Institute of
SCIENCE TOKYO

Institute of Science Tokyo
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https://www.isct.ac.jp/

## Advancing science and human wellbeing

We find our purpose through the advancement of science and human wellbeing.

Progress requires a convergence of knowledge and technology that bridges organizations, academic disciplines, and fields of research.

We celebrate individuality to foster a rich culture of learning and creation,
seeking to constantly reinvent ourselves
in order to bring change for a better future.

As pioneers opening new worlds of exploration, we expand the possibilities of science and create value for and with society.



## Mission

Advancing science and human wellbeing to create value for and with society.

## Core values

Explore and freely integrate knowledge and technology, without constraint of preconceptions.

Celebrate individuality to foster a rich culture of creation.

Continuously challenge existing assumptions and approaches to enable bold reinvention.

## Believing in the transformative power of science to create a better, brighter future

**—— Society is undergoing a seismic shift. What role do you think Institute of Science Tokyo (Science Tokyo) is expected to play?**

Ohtake In an age of rapid change characterized by volatility, uncertainty, complexity, and ambiguity (VUCA), Science Tokyo sets sail as a new university with "science" at its core. As we face an uncertain future, we want to have faith in the power of science. Instead of lamenting over an unforeseeable future, we are unleashing the power of science to create a better, brighter future. Our role is to use the power of science to realize a better life, a better society, and a better planet. Science Tokyo is a university that develops and nurtures professionals who embrace this role.

Tanaka Today, society faces many challenges, such as climate change, natural disasters, poverty, infectious diseases, and international conflicts. Attempts to solve all these problems in today's zero-sum society will lead to inequalities and divisions. That is why we need to change the direction of our society, from zero sum to positive sum. Innovation is paramount to changing the direction of society. Science Tokyo' s mission is to spawn innovations in diverse fields to overcome numerous societal issues.

Ohtake Our medium-term goal is to become a world-leading university that specializes in science. To achieve our goal, we have defined two tiers of university management, the foundational tier and the original tier. The foundational tier is about building a global-standard governance structure. To realize a high level of diversity, fairness, and inclusiveness for all stakeholders, we will create an environment where everyone is treated equally with respect and empowered to speak up and present proposals. Regarding the original tier, we will continue to promote education and research based on practical science. We will also cooperate with various universities at home and abroad to formulate a world-class research structure. This will help attract many leading researchers to our campuses while we also foster such talents by ourselves.

Tanaka As the academic head of the organization, my vision is to create an environment where intellect is circulated, exchanged, and mixed among all stakeholders, including faculty, students, medical personnel, technical and administrative staff, as well as university research administrators. That is required to create innovations. To ensure that our innovations make a real contribution to people' s wellbeing, we need to stay connected with society from the early stages of research, listen to what people have to say, and work together. I want Science Tokyo to be a university that is truly open to society.

## The CEO formulates the framework for Science Tokyo, while the CAO creates and empowers the organization

**—— Science Tokyo is the first national university corporation in Japan headed by a CEO and a CAO. How do you define roles and responsibilities between one another?**

Ohtake As the CEO, I will be responsible for managing the national university corporation, while Dr. Tanaka will be responsible for leading education and research. I see a great advantage in separating business management and academics. The CEO can concentrate on the management of Science Tokyo, and can devise simple yet bold initiatives to determine what is needed to create positive impact in society, and what is required to develop talented professionals. Furthermore, having two persons leading the Institute enables us to be more active. One of us can give a keynote speech at an international conference while the other is engaging with the local community or meeting students.

Tanaka Dr. Ohtake envisions the overall framework for Science Tokyo, while I create and empower the organization. My key values are autonomy and collaboration. Intellect can only be seamlessly circulated and exchanged among stakeholders when each person embraces autonomy and the spirit of collaboration. Science Tokyo will aim to foster the culture of autonomy and collaboration, and we need an organization that promotes such culture. Specifically, we have established three new research institutes in time for the merger in October 2024: the Institute of Integrated Research, which promote research in various fields; the Institute of Future Science, which is dedicated to innovative research for future society; and the Institute of New Industry Incubation, which consolidates industry-academia collaborations that promotes collaborative research and the development of future human resources.

## Convergence science that merges diverse academic fields

**—— What initial actions will the new university take?**

Ohtake Since Science Tokyo is established by the merger of two universities, our first action is to drive integration throughout the entire organization. We will also strive to create and foster a new culture that is unique to Science Tokyo. Society has high expectations for collaborations between medicine and engineering, so we will work towards achievements in this sphere in the short term. In fact, joint research between researchers in science and engineering and those in medicine and the dental sciences, mainly young people, has already started.

Tanaka A new facility called the Biomedical Engineering Laboratory (tentative name) will be the hub for medicine-engineering collaboration. It will be on Yushima Campus, where Science Tokyo Hospital is located. Once complete, it will bring science and engineering students and researchers close to a clinical environment. I hope that discoveries from their experience in the clinical environment will lead to new research and study in the medicine-engineering field. We are also working on a mechanism to allow medical and dental students and researchers free access to the science and engineering campus. These are some of our early ideas for accelerating the circulation and exchange of intellect.

Initially, the merger will only mix students from science and engineering, and medical and dental backgrounds. Eventually, science and engineering intellect and medical and dental sciences intellect will converge in each person, which I hope will create researchers who are experienced in all of these fields. There may not be many of these researchers, but I am not concerned about quantity. The people who are fully capable of creating innovations will drastically change our society for the better.

**—— Synergies created by the convergence of science and engineering with the medical and dental sciences will be the strength of Science Tokyo.**

Ohtake Tokyo Institute of Technology was one of Japan' s top national universities specializing in science and engineering, while Tokyo Medical and Dental University was one of Japan' s leading national universities for medical and dental studies. Both universities have long been engaged in cutting-edge research based on practical science. The merger of these two universities is like building a bridge that connects the summits of two high mountains. We call it "a bridge over two peaks". "Convergence science" refers to the diverse academic fields that line the bridge over the two peaks.

Tanaka Another way of phrasing convergence science is "fusion science" . We can apply engineering and medical science to create surgical robots, or science and medicine to develop new drugs. We no longer have to limit this fusion to science and engineering or the medical and dental sciences. There are limitless possibilities for fusion at Science Tokyo. The removal of boundaries that separated these scientific fields encourages free collaboration and unlimited fusion across these fields.

Ohtake An important point here is that the humanities and social sciences are also essential to convergence science. To give you an example, if we want to relocate to Mars, we need to secure oxygen, water, food, and energy on Mars, but we also need law and philosophy to define a living system for humans. Holistic knowledge of academics is required to create new innovations.

Tanaka We already have more than 70 talented researchers who specialize in humanities and social sciences in Science Tokyo. We are off to a good start in creating new convergence science and future prospects also look promising.

## Developing doctoral students into entrepreneurs, attracting talented researchers from outside Japan

**—— What are your thoughts on recruiting and developing researchers?**

Tanaka We would like to actively develop and nurture doctoral students who will lead innovation. Today, doctorate holders in Japan have limited opportunities to excel. Moving forward, we will be leveraging our networks with industry to create a framework for developing doctorates with society. International perspectives and startup strategies are particularly important. We will form a comprehensive partnership agreement with highly active universities outside Japan to promote exchange of students and researchers. We will also formulate a system for supporting business startups by doctorates, allowing these doctorates to freely come and go between labs and their startup company.

Ohtake To recruit talented researchers from overseas, I cannot stress enough the importance of creating the right environment. Science Tokyo already has best practices with Earth-Life Science Institute (ELSI) and World Research Hub Institute (WRHI) that successfully invited world-leading researchers from outside Japan. We will use this experience and expertise to create an inbound system. We have a plan for making sufficient research facilities, equipment, and instruments available at the Institute. Researchers can come to Science Tokyo without worrying about what to bring and get started right away, or they can participate in an experiment for, say, three months out of a year. Either way, we need to provide flexibility for research.

**—— Finally, can you share your ambitions for the future?**

Ohtake As the CEO of Science Tokyo, I will carry out the three E' s: Energize, Execute and Empower. I will energize the Institute' s stakeholders with vitality, execute my commitments and promises, and empower our team members so they can blossom. The three E's will always be kept in mind as I lead Science Tokyo with Dr. Tanaka.

Tanaka I will work closely with Dr. Ohtake to create a university for the new era. In the near future, we will see the birth of some amazing innovations. Keep an eye on Science Tokyo!

**Naoto Ohtake**

**President and Chief Executive Officer (CEO), Institute of Science Tokyo**

In 1992, Ohtake earned his doctoral degree in mechanical engineering from Tokyo Institute of Technology (Tokyo Tech). In 2010, he became a professor of the Department of Mechanical Sciences and Engineering, Graduate School of Science and Engineering, Tokyo Tech. In 2022, he was appointed the Director-General of the Institute of Innovative Research, Tokyo Tech. He assumed his current position in October 2024. Ohtake specializes in the fields of functional materials and thin film technology.

**Yujiro Tanaka**

**President and Chief Academic Officer (CAO), Institute of Science Tokyo**

In 1985, Tanaka completed the doctoral program at the Graduate School of Medicine, Tokyo Medical and Dental University (TMDU). In 2001, he became a professor of the Department of General Medicine, TMDU Medical Hospital. He was appointed the president of TMDU in 2020. He assumed his current position in October 2024. Tanaka specializes in gastroenterology and medical education.

# The two universities, both pioneers in the history of science, are integrating to become a center of international excellence in research and education.

Tokyo Tech

Realizing a world-leading science and technology university

TMDU

Cultivating professionals with knowledge and humanity, thereby contributing to people's well-being

**1881** — Tokyo Vocational School is established with the aim of training outstanding engineers.

**1926** — Takayanagi develops the world's first practical electronic television.

**1929** — Status of Tokyo Higher Technical School elevated to degree-conferring university, later renamed Tokyo Institute of Technology

**1928** — Tokyo National School of Dentistry is established as Japan's first national dental training institution.

**1946** — Tokyo Medical and Dental University (The Former System)

**1955** — A prototype is developed of an electrical root canal length measuring instrument which became the standard for dental treatment around the world.

**1960** — Suzuki performs the first successful operation on a patient with severe heart valve disease using a self-made artificial valve.

**1962** — Katsuki investigates the central nervous system mechanisms of hearing and contributes to the modernization of neurophysiology in Japan.

**1970** — From silver fillings to white teeth; adhesive resins of various materials are developed and put into practical use.

**2000** — Shirakawa is awarded the Nobel Prize in Chemistry for the discovery and development of conductive polymers.

**2003** — Hosono invents the IGZO thin-film transistor used in smartphones and other devices.

**2016** — Ohsumi is awarded the Nobel Prize in Physiology or Medicine for elucidating the molecular mechanisms and physiological significance of autophagy.

**2017** — The TSUBAME3.0 supercomputer, which combines overwhelming processing speed with the world's highest energy efficiency, is developed.

**2018** — Selected as a Designated National University Corporation

**2020** — Yokota's invention of "heteronucleic acid medicine" leads to a breakthrough drug discovery.

**2021** — Selected as a Designated National University Corporation

**2023** — "Saroa", the world's first surgical assist robot that reproduces the sense of touch, is introduced into clinical use.

RIVERFIELD Inc.

**2024**

Institute of SCIENCE TOKYO

**Established in October 2024**

# Science Tokyo by the numbers

As of May 1, 2023

## Staff / Students

| Undergraduate students | Graduate students | Faculty | Staff |
|---|---|---|---|
| 6,242*1 | 7,116*1 | 1,887*1 | 3,740*1 |

## Research

| Papers published (2022) | Grants for commissioned research (2021) | Grants-in-aid (2021) | Shared research equipment (2022) |
|---|---|---|---|
| 5,170*2 | 13.2 billion yen*3 | 6 billion yen*4 | 854*5 |

## Industry-academia collaboration

| Joint research projects (2021) | Grants for collaborative research (2021) | University-launched ventures (as of July 2023) | Intellectual property income (2021) |
|---|---|---|---|
| 1,109*3 | 4.6 billion yen*3 | 146*3 | 187 million yen*6 |

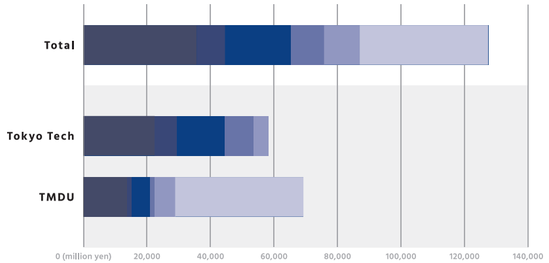
## International engagement

| International students | International faculty | International co-authored papers (2022) | International university partnerships |
|---|---|---|---|
| 2,145*1 | 81*1 | 1,794*2 | 340*7 |

*1(Source) National Institution for Academic Degrees and Quality Enhancement of Higher Education (NIAD-QE), "Basic University Information (2023)" *2(Source) InCites Dataset + ESCI Schema: Web of Science Domestic/ International Collaboration: All Time Period: [2022, 2022] *3(Source) Ministry of Education, Culture, Sports, Science and Technology, "Status of Industry-University Collaboration at Universities in FY2021" *4 (Source) Japan Association of National Universities, "Basic Data for National University Corporations (March 31, 2023)" *5 (Source) Tokyo Tech website *6 (Source) Ministry of Economy, Trade and Industry, "University Fact Book 2023" *7 (Source) Tokyo Tech Data Book 2023-2024

## Revenue

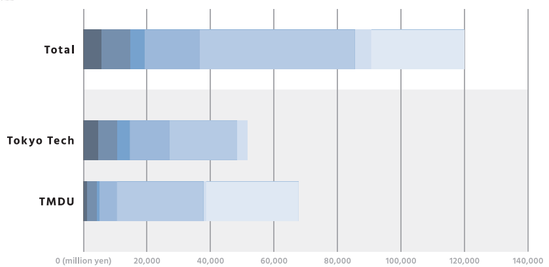
FY2022




■Operating grants ■Revenue from student fees ■Grants for commissioned research ■Donations ■Others ■Hospital

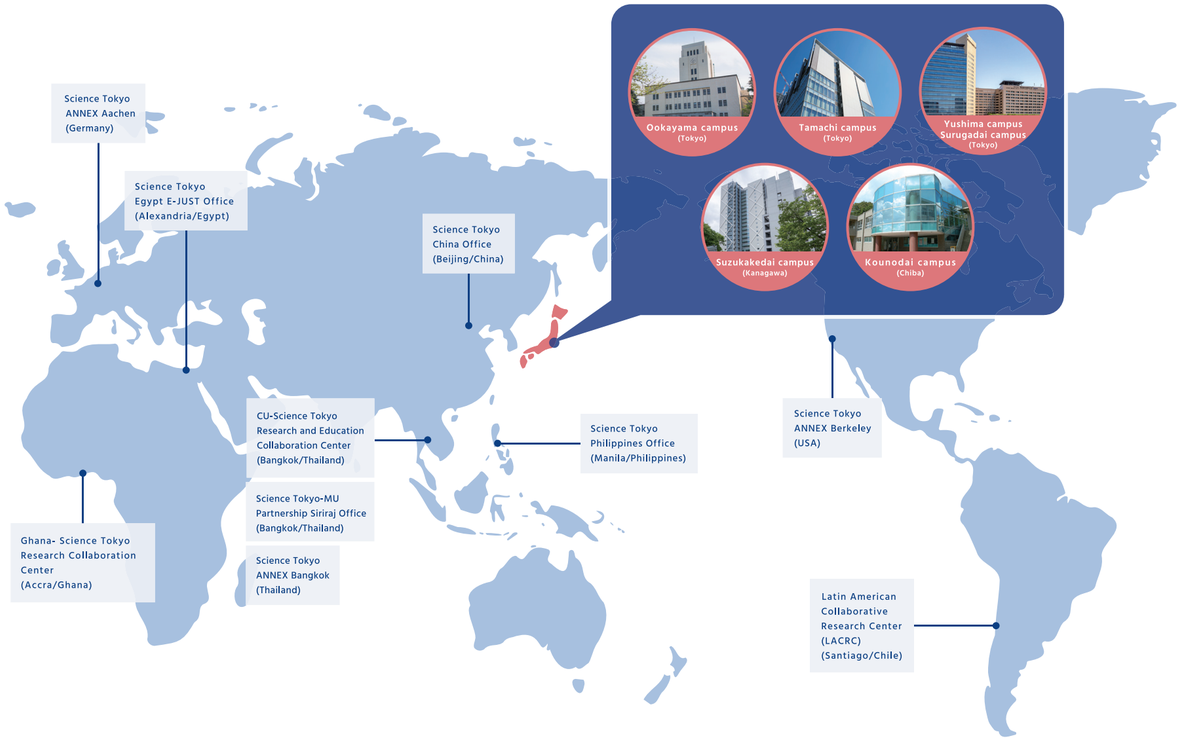
## Expenditure

FY2022




■Educational expenses ■Research expenses ■Educational and research support expenses ■Commissioned research ■Personnel ■General administrative expenses ■Medical expenses

# Campuses and overseas bases



# Science Tokyo education and research organizations

| | |
|---|---|
| School of Science | Mathematics<br>Physics<br>Chemistry<br>Earth and Planetary Sciences |
| School of Engineering | Mechanical Engineering<br>Systems and Control Engineering<br>Electrical and Electronic Engineering<br>Information and Communications Engineering<br>Industrial Engineering and Economics |
| School of Materials and Chemical Technology | Materials Science and Engineering<br>Chemical Science and Engineering |
| School of Computing | Mathematical and Computing Science<br>Computer Science |
| School of Life Science and Technology | Life Science and Technology |
| School of Environment and Society | Architecture and Building Engineering<br>Civil and Environmental Engineering<br>Transdisciplinary Science and Engineering<br>Social and Human Sciences<br>Innovation Science<br>Technology and Innovation Management<br>(Professional master's degree program) |

| | |
|---|---|
| Faculty of Medicine | School of Medicine<br>School of Health Care Sciences<br>(Track of Nursing Science /<br>Track of Medical Technology) |
| Faculty of Dentistry | School of Dentistry<br>School of Oral Health Care Sciences<br>(Track of Oral Health Care Sciences /<br>Track of Oral Health Engineering ) |
| Graduate School of Medical and Dental Sciences | Medical and Dental Sciences<br>Biomedical Sciences and Engineering<br>Health Sciences and Biomedical Engineering |
| Graduate School of Health Care Sciences | Nursing Innovation Science |
| Institute for Liberal Arts | – |
| Institute of Science Tokyo Hospital | Division of Clinical Medicine<br>Division of Clinical Dentistry |
| Institute of Science Tokyo High School | Applied Chemistry Information Systems<br>Mechanical Systems Engineering<br>Electrical and Electronics Architectural Design |



## Three new research institutes drive social innovation and foster knowledge circulation within and beyond the university.

### Institute of Integrated Research

**Promotes cutting-edge research and leading the world's academic network.**
**Aims to solve the diverse social issues**

- Pioneers innovative science and technology with the expertise from multiple disciplines.
- Creates research results that can lead to the development of future industrial and medical infrastructure in response to social issues

### Institute of Future Science

**Develops interdisciplinary social impact research.**
**Discovers novel issues, challenges their resolution,**
**and presents a vision for the future to society**

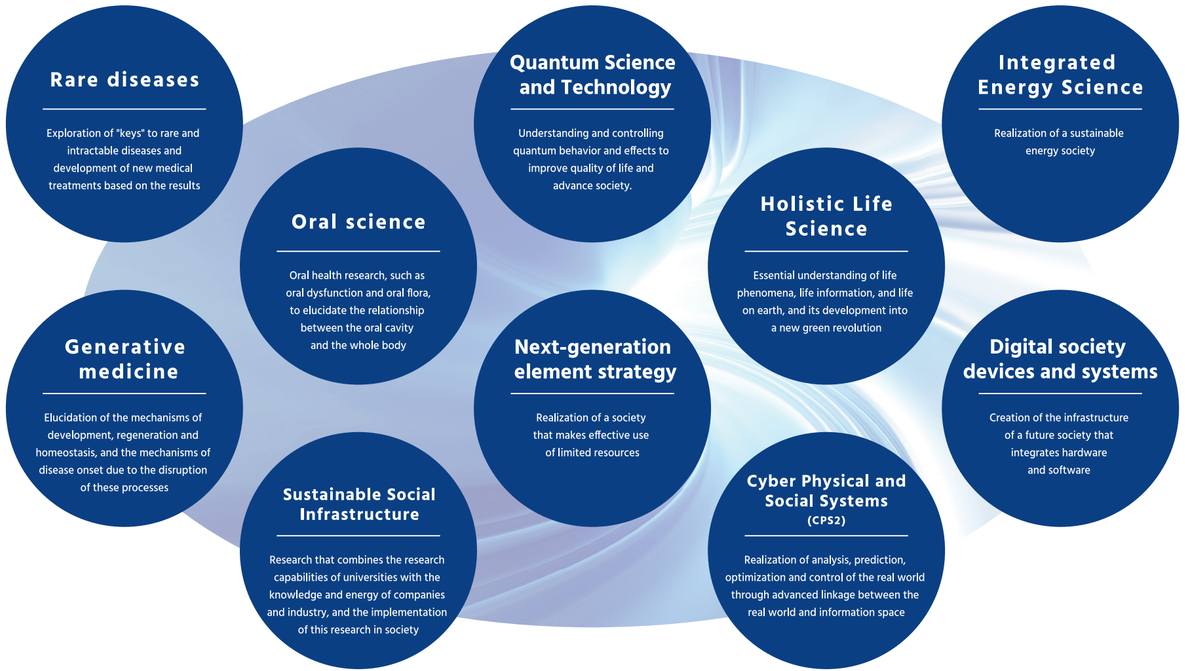
- Creates new research areas through initiatives, presents alternative visions of the future, and works towards their realization.)Explores solutions to social issues through the convergence of scientific knowledge.

### Institute of New Industry Incubation

**Builds an innovation ecosystem in collaboration with society that leads to the creation of new industries and the development of future human resources**

- Conducts joint research with companies, and leads to the creation of new industries.
- Develops doctoral-level human resources through research.
- Builds and implements a new industry-academia collaboration model for innovation.

# 10 world-leading research fields




**By integrating cutting-edge fields in science and engineering and medicine, we will contribute to solving social issues and realizing a prosperous future society.**



# Overview and performance of the Hospital

Institute of SCIENCE TOKYO HOSPITAL

## Philosophy

**Contribute to the well-being of people by providing the world's highest standard of total health care**

## Basic policy

1. Provide patient-centered, high-quality, holistic medical care.
2. Cultivate compassionate medical professionals.
3. Develop and practice high-quality medical care.
4. Be accessible to the community and responsive to patient needs.
5. Work together to protect our patients and colleagues.

## Notable Achievements in FY2023

Acceptance of severe COVID-19 patients:
**1st** among university hospitals in Tokyo (FY2022)

Number of patients receiving initial medical examinations :
**1st** among national university-affiliated hospitals in Japan (FY2022)

Comparative evaluation of the Emergency Medical Center: 99 points, **rank S**

| Division of Clinical Medicine | | Division of Clinical Dentistry | |
|---|---|---|---|
| Number of beds occupied (hospital) | 753 | Number of beds and treatment units | 60 beds, 327 units |
| Total number of inpatients | 233,678 | Total number of inpatients | 13,164 |
| Average number of days in hospital | 10.66 | Average number of days in hospital | 6.15 |
| Total number of outpatients | 501,100 | Total number of outpatients | 327,281 |
| Average number of patients per day | (Outpatient)2062.1<br>(Inpatient)638.4 | Average number of patients per day | (Outpatient)1346.8<br>(Inpatient)36.1 |
| Total number of surgeries | 8,550 | Total number of surgeries | 2,305 |

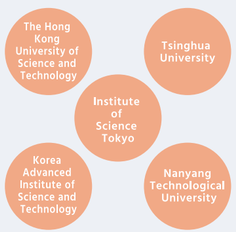
# Research and education with global reach

## Together with world-class institutions, we aim to advance science and technology, develop human resources, and lead global research. *Major activities as of October 2024.

### Leadership in Asia

**ASPIRE League**

Consortium of the top 5 science and technology universities in Asia




By forming a hub of innovation in Asia, the consortium aims to contribute to the realization of a sustainable world. By establishing a network of world-class science and engineering universities, it promotes academic exchange among students and researchers.

### Exchanges with leading Asian universities

**Campus Asia Plus**

(joint education program)

Through student and research exchanges with Tsinghua University (China), Korea Advanced Institute of Science and Technology (Korea), and Nanyang Technological University (Singapore), we are deepening collaboration among the best science and engineering universities in Asia. Through inter-university cooperation, we aim to raise the standard of higher education in Asia and nurture promising leaders.

**Joint graduate program with Tsinghua University**

The dual master's degree program allows students to obtain two degrees. Since 2004, it has trained excellent science and technology personnel who are familiar with the culture and customs of both Japan and China.

### Collaboration and exchange with overseas bases

**Collaboration with universities, research institutes, companies**

In collaboration with overseas universities, research institutes, and companies, we enhance the quality of education and research by promoting international educational programs and uncovering the seeds of international joint research at Science Tokyo's overseas bases.

Examples:

- Workshop and symposium with RWTH Aachen University
- Research Showcase in Bangkok
- Joint Colloquium with UC Berkeley
- International collaborative research on emerging and reemerging infectious diseases at the Ghana site

### Driving worldwide medical-industrial collaboration

**The Global Consortium of Innovation and Engineering in Medicine**

Consortium of universities, government agencies, private partners, etc.

The Consortium provides a global network for the development of medical education, fosters global collaborative research, promotes international exchange, and hosts an annual international summit through collaboration and innovation between medicine and engineering. Science Tokyo is a founding member of the Consortium.



## Together with the world's top universities, we offer educational programs that enable students to acquire a high level of international competence.

### Programs with Imperial College London

Science and Technology

**Global Fellows Programme for doctoral students**

Through mixed group discussions, field trips, poster presentations, etc., the program aims to develop leadership, interdisciplinary and communication skills as a researcher, collaboration with researchers from various fields, acquisition of perspectives outside of one's specialty, cross-cultural exchange, and network building.

Medicine and Dentistry

**Intercalated Bachelor of Science programme**

The program aims to cultivate an international mindset and intellect that can be used on the world stage by participating in systematic scientific education and discussions at world-class universities and engaging in "serious study abroad" for about one year to earn a degree.

### Programs with Harvard University

Medicine and Dentistry

**Clinical training through teacher training and credit transfer**

In 2002, a medical education affiliation agreement was formed with HMI (Harvard Medical International), currently PHMI(Partners Harvard Medical International) , and PIMS (Partners International Medical Services) in 2012.The agreement provides medical students with opportunities for clinical training at Harvard Medical Schoolaffiliated hospitals on a credit transfer basis.

### Global Education Option (GEO)

Science and Technology

**Strengthening international capabilities to develop and exploit new value**

This program is structured to organically link global education with elements of foresight, leadership, value creation, and career building, and help students acquire greater international competence. The program offers coursework in study abroad and foreign language communication.