

ENGINEERING NEW MEDICAL SOLUTIONS

From algorithms that mine medical big data, to intelligent diagnosis systems and surgical robots, a new interdisciplinary field, called intelligent medical engineering (IME), has emerged at the junction of engineering and medicine. The School of Medicine at Nankai University has launched China's first IME programme to explore this.



ADMINISTERING INTELLIGENT MEDICINE

With subjects spanning intelligent drug discovery, medical robots, medical image identification and health data management, the IME programme is a multi-disciplinary, diverse platform for education and research, according to Xiang Rong, the dean of Nankai's School of Medicine.

"We are piloting a new model for undergraduate recruitment and education," says Xiang. To create IME, the School of Medicine brought together staff and resources from eight Nankai schools, the School of Mathematical Sciences, the School of Physics, the College of Chemistry, the College of Life Sciences, the College of Pharmacy, the College of Computer Control and Engineering, the School of Statistics and Data Science and the College of Software. They joined forces with researchers from Tencent's artificial intelligence medical lab. "By leveraging these resources, and integrating all the disciplines, we aim to foster versatile, innovative professionals with basic medical knowledge and engineering practice capacities, who can lead the future of medical development," he says.

In September 2018, the IME programme welcomed its first class of undergraduates. As an emerging field at the vanguard of science and technology, the IME has promising career prospects for its graduates, according to one student. He hopes to use interdisciplinary knowledge and skills gained through the course to improve medical conditions in remote and developing regions. Addressing such medical needs is a remit of the IME programme, which as well as providing quality education and research, seeks to fulfill China's health development mission.

LOOKING TO THE FUTURE

Another example of integrating medicine and engineering at Nankai is the newly launched Ophthalmology & Optometry

undergraduate programme. The course, which offers interdisciplinary education and international training, is provided in partnership by Nankai's School of Medicine, Nankai University Affiliated Eye Hospital and the Pacific University in the USA. Pacific University will offer ophthalmology and optometry courses, and will guide the residency programme for students at the Nankai University Affiliated Eye Hospital.

This approach takes the best of the established US education system, quality basic medical education from Nankai's medical school, and the rich clinical resources of the eye hospital.

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Driven by the development of optics and spectroscopy, new materials, big data and AI technologies, this new programme has great potential in applying the newest engineering technologies to improve vision, says Xiang. Students will be trained in basic and clinical medicine, and relevant science and engineering skills. "We hope by innovating the medical training model, we will produce well-rounded talent to improve vision health."

The programme will recruit 30 students in September 2019 for five years of training, and plans to gradually scale up.

A HISTORY OF INTERDISCIPLINARITY

Nankai's School of Medicine has a rich tradition of leveraging resources in the natural sciences,

humanities, engineering, and social sciences to foster well-rounded medical talent.

The school is rooted in a medical preparatory class established at the former College of Science in 1930, which was tied closely to a range of science programmes, as well as engineering. In the 1980s, former presidents of Nankai proposed to the Ministry of Education that science and engineering education should be combined. Before the School of Medicine was formally founded in 1993, Nankai also held seminars with national medical and education experts in China to discuss interdisciplinary developments.

In the last 20 years, the integration of medical science and engineering was put into practice through university-industry cooperation and joint educational efforts. Xiang believes that interdisciplinary thinking in education will be key to unlocking innovation opportunities, and lead to new scientific discoveries. Similarly, when engineers, physical science researchers, life scientists, and clinicians are equal partners, new medical research opportunities will emerge.

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Xiang says partnership is a good approach to realize such goals. Taking the joint education model, Nankai's School of Medicine has established strategic partnerships with the People's Liberation Army (PLA) General Hospital in Beijing and 12 quality tertiary hospitals in Tianjin, which excel in various clinical specialties

and have well-equipped clinical and research laboratories. The idea is to create a consortium to enable close collaboration in medical technology provision, research platform construction, and training programme reform that will facilitate a wonderful training experience for students and promote the advancement of medical education.

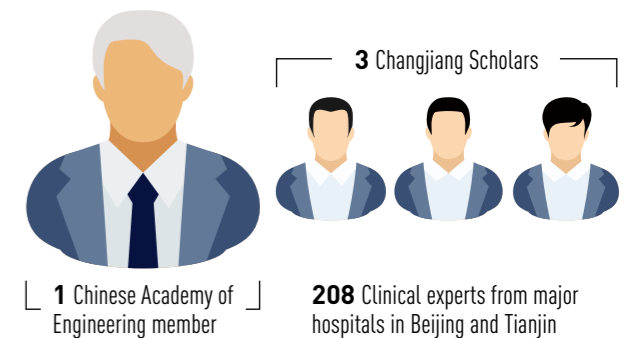
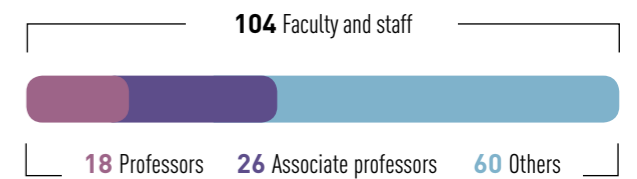
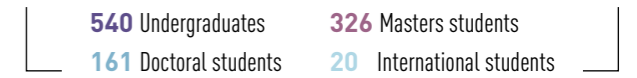
Through these partnerships, an integrated clinical medicine programme has been established, where students will complete five years of undergraduate study on a Nankai University campus, learning basic theories and subject area knowledge in medicine, coupled with practical opportunities at major hospitals in Tianjin. They will then undertake three years of graduate study at the PLA General Hospital in residency training. This will expose students to patients, enhancing their clinical knowledge and capacity to handle challenges in real-world clinical settings. This integrated training programme also creates a model for military and civilian collaboration in developing medical education.

Incidentally, these partnerships have also boosted the dental programme, which offers basic medical theory training to students in the first four years, and clinical practice in Tianjin Stomatological Hospital in the fifth year.

The School of Medicine at Nankai University views the convergence of medical science and engineering as a unique way to drive medical research and education, and to enhance its impact.

It has recently established a virtual reality laboratory for detecting microorganisms in clinical samples, along with a virtual reality experimental teaching programme to provide an immersive and interactive experimental teaching environment for medical students. Interdisciplinary integration will also be the force that drives the development of translational and precision medicine, bringing vital innovations. ■

NANKAI SCHOOL OF MEDICINE AT A GLANCE



ADVANCED RESEARCH PLATFORMS

14 research laboratories, and 4 national-level research platforms, including a collaborative innovation centre on biotherapy, an international joint laboratory on biomedicine.

FRUITFUL RESEARCH RESULTS

Having undertaken 437 national, provisional, or ministerial research projects, and published widely in leading international journals, particularly on the tumour microenvironment, cancer immunology, gut microbiota and diseases, and food science.