



100th
Anniversary of Our
First Female Students

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Mini NOTEBOOK

Tohoku University 2023



Fall 2023 Edition



Introducing Tohoku University

Located in the city of Sendai, in Japan's picturesque Northeast region, Tohoku University is one of the country's top institutions, renowned for its innovative research and dynamic global network.

Tohoku University was founded in 1907 and is known for its original guiding principles of putting research first, having an open-door policy and committing to practice-oriented research and education. Always a trailblazer, the university was the first in Japan to accept women in 1913 and was one of the first to welcome international students.

These days, Tohoku University is home to 18,000 students across 10 faculties, 15 graduate schools and six research institutes. About 10 percent of the students come from abroad, contributing to one of the most cosmopolitan academic environments in Japan.

Tohoku University's excellent learning environment,

international outlook and research influence, has earned it recognition from the Japanese government. In June 2017, it was conferred the status of a Designated National University, and it is currently a candidate to be a "University for International Research Excellence." If selected, Tohoku University stands to gain access to the revenue from a 10 trillion yen government project.

For the last four years, the university has also held the number one spot in Times Higher Education's annual ranking of Japanese universities, a list that highlights institutional resources, quality of education and overall student experience.

Tohoku University's researchers are behind some of the

world's most lifestyle-changing innovations, such as the split-anode magnetron used in microwave ovens, the steel-wire recorder and the Yagi-Uda antenna.

More recently, the university has been a global leader in the development of disaster science and risk mitigation strategies through the International Research Institute of Disaster Science; and in personalized medicine research at the Tohoku Medical Megabank Organization, home to Japan's largest population biobank.

A 40,000m² Science Park is also currently in the works. When completed it is set to become an international hub for advanced science and technology research and development.

In the News

Tohoku University is committed to improving communities at home and abroad through multidisciplinary research, green initiatives and the promotion of diversity, equity and inclusion.

On August 21, 1913, three female students were admitted to Tohoku Imperial University, the precursor to Tohoku University. The announcement in the official gazette broke the gender barrier in Japanese higher education, marking the first time in the country's history, that female students were accepted to a national university.

Those three extraordinary women were Chika Kuroda, Ume Tange and Raku Makita.



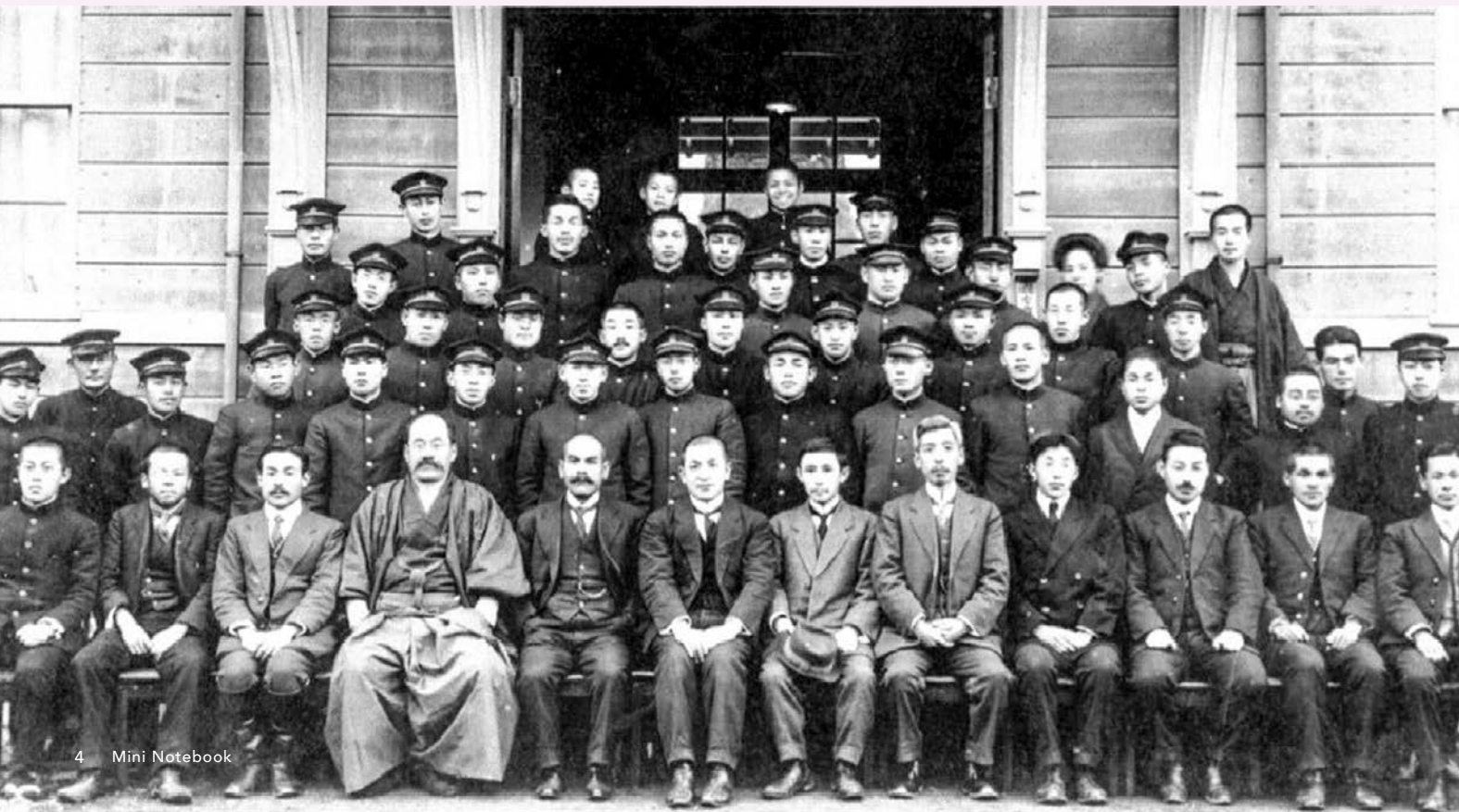
Their admission was controversial in the media, male students campaigned against it, and the Ministry of Education even sent a letter of inquiry to Tohoku Imperial University, claiming that there was no

precedent for the admission of women. "At that time, universities were the preserve of male students from the old high school system," said Associate Professor Satoshi Kato of the Tohoku University Archives. "It was unthinkable for women to enter university as a regular student."

But the university held firm, and Kuroda, Tange and Makita became trailblazers not only as students but also in their successful post-graduation careers.

In the 110 years since, Tohoku University's unwavering "Open Doors" policy has welcomed talented students, regardless of gender, ethnicity, nationality, or economic background.

In April last year, the university unveiled the "Tohoku University Diversity, Equity and Inclusion (DEI) Promotion Declaration," renewing its commitment to building an environment - on campus, in the community and around the world - where all voices are heard and respected.



Special Label Hime White

To celebrate the 110th anniversary of the first female university students in Japan, Tohoku University and microbrewery ISEKADO have collaborated to produce a specially packaged version of the popular craft beer, Hime White.

The special edition beer will be sold with an original label designed by Nagi, a Tohoku University alumna and professional illustrator. Nagi, a 2019 graduate of the Faculty of Economics, said she designed the label to reflect "the strength of positive will."

ISEKADO, the brewing arm of Mie-based Nikenjayamochi Kadoya Honten, was started in 1997 by Narihiro Suzuki, who graduated from Tohoku University's Faculty of Agriculture in 1992.

Each bottle of the special label Hime White costs 572 yen, and a portion of the proceeds will go towards the promotion of diversity, equity & inclusion (DEI) through the Tohoku University Fund.

Science Ambassadors

The Science Ambassadors program, formerly known as the Science Angels program, is a cornerstone of Tohoku University's on-going efforts to promote diversity, inclusion and the role of women in science and technology.

Members serve as a support network for each other and as role models for children, especially young, school-age girls. Science Ambassadors regularly give talks and host events to encourage the love of science among young students.



G7 Science and Technology Ministerial Meeting

Ministers from the G7 and the European Union met in Sendai in May to discuss how international cooperation in scientific research and development can help solve global problems. Tohoku University hosted several events that showcased a cross-section of its science and technology initiatives.

At the International Research Institute of Disaster Science, the G7 ministers learnt about the latest in disaster risk reduction research, and the development of disaster response robotics. They also toured NanoTerasu, and attended a meeting on quantum innovation, where stakeholders from government, industry and academia discussed accelerating the global implementation of quantum technologies.



The three-day ministerial meeting ended with the release of a joint communique, in which the ministers agreed on the importance of open science, which makes scientific research and its dissemination accessible to everyone.



Science Park and NanoTerasu

A 40,000m² Science Park is being built on the new extension of Aobayama campus. When completed, it will serve as a hub for advanced science and technology research and development.

The centerpiece of the Science Park is NanoTerasu, the next-generation 3GeV synchrotron radiation facility that is scheduled to begin operations in 2024. The giant microscope will be capable of making nanoscale observations of both the surfaces and interiors of

different objects, and of visualizing the microscopic mechanisms by which these objects function.

NanoTerasu is so named because "nano" is the scale of observation at the facility, "terasu" is the Japanese word for shining a light on something and Amaterasu is the goddess of the sun in Japanese mythology. The project is led by the National Institutes for Quantum and Radiological Science and Technology, and the Photon Science Innovation Center.



2023 Birdman Rally

Congratulations to the Tohoku University Windnauts on taking second place in the human-powered propeller-driven aircraft category at the 2023 Japan International Birdman Rally.

Piloted by Daichi Iwata, and designed by a team led by fellow third-year engineering student Kazuki Ogawa, the Windnauts' aircraft reached a distance of 42837.78m in under 2 hours of flight time, breaking the previous record of 38010.28m held by Nihon University.

"We would like to thank the companies that sponsored us and provided us with materials, the alumni who passed on their knowledge and experience, and everyone who supported us," said Takaaki Kawahito, leader of the Windnauts.

In the Lab

Tohoku University's bright and vibrant researchers continually produce pioneering research with wider society and application in mind. These innovations go a long way to ensuring a pathway for a sustainable and bright future.

Breaking Down Walls: How Algae Pass Nutrients to their Coral Host

Researchers have unveiled a hidden pathway for sugar release by symbiotic algae, underscoring the crucial role of the often-overlooked cell wall. This discovery



not only highlights the cell wall's protective function but also its significance in symbiosis and carbon circulation within the ocean. Microalgae's well-known symbiotic relationship with cnidarians like corals and sea anemones involves the exchange of sugars and nutrients. This delicate balance, critical for fertile coral reefs in nutrient-poor tropical oceans, faces threats from environmental changes. The research reveals that sugar release is triggered when the algal cell degrades its own cell wall, a process amplified by acidic conditions, even in the absence of a host. Cellulase, an enzyme typically known for breaking down plant cell walls, mediates this release.



Missing Island Explains How Endemic Species on the Miyako Islands Emerged

Researchers from Tohoku University have presented evidence that an ancient landmass, the Okinawa-Miyako Submarine Plateau, facilitated migration among the Ryukyu Islands—sometimes dubbed the Galapagos of Asia. Despite the Kerema Gap separating them, species on the Miyako Islands share genetic affinities with those on Okinawa and northern regions

rather than the nearby Yaeyama Islands. The plateau, active from 5.5 million to 270,000 years ago, acted as a bridge for biological migration. This new hypothesis integrates geological and biological data, explaining discrepancies in the arrival of endemic species. The study showcases the importance of conserving and protecting the unique island biota found on Miyako island.

Creating Sustainable Coastal Ecosystems and Fisheries

An international research team led by Tohoku University has set up the SEAQUEST Project to address the fluctuating fishery population in the Tohoku region caused by the 2011 Great East Japan Earthquake and climate change.

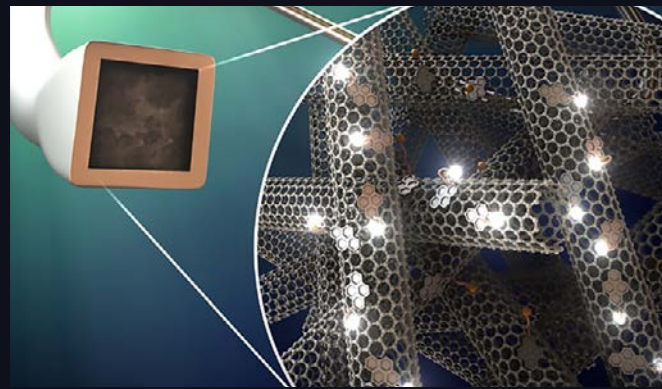
According to Associate Professor Alyne Delaney, who is leading the team, the project combines the use of environmental DNA (eDNA) and AI, while embracing Japanese socio-ecological concepts such as "satoumi" (the link between humans and marine ecosystems) and "umigyō" (ensuring community benefits through the maritime industry).

The research team hopes the project will help to foster stakeholder collaboration and cultivate a holistic approach to ensuring social and environmental sustainability in the region.



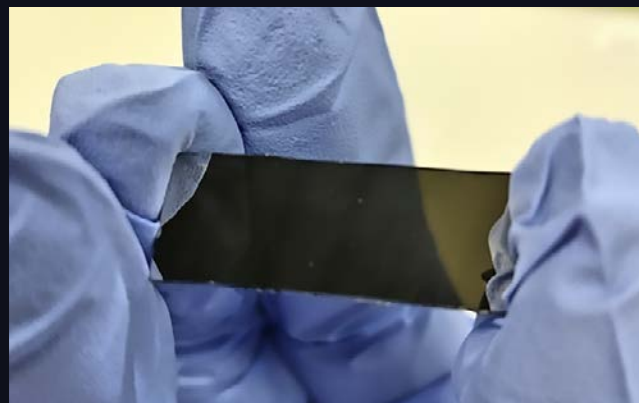
Discovering Features of Band Topology in Amorphous Thin Films

Scientists have long focused on topological materials, studying their unique electronic band structures for potential next-gen devices. Initially limited to ordered crystalline materials, a collaborative research team, led by Associate Professor Kohei Fujiwara and Professor Atsushi Tsukazaki from Tohoku University, has discovered that amorphous materials, with disordered atomic arrangements, can also possess these special properties. Their work, reported in *Nature Communications*, highlights the validity of band topology in amorphous states. This breakthrough not only broadens material options but also promises cheaper device development. The team's experiments on iron-tin amorphous thin films suggest novel applications in IoT-driven sensing technology and beyond.



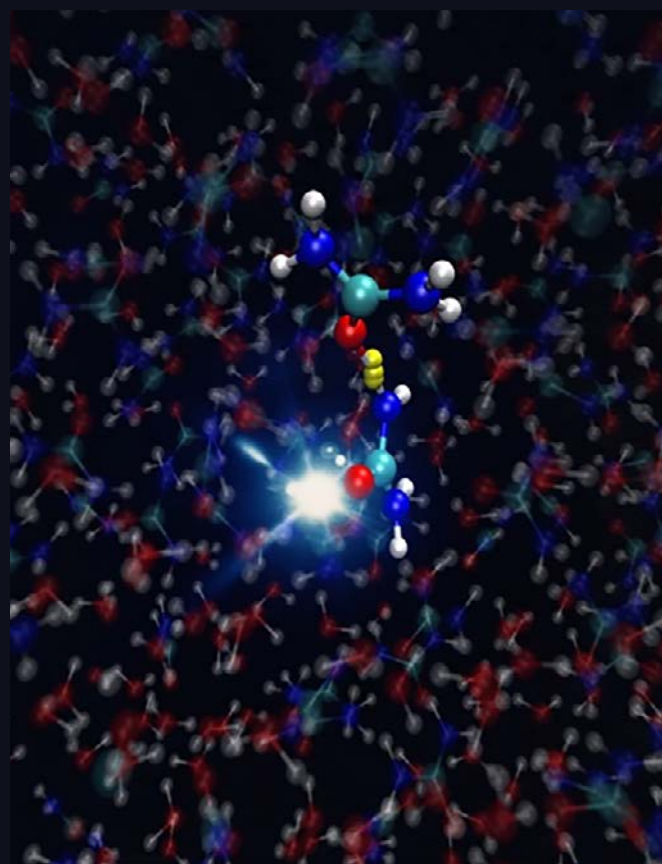
Reading Chemicals Inside the Brain with an Aptamer/Microelectronic Fiber Combination

A groundbreaking neural device offers a promising avenue for understanding and treating brain disorders. Developed by a research group at Tohoku University's Frontier Research Institute for Interdisciplinary Sciences (FRIS), this device combines multifunctional fibers with DNA molecular probes, enabling high-sensitivity and selective detection of neurotransmitters in the brain. Unlike traditional electrical methods, this innovation taps into the brain's chemical signals. To create the device, Yuanyuan Guo, an associate professor at FRIS, and her team enhanced microscopic, thermally-drawn microelectronic fibers to sense neurochemicals using aptamers—customizable synthetic DNA strands that act like molecular keys.



A Glimpse into the Very First Processes that Could Have Formed Life on Earth

A new technology has illuminated the age-old mystery of life's origins on Earth. Researchers, led by Zhong Yin at Tohoku University's International Center for Synchrotron Radiation Innovation Smart (SRIS), unveiled the secrets of prebiotic conditions on Earth, where small water puddles containing urea—an organic compound essential for forming nucleobases—became exposed to intense radiation. Using X-ray spectroscopy, they examined urea molecules at the femtosecond level, revealing how they react after ionization by high-energy radiation. This breakthrough not only sheds light on the formation of life but also pioneers the emerging field of attochemistry, allowing scientists to witness molecular reactions in real-time.



New Research Center to Bridge the Real and Virtual World

Tohoku University's Research Institute of Electrical Communication (RIEC) has launched the New Interdisciplinary ICT Research Center for Cyber and Real Spaces, which is dedicated to bridging the gap between the physical and virtual realms. This interdisciplinary center, merging AI research, psychology and VR/AR/MR communication tech, aims to make it easier to transmit nonverbal cues, such as facial expressions and body language, and make online communication more inclusive.

“The idea for the center came in the wake of the COVID-19 pandemic and the rise of online meetings,” says its director Yoshifumi Kitamura. The center's researchers have already been working closely with actors based in Sendai and Taiwan to capture body movements linked with certain emotions. This will be used to create the first motion data base in Asia, adopting culturally specific emotions to make humanized avatars more diverse.

Water Storage Capacity in Oceanic Crust Slabs Increases with Age

An international research team has unveiled a crucial link between a subduction zone's age and its capacity to recycle water within the Earth's layers. When tectonic plates collide, causing one to subduct beneath the other, rocks undergo metamorphism due to shifts in pressure, temperature and chemical conditions. This process is pivotal for recycling water and vital elements deep within the Earth. Surprisingly, the rock believed to store significant water, lawsonite eclogites, does not form in cold subduction zones, as previously assumed. Instead, it develops in more mature subduction zones.



Lengthy Screen Time Associated with Childhood Development Delays

A study by Tohoku University and Hamamatsu University School of Medicine has revealed that screen time in one-year-olds is linked to developmental delays. The research analyzed 7,097 mother-child pairs and assessed screen time exposure, finding that increased screen time within a child's first year of life correlated with developmental delays at ages two and four in various domains, except gross motor skills. This suggests the need to consider different domains separately when discussing the screen time-child development association. The researchers are hopeful that their insights will lead to further investigations into the impact of various types of screen exposure on child development.

In the Classroom

Tohoku University's growing global network creates a culturally diverse learning environment. Enhanced digital technology has also led to dynamic hybrid classrooms, and more programs with online / in-person options than ever before.

Tanabata season in August is when Sendai city is awash with the bright colors of beautifully handmade traditional decorations hung on bamboo.

Once again, the set made by Tohoku University students featured prominently downtown. A combination of international and Japanese students – most of them members of the International Program in Liberal Arts (IPLA) – spent eight weeks folding the 2,000 paper flowers and 600 origami ornaments that

make up the decorations.

“The Tohoku University decorations are special because the designs have a multicultural flavor,” says Associate Professor Yuka Sakamoto of the Global Learning Center. “Sendai Tanabata is one of the major festivals in the Tohoku region. So, participating in this festival is not only about making and appreciating the beautiful decorations, it’s also preserving a tradition that has been celebrated for a very long time.”



Summer, Winter and Online:

Summer School, Winter Sessions and online programs offer a quick taste of student life in Sendai.

There is the Tohoku University Japanese Program (TUJP) where graduate and undergraduate participants learn Japanese language and culture; and the Tohoku University STEM Summer Program (TSSP) which is designed to showcase the university's work in cutting-edge science and technology.

“We encourage intercultural collaborative learning even in short programs, so international and domestic students develop different perspectives through interaction with each other,” says Kazuko Suematsu, deputy director of the Global Learning Center. “These programs are very well received, and many participants have returned to do longer-term exchange programs or even applied to our graduate schools.”



In-coming

For degree seeking students, Tohoku University currently offers 10 International Joint Graduate Programs in five leading fields such as spintronics and materials science; and five emerging fields, such as Japanese studies and disaster science.

There are also 23 graduate and three undergraduate degree courses taught in English as part of the Future Global Leadership (FGL) Program.

For shorter exchange opportunities, there are four programs open to students from partner universities. The Junior Year Program in English (JYPE) and the Cooperative Laboratory Study Program (COLABS) have research-oriented curricula that allow students to explore topics in science. While the International Program in Liberal Arts (IPLA) offers courses in the humanities and social sciences that promote the understanding of Japanese language and culture.

Participants in the Direct Enrollment Education Program for Natural Science Students (DEEP) mainly take specialized science and engineering courses taught in Japanese.

Out-going

To encourage a global mindset, there are myriad short-term and double degree options for Japanese or domestic students who are interested in studying abroad.

These include the Study Abroad Programs (SAP) which focus on improving practical language and communication skills; and Faculty-led Programs (FL), which explore a single theme through problem-solving projects, field work and other activities. SAP and FL programs have dynamic curricula co-designed by faculty members of Tohoku University and the partner institutions involved.

In the Community

Students and staff engage in various outreach programs throughout the year. Alumni in Japan and around the world are also active members of the Tohoku University family.

Katsurao Plant Factory Tomatoes

Tohoku University's Katsurao Plant Factory in Fukushima prefecture regularly hosts educational events for the community. This summer, staff handed out 177 seedlings of Suzukoma tomatoes, and taught local residents how to grow them.

The Katsurao Plant Factory is an initiative by Tohoku University's Graduate School of Agriculture and the Fukushima Innovation Coast Framework. The project, which began in 2018, aims to cultivate clean tropical fruits and organic tomatoes, in response to concerns about the safety of local produce after the Dai-ichi Nuclear Power Plant accident in 2011.

The facility has three greenhouses, each fitted with technology that can control temperature, humidity and carbon dioxide concentration. The crops are

monitored by researchers and staff through multiple cameras, an automatic data storage system and regular site visits.

Over the years, staff at the facility have tried growing bananas, rice and coffee beans, but mangoes and tomatoes seem to be the most viable.



TomoPro

Tohoku University launched another round of its popular "Tomoni" crowdfunding program over the summer. Known colloquially as "Tomopro," the program was first introduced in 2021 to give students an opportunity to impact their own future by crowdsourcing their ideas and building a project with sponsors who share their vision.

Selected proposals are presented on the university's crowdfunding platform and will receive funding of up to 500,000 yen. Alumni and members of the university will provide mentorship, professional advice and other (non-financial) support.

For more details about the program, visit the Tohoku University Fund website.



Tohoku University Fund
https://www.kikin.tohoku.ac.jp/news/news_detail/view_express_entity/51

Kazumasa Oda Notebook

Singer-songwriter and alumnus Kazumasa Oda, has collaborated with Tohoku University to design a Tsubame-branded notebook, with motifs inspired by his song "Midori-no-Oka." The notebook's cover features a sketch by Oda, while the inside pages contain images and production notes of the song.

Each Notebook costs 440 yen. A portion of the proceeds from the sale will go to the Tohoku University Fund and earmarked for educational and research activities.



Volunteer with SCRUM

One of the best ways to learn is through giving back, and Tohoku University offers many opportunities for students to volunteer, to make a difference to the lives of others and gain a better understanding of the communities in the region.

An active student-run volunteer group is SCRUM, which organizes activities mainly in towns and cities affected by the 2011 Great East Japan Earthquake and Tsunami. In addition to helping in recovery efforts, SCRUM also holds events to raise awareness of disaster prevention and risk reduction.

Alumni Network



Tohoku University has alumni in over 145 countries and the Alumni Association provides the best ways to stay connected. In Japan, the Alumni Association hosts four main events each year in the Kansai, Kanto and Kyushu areas, as well as regular campus activities like Homecoming Day.

The association also has several overseas chapters which can be accessed through the Tohoku University Alumni Network. The online platform serves as a hub for the latest university news and provides a place for alumni across the globe to connect, network and deepen their ties with the university and with each other. The international network hosts several online gatherings each year.



Alumni Network
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