Globally Engaged

Tohoku University

A Designated National University

Nationally Recognised, Globally Engaged

Tohoku University has been engaging with society since it was founded in 1907. That commitment has grown stronger since the Great Eastern Japan Earthquake.

Thanks to the generous support of many people around the globe, we have been able to restore our research facilities that were heavily damaged by the disaster. In return, we have been constantly asking ourselves what the university can do to assist others who have experienced hardship.

Many years of research in spintronics has shown me that I cannot pursue my research without the support of society. Of course, I am not the only one to feel that way — a sense of gratitude and connection with society is shared across Tohoku University as a core element of our identity.

In 2015 we launched an initiative to become a center of research with social impact, seeking solutions for the most pressing challenges facing contemporary society. We have embarked on 30 research projects for solving key challenges in seven areas: a sustainable environment; a healthy population; safety and security; connecting with the global community; a responsive and prosperous future; life in space; and a university that supports communities.

The chart on page 5 outlines the ways in which these 30 projects share many of the aims of the United Nations' Sustainable Development Goals (SDGs).

Another milestone was set last November with the release of our Tohoku University Vision 2030. This illustrates what the university is aspiring to be in 2030 and defines the medium to long term core strategies and concrete actions needed to get us there. Tohoku University's founding principles continue to be relevant in guiding this future ambition: Research First, Open Doors, and Practice-Oriented Research and Education.

As a specific course of action, we have formulated 19 core strategies to drive the four main components of Vision 2030: Education, Research, Co-creation, and Governance Reform. These strategies are embodied in key projects such as the launch of the Tohoku University College of Creative Endeavor; the establishment of the Core Research Cluster enveloping our university's four key research areas: materials science, spintronics, next-generation medicine, and disaster science; and

implementation of the B-U-B model of industry-academia collaboration for open innovation.

We will never waver in our commitment to creating value as a globally engaged university. As a proud member of the Tohoku University community, I am very excited to collaborate locally and globally to ensure a path to a bright future.

January 2019

Hideo Ohno, President of Tohoku University

Hideo Ohno is an internationally renowned physicist in the field of spintronics and has been president of Tohoku University since 2018.

Tohoku University's SDGs: A Safe, Secure and Sustainable Society

Research with social impact is the umbrella term for interdisciplinary research projects based on Tohoku University's fields of strength, which aim to contribute to a sustainable future. Sustainability refers not only to the conservation or recycling of resources and preservation of the environment, but also to the resolution of economic and societal issues. Research projects initiated by Tohoku University are closely connected to the 17 Sustainable Development Goals (SDGs) announced in 2015 by the U.N.

Tohoku University's own SDGs toward the realization of a sustainable society were initiated following the Great East Japan Earthquake of March 2011. In order to help communities recover from the disaster, we established the International Research Institute of Disaster Science (IRIDeS) one month after the disaster and launched eight priority projects to achieve a safe, and secure society.

Since 2011 Tohoku University has increased its focus on society through post-disaster reconstruction and various research projects. This led to establishing research with a social impact in 2015. These actions are an important part of Tohoku University's position as a Designated National University. Collaborating with partners and communities both at home and abroad, we will continue our work toward a sustainable and prosperous future for all.

Timeline of R&D related to sustainability

November 2017
First World Bosai Forum

March 2015
UN World Conference on Disaster Risk Reduction

September 2015
UN Sustainable Development Goals

November 2011
UN Academic Impact Support of Principle 9 (Sustainability)

Contributing to the realization of a sustainable society through Tohoku University's own SDGs

2030

Further advancements of Tohoku University's activities for sustainable development

2017

2015

2011

Basics of Education & Research
Fields Contributing to Sustainable Development

Renewable Energy	Energy Efficiency
Illness Prevention	Resource Protection
Equal Opportunities	Conservation
Climate Change	Education
Human Security (Measures against Poverty, Pollution & Conflicts)	

...and many others

March 11, 2011
The Great Eastern Japan Earthquake

1 **Disaster Risk Reduction Strategies**
Safety, Security & Sustainability

April 2011
International Research Institute of Disaster Science

2 **Development of Tohoku University's SDGs**
Towards Sustainability and Prosperity

July 2015
Research with a social impact

3 **Promotion of Tohoku University's Activities**
Community Collaborations

June 2017
Selection as a Designated National University

Tohoku University's Sustainable Development Goals

SUSTAINABLE DEVELOPMENT GOALS

Research Area	Project Logo, Number & Title	Corresponding UN SDGs
A Creating a Sustainable Environment	A0 Environmental Values A1 Climate Change A2 Synergy with Nature A3 Energy A4 Recycling	7 AFFORDABLE AND CLEAN ENERGY 12 RESPONSIBLE CONSUMPTION AND PRODUCTION 13 CLIMATE ACTION 14 LIFE BELOW WATER 15 LIFE ON LAND
B Health & Well-Being	B1 Homeostasis B2 Personalized Medicine B3 Zero Dementia B4 Oral Hygiene B5 Medicine for the People	3 GOOD HEALTH AND WELL-BEING 6 CLEAN WATER AND SANITATION
C Safety & Security	C1 Disaster Risk Reduction C2 Infrastructure for the Future C3 Overcoming Infectious Diseases C4 Radiation Safety and Society	6 CLEAN WATER AND SANITATION 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE 11 SUSTAINABLE CITIES AND COMMUNITIES
D Connecting with Global Communities	D1 Japanese Studies D2 Cross-Cultural Dialogues D3 Value of Information D4 Future of Information Society D5 Manufactory	8 DECENT WORK AND ECONOMIC GROWTH 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE 16 PEACE, JUSTICE AND STRONG INSTITUTIONS 17 PARTNERSHIPS FOR THE GOALS
E A Responsive & Prosperous Future	E1 Prosperity E2 Longevity E3 Hope from Tohoku E4 New Food Production	2 ZERO HUNGER 8 DECENT WORK AND ECONOMIC GROWTH 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE 16 PEACE, JUSTICE AND STRONG INSTITUTIONS
F Life in Space	F1 Innovation from Life F2 Space Exploration	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE 13 CLIMATE ACTION
G Academia Supporting Communities	G0 Meaning of Academia G1 Principle of Education G2 Societal Role of Science G3 People, Law & Politics G4 Fair Society	1 NO POVERTY 4 QUALITY EDUCATION 5 GENDER EQUALITY 8 DECENT WORK AND ECONOMIC GROWTH 10 REDUCED INEQUALITIES 16 PEACE, JUSTICE AND STRONG INSTITUTIONS

A Science Park in the City of Trees

Tohoku University is working on a new initiative for collaborating with society: a hub for creative innovation at the new campus extension at Aobayama.

Since its founding, Tohoku University has consistently offered groundbreaking research generating innovative and progressive developments across many domains. This model of research remains very much alive in the 21st century. The Aobayama Campus extension, which opened in 2017 on a site spanning 81 hectares, will be an advanced platform for upcoming projects; a science park focused on supporting a sustainable future.

The campus extension is being developed to encourage collaboration between innovation-oriented businesses of all sizes. The Science Park Zone will be Tohoku University's own style of innovation ecosystem, operating not as a B2B platform, but as a business-university-business (B-U-B) forum where our university plays the core, conveying role. Collaborations will all focus on a shared vision for a sustainable future.

There are several steps to building this innovation ecosystem. The first is to create a center for industry collaboration under one roof. We will relocate certain university organizations such as the Office of Cooperative Research and Development, Tohoku Techno Arch (a Technology Licensing Organisation), and Tohoku University Venture Partners (a venture capital firm) to the campus extension, creating an all-in-one operational structure to facilitate full-scale collaboration with industry.

In addition, we will strengthen our framework for catering to the advanced open innovation needs of businesses. For each domain of technology, we will establish a consortium designed to enable diverse players — from established companies to startups — to effectively emphasize their respective roles. Together, these consortia will form the open ecosystem for new innovation, constantly producing seeds of innovation. We will establish rules for large-scale co-creation projects in competitive areas, as a step towards commercialization of innovative seeds emerging from university research.

Proof of the high level of open innovation at Tohoku University can be found in our Center for Innovative Integrated Electronic Systems (CIES). Globally recognized as a leading center for cutting-edge open innovation in ultralow power technologies utilizing AI and IoT applications, CIES has produced tremendous achievements that earned the Prime Minister's Award for Achievements in Private-Public Innovations in 2016.

CIES has paved the way towards further strategic open innovation that will encompass other realms of technology, including next-generation medicine, materials science, tough AI/intelligent robotics, quantum computing and next-generation synchrotron radiation, among others.

All this is part of Tohoku University's evolving innovation ecosystem, one that promises to bring important results and swift progress on the exciting road ahead.

Innovative ultralow power technologies for AI and IoT

As the world enters the AI era, many science-based organizations are pursuing software-focused AI research. At Tohoku University, AI research has been centered on hardware. AI systems require vast memory resources to store the enormous volumes of data that go into their learning processes. However, our existing memory technologies cannot store and retrieve that information without using excessive amounts of electricity.

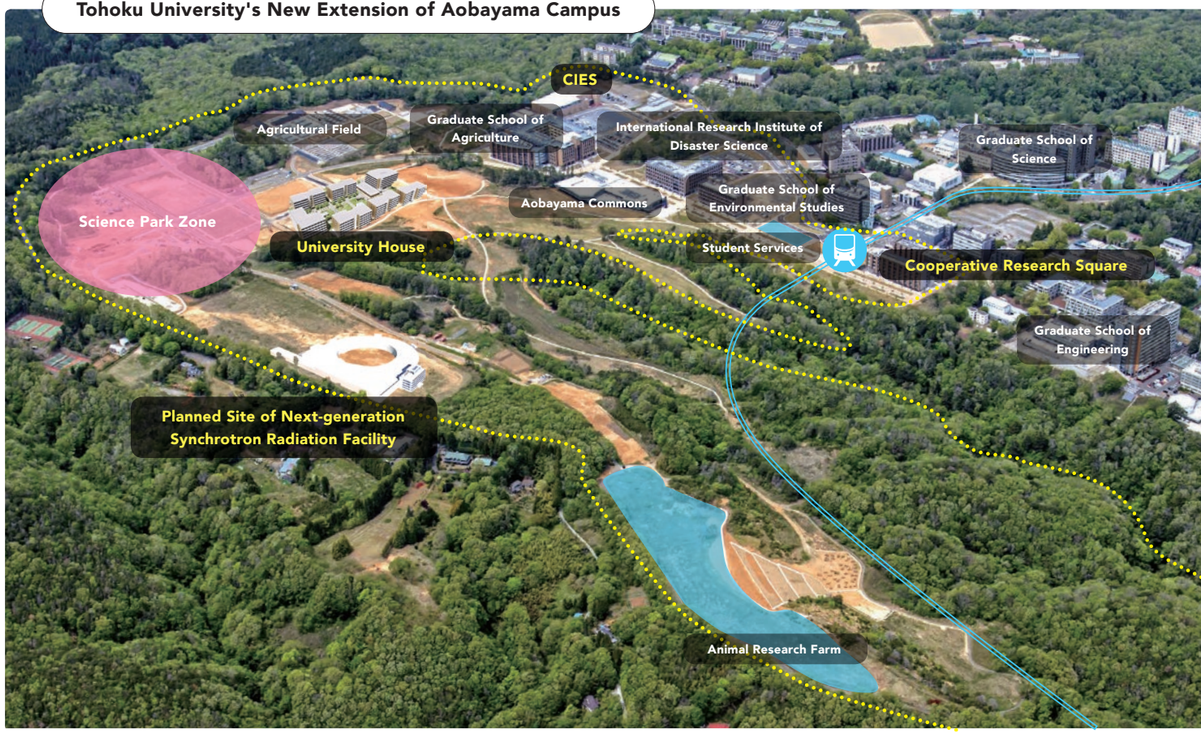
That's why we have turned to spintronics as a promising solution to use in ultralow power memory, establishing a collaborative research consortium to serve as an innovation ecosystem for spintronics research. The consortium is spearheaded by our Center for Innovative Integrated Electronic Systems (CIES), headed by Professor Tetsuo Endoh, a pioneer of sophisticated 3D-integrated memory.

Born from the Faculty of Science

Tohoku University began when its Faculty of Science was officially established in 1907. There were no buildings at the campus at the time and several professors were based in Europe so the first faculty meeting was held in Gottingen instead of Sendai.

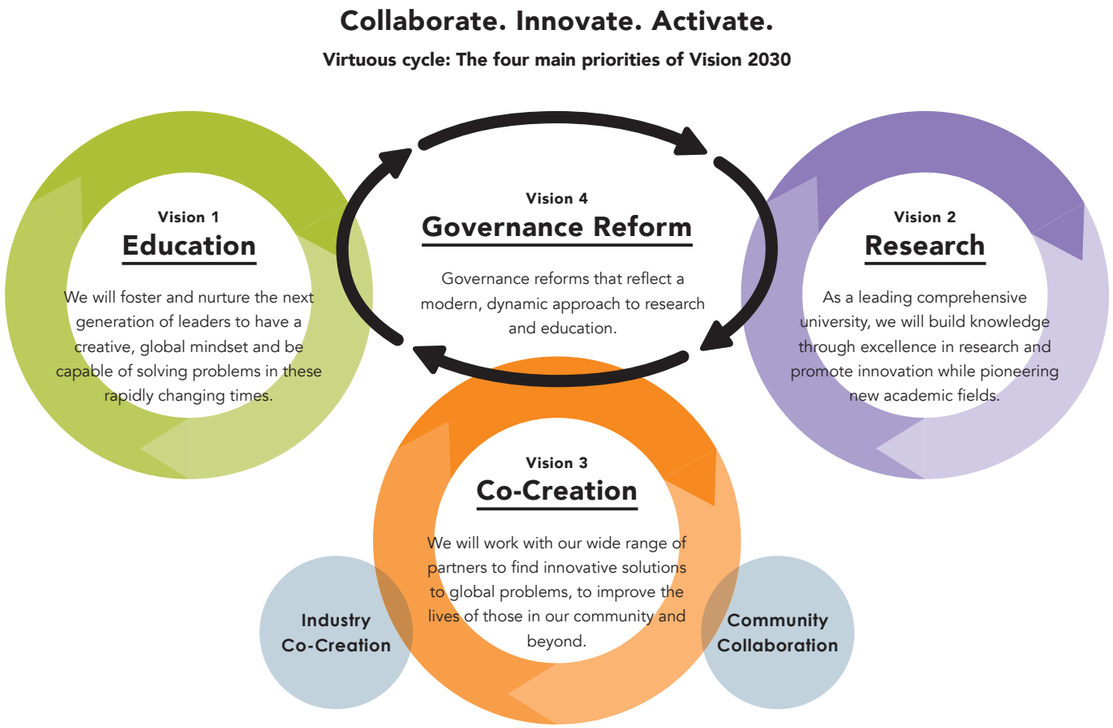
In 1922, Albert Einstein visited Sendai with his wife. He gave a talk at Tohoku University stating, "Sendai is a city well suited for research and Tohoku University is and will be a force to be reckoned with." In 2018, Sendai City was ranked 90th by Nature Index in its list of Top 200 Science Cities.

Tohoku University's New Extension of Aobayama Campus



A Leading University in Innovation and Academic Excellence

In June 2017, Tohoku University was selected as one of the first three Designated National Universities (DNU) by the Minister of Education, Culture, Sports, Science and Technology. This title is conferred on national universities in recognition of their excellent capabilities and potential for world-leading education and research.



As a Designated National University, Tohoku University aims to be a leader in creation and transformation. This requires developing world-class knowledge through excellent education and research. To achieve our goal, we will first focus on four core activities: education, research, co-creation (partnerships with industry and community), and governance reforms.

As of August 2018, several projects had been put into action. In education, we launched a program to provide funding and necessary support for interdisciplinary advanced research and education, International Joint Graduate Programs, as well as graduate student research and study. In research, we established Core Research Clusters in our four leading research fields and an international research cluster of five additional fields. In co-creation we've developed a center for industry-academia collaboration and the Science Park at our new Aobayama campus extension.

Japan's first next-generation synchrotron radiation facility to be constructed at Aobayama Campus

In July 2018 the Ministry of Education, Culture, Sports, Science and Technology announced its decision to establish Japan's first-ever next-generation synchrotron radiation facility at the new extension of Aobayama Campus. A coalition of five organizations — SLiT-J, Miyagi Prefectural Government, Sendai Municipal Government, Tohoku University and Tohoku Economic Federation — was selected to partner with the National Institutes for Quantum and Radiological Science and Technology (QST) to implement this project.

The facility will feature a huge circular particle accelerator measuring 325-425 meters in circumference and 100-135 meters in diameter. The soft X-ray radiation generated by the accelerator will be used to perform observations for visualizing the functions of materials subjected to various methods. The facility is projected to be operational around 2023. With this exciting new facility, the Aobayama Campus extension is expected to attract top level researchers.

Japanese Studies: A Fresh Approach

Studying Japan through a multidisciplinary lens

2019 sees the opening of a new, multidisciplinary department at Tohoku University. The new Department of Japanese Studies and associated International Joint Graduate Program in Japanese Studies means students and staff will have opportunities to collaborate and research in ways not previously possible.

A collaborative project of the Humanities Faculties, the International Joint Graduate Program in Japanese Studies (GPJS) will operate in conjunction with overseas institutions to provide a multidisciplinary field to address contemporary issues facing society. Including researchers in Western Studies, the GPJS aims to deconstruct the standard diachronic view within traditional Japanese Studies and allow for synchronic research across disciplines and regions.

At the same time, the Graduate School of Arts and Letters (GSAL) will include three new departments from April 2019: Japanese Studies, Global Humanities, and Integrated Human Sciences. Various Japan-related research cultivated in the GSAL will form the Department of Japanese Studies, offering a broad multidisciplinary perspective on 'Japan'. The newly introduced major of Innovative Japanese Studies, lead by faculty from Japan and abroad, will enable students to conduct comprehensive inquiries into Japanese society, history and culture.

Core Research Cluster

Aiming for the pinnacle of scientific research

CORE RESEARCH CLUSTER

Tohoku was made a Designated National University due to its expertise in four scientific fields. To further those strengths, we have established four on-campus centers of collaborative research that are collectively referred to as the Core Research Cluster.

Materials Science

Functional and structural materials are in high demand

Our hub for materials science research seeks to create innovations that will contribute to building a sustainable planet. Scientists are developing solutions for two increasingly important areas of global need: high-efficiency energy conversion and storage materials (functional materials) and highly reliable social infrastructural materials (structural materials). At the same time, this hub is expanding the horizons of materials science by leveraging the strengths of the Advanced Institute for Materials Research (AIMR) in mathematics driven materials science research.

Spintronics

New platform technologies for AI & IoT

Tohoku University is at the forefront of spin-centered science through the partnership between the Center for Spintronics Research Network (CSRN) and the Graduate Program in Spintronics. It is focused on creating science and technology to support AI and IoT into the future, including ultralow-power computers, ultrahigh-sensitivity sensors, ultrahigh-capacity data storage and ultrahigh-efficiency thermoelectric technologies.

Next-generation Medicine

Exploring AI and medical data science to advance medical genomics

Tohoku University's Advanced Research Center for Innovations in Next-Generation Medicine (INGEM) is contributing to the development of next-generation medicine founded on personalized healthcare and prevention.

The Tohoku University Tohoku Medical Megabank Organization's (ToMMo) integrated biobank of 150,000 participants, provides INGEM with genomic and other biological information, as well as clinical information to pursue research driven by AI and other forms of medical data science. It also conducts research to help shed-light on relationships between diseases and hereditary/environmental factors and applies the findings to the implementation of clinical studies.

Disaster Science

Establishing the discipline and creating resilient communities

Our disaster science research is helping to establish disaster science as a new discipline. The research integrates the phases of disaster management cycle theory (pre-investment/prevention; emergency response; mitigation: recovery/reconstruction; resilient community development) with the four realms of science (human, social, practical and natural) that are associated with those phases.

The university is uniquely placed to share experiences and lessons from the Great Eastern Japan Earthquake. As a comprehensive university it supports the development of safe and resilient communities by bringing together expertise and the latest research in disaster risk reduction from around the world.

Further Collaboration

Tohoku University and University College London

A delegation from Tohoku University, led by President Hideo Ohno, was in the UK for a "Partnership Kickoff" event with University College London (UCL) in October 2018. President Ohno met with UCL President and Provost Michael Arthur to discuss further developing collaborative links between the two universities.

Provost Arthur highlighted UCL's longstanding connection with Japan, which dates back to the 1860s when Japanese students known as the Choshu Five and Satsuma 19 defied a Japanese travel ban and risked capital punishment to study at UCL. He also emphasized the shared ideals of being globally and outwardly engaged: "Global partnerships like the one we're developing with Tohoku demonstrate how higher education can play a part in solving pressing world challenges."

President Ohno echoed the sentiment, while acknowledging historical similarities between the two institutions, such as being their respective country's third national university and the first to accept female students. He spoke of Tohoku University's new status as a Designated National University Corporation and what that means for its academic and industry partners: "As a university leading new creation and change, we are undertaking organizational reform to promote cross-sectional integrated research that goes beyond the barriers of undergraduate departments and graduate schools. We are promoting research to solve social problems."

Tohoku University and UCL then renewed their 2013 academic exchange agreement, adding data science and higher education to the existing partnerships in life science, materials science and disaster science. Some 50 academics from the 2 institutions participated in joint workshops across five academic fields: disaster science, neuroscience, materials science and spintronics, data science and higher education.

"For the past five years, our partnership with UCL has been one of our most productive in the UK in terms of paper co-authorship and researcher mobility" said President Ohno, who attended the workshop on spintronics. "With this new agreement and the workshops here, I look forward to seeing what else we can achieve together."

Nurturing Students to Become Creative Members of Society

For more than a century, Tohoku University has encouraged students to engage with their communities, using their knowledge and skills to make a difference. So that we can continue doing this in an increasingly globalized world facing diverse challenges, we are adding a variety of new dimensions to our system of education. Here are our three flagship projects.

University Houses

Deeper understanding of Japanese culture: Communal living with Japanese peers

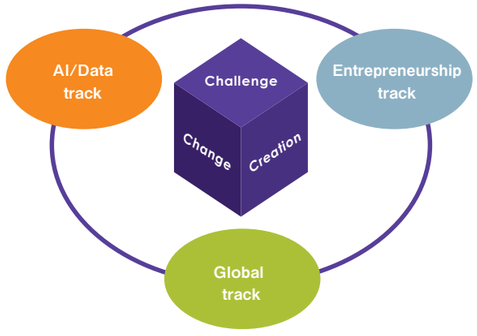
University House (UH) Aobayama opened at the new Aobayama Campus extension in October 2018. The dormitory offers a similar number of rooms to Japanese and international students as a way to help students from other countries make meaningful and genuine connections with Japanese students and culture. This is the fifth such dormitory to be built at Tohoku University since construction began in 2007, joining UH Sanjo I, II and III, and UH Katahira. Together they have a total capacity of 1,720 making the Tohoku University House system Japan's largest communal living space for Japanese and international students.

College of Creative Endeavor

Educating future minds: A 21st century approach

Today's world is increasingly marked by globalization and by the rising importance of AI, big data, and IoT, spawning the need for disruptive innovation to take us beyond the limits of our established systems. To better equip students in this era of great change, we are launching a new education program in 2019 — the Tohoku University College of Creative Endeavor. The program will offer practical education under three contemporary tracks: Global, AI/Data, and Entrepreneurship.

The Global track draws on the Tohoku University Global Leader Program (TGL) established in 2013. The AI/Data track adds new courses in the practical application of AI and data science fundamentals and applications to the existing curriculum. This track will explore a wide range of topics, including legal issues, social challenges, human values and other humanities-related content. The Entrepreneurship track will include internships and other forms of engaged learning for skills to launch a new business, and become an innovator with inspired thinking and a can-do attitude.



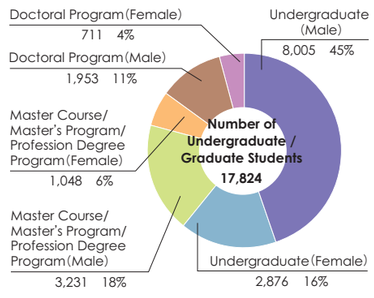
International Joint Graduate Programs

Cultivating Sophisticated Talent to Lead the World

- The Spintronics program provides education that spans from the classical to the quantum and from mathematics to application.
- On the Earth and Environmental Sciences program students learn about the Earth's interior and surface, the oceans and interplanetary space, and how to apply scientific knowledge to benefit society and the environment.
- The Data Science program focuses on creative problem-solving, data analysis, and technological innovation.
- The Physics for the Universe program provides education in the physics of the universe from its origin to today.
- The Neuro Global program offers a cross-sectional curriculum in neuroscience, spanning genes, genomes, molecules, cells, systems, brain imaging, behavior and environmental response.
- The Integration of Mechanical Systems program focuses on the production and development of integrated systems that serve challenging applications.
- The program in Japanese Studies provides students with the skills to tackle contemporary issues by offering broad knowledge ranging from eastern/western classics to today's digital culture.
- The program in Materials Science broadly covers the fundamentals and application of techniques for creating, analyzing, and evaluating materials, with a focus on metallurgy.
- The program in Resilience and Safety Studies, as a hub of disaster and environmental sciences, combines insights from medicine, engineering, agricultural science, the humanities, and social sciences to tackle challenges ranging from disasters and environmental destruction to market issues and economic crises.

Through programs such as these, our university continues to fulfill its commitment to nurturing high-level experts who can truly make a difference locally and globally.

Number of Students



Total Number

(as of May 1, 2018)

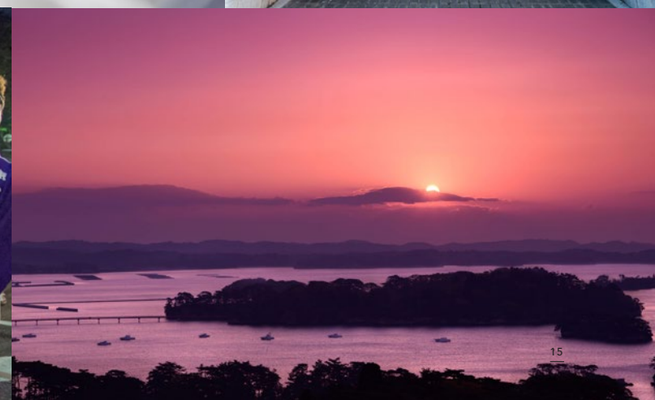
Categories	Student Quota	Number of Students	Number of International Students			Research Students/Special Auditing Students/Special Research Students/Credited Auditors/ Undergraduate Preparatory Students/Intensive Japanese Language Program
			Japanese Government Scholarships	Private Means	Subtotal	
Undergraduate Students	10,040	10,881(2,876)	56	149	205	351
Graduate Students (Master's Program/ Profession Degree Program)	3,838	4,279(1,048)	120	657	777	192
Graduate Students (Doctoral Program)	2,581	2,664(711)	188	476	664	
Subtotal	16,459	17,824(4,635)	364	1,282	1,646	543
Attached School	40	28(17)	-	-	-	-
Research Institutes	-	-	-	-	-	21
Others	-	-	-	-	-	27
Grand Total	16,499	17,852(4,652)	364	1,282	1,646	591

※( ) indicates the number of female students. ※"Private Means" include foreign government funds.

Sendai: The City of Trees

You'll feel at home before you know it

Sendai is known as the "City of Trees". This moniker was inspired by Sendai's history—originally the capital of the Date Domain—and by the many trees and other beautiful vegetation that grace the cityscape. Spring in Sendai fits the quintessential image of Japan in full bloom and greenery. Sendai is also known for its warm and welcoming community. It is a metropolis that offers the full Japanese experience without the stresses that come with large city living.



Director: Noriko Osumi (Vice President, Tohoku University)
Editor: Osamu Shimizu (Academic Groove Movement)
Designer: Masami Furuta (opportune design Inc.)
Cover photographer: Shunichi Atsumi (SHUN'S)
Translation: Umes Corporation
English editor: Beth Thomas
Printer: Mochizuki Printing Co., Ltd.

Public Relations Office, General Affairs and Planning Department
Tohoku University
2-1-1 Katahira, Aoba-ku, Sendai 980-8577

www.tohoku.ac.jp