citation frequency distribution for all publications in the same year, subject category, and document type (arranging the papers in ascending order of citation count), and determining the percentage of papers at each level of citation. If a paper has a percentile value of 99, then 99% of the papers in the same subject category, year, and document type have a lower citation count.

A percentile is a normalized indicator because it indicates how a paper performed relative to others in its field, year, and document type. For any set of papers, an Average Percentile can be calculated as the arithmetic mean of all the percentiles of all the papers in the set. In the case that a paper is assigned to more than one category, the category in which the percentile value is closest to 100 is used (the best performing value). Percentile values are rounded to the second decimal place.

Category Normalized Citation Impact (CNCI)

The Category Normalized Citation Impact (CNCI) of a document is calculated by dividing the actual count of citing items by the expected citation rate for publications with the same document type, year of publication and subject area. When a document is assigned to more than one subject area, an average of the ratios of the actual to expected citations is used. The CNCI of a set of publications, for example, the collected works of an individual, institution or country/region, is the average of the CNCI values for all the publications in the set. CNCI is a valuable and unbiased indicator of impact irrespective of age, subject focus, or document type. Therefore, it allows comparisons between entities of different sizes and different subject mixes.

- A CNCI value of 1 represents performance at par with the global average.
- Values above 1 are considered above average.
- Values below 1 are considered below average.
- A CNCI value of 2 is considered twice the global average.

CNCI is an ideal indicator for benchmarking at all organisational levels (institution, region, etc). When dealing with small sets of publications, though, for example, the publications of one individual, the CNCI values may be inflated by a single Highly Cited Paper. More information can be found on the InCites website.

Citations from patents

The number of citations a set of publications has received from patents indexed in Derwent Innovations Index™ on Web of Science. This integration provides unique opportunities to not only assess the impact of patents on publications, but also allows users to explore trends and patterns in innovations further to deliver further insight into emerging fields of research.

Collaboration Category Normalized Citation Impact (Collab-CNCI)

Collab-CNCI compares citation impact to global expected citations, normalized by subject, year, document type and collaboration type. Each publication falls into one of five collaboration types, determined by:

1. The number of distinct countries in the author addresses
2. If all addresses are from the same country, the number of organisations involved

Overview of Collaboration Types

1. Domestic – Single: publications where all authors are affiliated with the same institution in a single country.
2. Domestic – Multiple: Publications where all authors are affiliated with multiple institutions within the same country.
3. International – Bilateral: Publications with author addresses from exactly two distinct countries.
4. International – Trilateral: Publications with author addresses from exactly three distinct countries.
5. International – Quadrilateral +: Publications with author addresses from four or more distinct countries.

Cumulative growth

Cumulative growth shows the total increase in the quantity of publications over a period, accounting for all previous growth.

Documents in Top 1%

Publications in the Top 1% based on citations by category, year, and document type.

Documents in Top 10%

Publications in the Top 10% based on citations by category, year, and document type.

Essential Science Indicators

Essential Science Indicators is an analytics tool that identifies Top performing papers, authors, institutions, countries, and journals across 22 broad disciplines based on citation thresholds.

Growth and average growth

In this study, we visualise the evolution of the number of Web of Science publications for a certain entity and period. To quantify the change in the number of publications from one year to the next, we use the growth

rate. The growth is then the number of publications in the most recent year (Ny2) subtracted from the number of publications in an earlier year (Ny1) and divided by it, and represented as a percentage:
G= (Ny2- Ny1)/ Ny1

Industry collaboration

Papers that contain two or more Organisations with at least one Organisation listing its organisation type as “corporate” or “global corporate”.
When a corporate or a global corporate organisation is searched in InCites, its publications will be captured in the Industry Collaboration indicator.
It is not possible to unify data for every affiliation of all publications in InCites; therefore, only unified entities have an organisation type. There will be corporate affiliations that are not yet unified and without an organisational type. As such, these affiliations will not be identified as an industrial collaboration. Clarivate Analytics has made considerable efforts to identify the largest corporations and unify them; however, these efforts tend to focus on large multinational corporations and may lead to regional bias.

Scholarly output

In this report, scholarly output refers to published peer-reviewed articles, reviews, and conference proceedings that are indexed in the Web of Science database.

Societal impact

The societal impact refers to how academic or scientific research contributes to and influences society beyond the academic community. It includes real-world benefits that research brings to individuals, communities, industries, policy and the environment.

Web of Science Documents

This is an indicator to refer to substantive journal articles, reviews, and proceedings papers, excluding editorials, meeting abstracts, and other types of publications. It is based on the Web of Science Core Collection, as of December 31, 2024.

APPENDIX B

DATA SOURCES AND ANALYTICAL PLATFORMS

Web of Science

The data used in this study came from the Clarivate Web of Science databases, which give access not only to journals but also to conference proceedings, books, patents, websites, and chemical structures, compounds and reactions.

Web of Science has a unified structure that integrates all data and search terms together and, therefore, provides a level of comparability not found in other databases. It is widely acknowledged to be the world’s leading source of citation and bibliometric data. The Web of Science Core Collection is the premier resource on that platform and includes over 22k peer-reviewed, high-quality scholarly journals published worldwide (including Open Access journals), over 308k conferences, over 151k editorially selected books and 92M records going back to 1900.

Coverage is both current and retrospective in the sciences, social sciences, arts and humanities. Clarivate has extensive experience with databases on research inputs, activity and outputs and has developed innovative analytical approaches for benchmarking and interpreting international, national and institutional research impact.
For more details: https://www.webofscience.com/

InCites Benchmarking and Analytics

InCites Benchmarking & Analytics was used in this project to generate relevant metrics and indicators.

InCites is a customised, citation-based research evaluation tool enabling analysis of productivity and benchmarking of output against peers worldwide, with underlying data drawn from the Web of Science Core Collection.

InCites provides disambiguated data for all publications in the Web of Science Core Collection. For more details: https://incites.clarivate.com/

Derwent Innovation

The Derwent World Patents Index (DWPI) is a comprehensive database that compiles patent applications and grants from 59 patent-issuing authorities worldwide. It provides abstracts in English, detailing the nature and use of inventions, and indexes them into technology categories for easy retrieval. DWPI also defines patent families, linking related patents globally around a Basic Patent (the first disclosure of the invention appearing in the database), facilitating the tracking of an invention's protection status internationally as further applications or granted patents published in multiple patent jurisdictions. For more details: https://www.derwentinnovation.com/

APPENDIX C
DATASET CREATION FOR THE TWELVE RESEARCH AREAS

Dataset construction

The dataset used for analysing publications and citations in the twelve chosen research areas was built based on Essential Science Indicators (ESI) subject areas and Web of Science subject categories.

Essential Science Indicators are broken out by 22 major fields of science. Each field is defined by a discrete set of journals.[74]

Web of Science categories refer to the categories assigned to the source publication. There are a total of 254 subject categories. Some source publications are assigned to multiple categories.[75]

PolyU Research Area	Corresponding ESI Subject Area
Engineering	Engineering
	Environment/ Ecology
	Geosciences

Table 1. ESI subject areas for engineering

PolyU Research Area	Corresponding Web of Science Subject Category
Civil engineering	Engineering, Civil
	Construction & Building Technology
	Transportation Science & Technology

Table 2. Web of Science subject categories for civil engineering

PolyU Research Area	Corresponding Web of Science Subject Category
Built environment	Energy & Fuels
	Engineering, Environmental
	Environmental Sciences
	Environmental Studies
	Nuclear Science & Technology
	Water Resources
	Green & Sustainable Science & Technology
	Materials Science, Ceramics
	Materials Science, Multidisciplinary

Table 3. Web of Science subject categories for built environment

74 Essential Science Indicators Journal List, https://esi.help.clarivate.com/Content/journal-list.htm
75 Web of Science Subject Categories, https://webofscience.zendesk.com/hc/en-us/articles/27505726032017-Web-of-Science-Subject-Categories

PolyU Research Area	Corresponding Web of Science Subject Category
Advanced manufacturing	Optics
	Automation & Control Systems
	Engineering, Aerospace
	Engineering, Manufacturing
	Microscopy
	Robotics
	Engineering, Industrial
	Engineering, Multidisciplinary
	Physics, Applied

Table 4. Web of Science subject categories for advanced manufacturing

PolyU Research Area	Corresponding Web of Science Subject Category
Geomatics research	Engineering, Geological
	Geosciences, Multidisciplinary
	Instruments & Instrumentation
	Remote Sensing

Table 5. Web of Science subject categories for geomatics research

PolyU Research Area	Corresponding Web of Science Subject Category
Computer science and artificial intelligence	Computer Science, Artificial Intelligence
	Mathematics, Applied
	Computer Science, Interdisciplinary Applications

Table 6. Web of Science subject categories for computer science and artificial intelligence

PolyU Research Area	Corresponding Web of Science Subject Category
Optometry	Ophthalmology

Table 7. Web of Science subject categories for optometry

PolyU Research Area	Corresponding Web of Science Subject Category
Biomedical engineering	Engineering, Biomedical
	Cell & Tissue Engineering

Table 8. Web of Science subject categories for biomedical engineering

PolyU Research Area	Corresponding Web of Science Subject Category
Rehabilitation sciences	Rehabilitation
	Orthopedics
	Sport Sciences

Table 9. Web of Science subject categories for rehabilitation sciences

PolyU Research Area	Corresponding Web of Science Subject Category
Nursing	Nursing

Table 10. Web of Science subject categories for nursing

PolyU Research Area	Corresponding Web of Science Subject Category
Hotel and tourism management	Hospitality, Leisure, Sports & Tourism

Table 11. Web of Science subject categories for hotel and tourism management

PolyU Research Area	Corresponding Web of Science Subject Category
Fashion and textiles	Materials Science, Textiles

Table 12. Web of Science subject categories for fashion and textiles

PolyU Research Area	Corresponding Web of Science Subject Category
Design	Art

Table 13. Web of Science subject categories for design

ABOUT

This report was developed by the Clarivate Academic and Government Consulting team in partnership with The Hong Kong Polytechnic University (PolyU), who provided funding for this project.

For over half a century Clarivate has pioneered the world of citation indexing and analysis, helping to connect scientific and scholarly thought around the world. Today, academic and research institutions, governments, not-for-profits, funding agencies, and all others with an interest in research, need reliable, objective methods for managing and measuring performance.

The Clarivate Academia and Government Consulting team provides reporting and consultancy services using customised analyses to bring together several indicators of research performance in such a way as to enable customers to rapidly make sense of and interpret a wide range of data points to facilitate research strategy decision making. We have extensive experience with databases on research inputs, activity and outputs and have developed innovative analytical approaches for benchmarking, interpreting and visualising of international, national and institutional research impact.

ABOUT THE HONG KONG POLYTECHNIC UNIVERSITY

With over 85 years of rich heritage, PolyU has evolved alongside Hong Kong, making pivotal contributions to its social and economic development, as well as to the Nation and the world. PolyU aspires to be an innovative world-class university that pursues excellence in education, research and knowledge transfer. Guided by its motto, “To learn and to apply, for the benefit of mankind”, the University nurtures socially responsible professionals and leaders with a strong sense of national pride and a global perspective, while driving world-leading research and innovation for societal benefits. PolyU’s unwavering commitment to excellence, impact, and innovation has earned it widespread international recognition. The University consistently ranks among the world’s Top 100 universities, a testament to its status as a global leader in higher education and cutting-edge research.

ABOUT CLARIVATE

Clarivate is a leading global provider of transformative intelligence. We offer enriched data, insights & analytics, workflow solutions and expert services in the areas of Academia & Government, Intellectual Property and Life Sciences & Healthcare. For more information, please visit clarivate.com.

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