TOHOKU
UNIVERSITY

Tohoku University Annual Review 2013

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Tohoku University Annual Review 2013

Tohoku University

Annual Review 2013

MISSION STATEMENT

Tohoku University has been committed to the “Research First” principle and “Open Door” policy since its foundation, and is internationally recognized for its outstanding standards in education and research.
The university contributes to world peace and equity by using the research results in solving societal problems, and educating human resources in leadership skills.

HISTORY

Tohoku University, formerly known as the Tohoku Imperial University, was founded in 1907. From its start, it displayed to the world an unswerving commitment to an “Open Door” policy. Departing from the norms of other imperial universities, it accepted graduates from technical schools and higher normal schools, and despite opposition from the government at that time, became Japan’s First University to admit female students in 1913 (admitting three in that year).
At the time of its founding, Tohoku University was able to attract a group of young and brilliant researchers who had trained around the world to serve on its faculty. For this reason, a “Research First” principle was established, calling upon scholars to not only pursue highly productive research but to also put their findings to work in the teaching of their students. In addition to this, Tohoku University has nurtured a tradition of “Practice Oriented Research and Education,” in which the results of cutting edge research are being put to use for the good of society and the improvement of living standards. Evidence of our pioneering practice includes the establishment of local venture businesses which have contributed to regional industry, and our status as the nation’s center for research on family law; the domestic branch of law which is closely associated with our daily lives.
Although Tohoku University was severely damaged in the wake of the Great East Japan Earthquake on March 11, 2011, great efforts have been made to restore the basic educational and research functions of our university, and with the traditions, the spirit of Tohoku University as its foundation, we will work toward the reconstruction of the Tohoku region and the regeneration of Japan.

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*The Tohoku University Annual Review 2013 covers activities conducted from April 2012 to August 2013.
*Personal information of those who are in this Annual Review including affiliation, position, and age is not current.

“Achieving World-Class Status and Leaping Ahead” and “Leading the Restoration of Tohoku and Japan”

Susumu Satomi
President, Tohoku University

Ever since Tohoku University was established in 1907, our philosophy has always been to put “Research-First,” to maintain an “Open-Door” Policy, and to emphasize “Practice-Oriented Research and Education.” With these principles, the University has historically served its charter role as a premier research-oriented educational institution of higher learning. Tohoku University’s Annual Review lists and describes the major achievements of the 2012 academic year.

Two years have passed already since the catastrophe of the March 11, 2011 Great East Japan Earthquake. Tohoku University, which was in the epicenter of the disaster stricken area, must be a force not only for the reconstruction of the Tohoku Region but for the whole nation, which had been in stagnant state for years even prior to the disaster.

We would like to steadily continue toward our two goals of “Leading the Restoration of Tohoku and Japan” and “Achieving World-Class Status and Leaping Ahead” that were set upon my inauguration as President of the university last April.

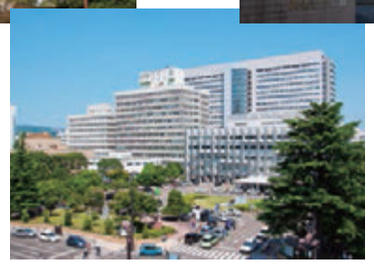
First, we will set a clear agenda in education and research towards our goal of “Achieving World-Class Status and Leaping Ahead.” In education, we will reconsider which liberal arts are necessary to future leaders in a turbulent society, and create an environment in which they can be reliably acquired. We will continue to produce human resources that will be able to communicate and interact with people around the world, along with future leaders that can play an active role in the international community. In research, we will analyze the current situation and challenges faced by each institute and graduate school to clearly define the direction of change that will lead to improvement in their functions. In April of this year, the Frontier Research Institute for Interdisciplinary Sciences was created, enabling the University as a whole to identify issues facing humanity and resolutely solve these issues from a comprehensive and interdisciplinary standpoint.

Second, we will continue to play an important role in “Leading the Restoration of Tohoku and Japan.” Even though the reconstruction efforts in the disaster affected areas have finally begun, a comprehensive vision for these efforts has yet to be outlined. Tohoku University, as a university at the epicenter of the disaster, has a duty to lead the reconstruction efforts through the development of new technologies and industries. Tohoku University has promoted a variety of projects aimed at reconstruction and rebirth through the “Institute for Disaster Reconstruction and Regeneration Research,” created immediately after the disaster, and its various programs such as the “International Research Institute of Disaster Science” and the “Tohoku Medical Megabank Organization.” In addition, we have established organizations for the reeducation of medical personnel and development of human resources for local health care organizations. We also launched the “Resilient ICT Research Center.” Looking toward the future, we are determined to overcome this crisis by building a worldwide cooperative framework to serve, not only Japan, but the entire world using the knowledge obtained from this disaster.

To fulfill its mission and to continue its contribution to the sustainable development of human society, Tohoku University will establish and act upon its vision to achieve the two above goals. Through analyzing both domestic and foreign trends and assessing the weaknesses, strengths, and the potential of this University, this vision will define our policies and timetable, serving as a foundation for achieving an ideal form for the University in five years time. As we celebrate the centennial anniversary of the admission of the first female students in Japan by Tohoku University, we sincerely ask for your understanding of our goals and duties, as well as our, and many others’, wish to contribute to the development of a peaceful and just human society.

Tohoku University News and Events (April 2012 - July 2013)

2012	
Apr.1	Susumu Satomi became the 21st President of Tohoku University
Apr.1	International Research Institute of Disaster Science established
Apr.5	2012 Tohoku University entrance ceremony
Jul.30-31	Tohoku University open campus
Sep.25	Tohoku University graduation ceremony
Oct.6	Tohoku University Homecoming Day
Oct.20	10th anniversary of the Graduate School of Educational Informatics Research Division/Education Division
Oct.2-4	Tohoku University Festival 2012
Nov.22	10th anniversary of the Graduate School of Environmental Studies
Nov.30	20th anniversary of the Graduate School of Information Sciences
Dec.10	Tohoku Medical Megabank Organization Community Support Centers opened
2013	
Feb.25-26	2013 Tohoku University entrance examination: first examination for general admission
Mar.12	2013 Tohoku University entrance examination: second examination for general admission
Mar.27	Tohoku University graduation ceremony
Apr.1	Frontier Research Institute for Interdisciplinary Sciences inaugurated
Apr.1	Ceremony for Student Certification for Leading Graduate School Programs
Apr.4	2013 Tohoku University entrance ceremony
Jul.30-31	Tohoku University open campus



Tohoku University
Disaster Reconstruction Projects

We are in the third year since the Great East Japan Earthquake, which occurred on March 11, 2011. Tohoku University established the Institute for Disaster Reconstruction and Regeneration Research on April 2011 and promoted the following eight projects.

1 International Research Project on Disaster Science

International Research Institute of Disaster Science (IRIDeS) has been established and is acting to understand the mechanisms that generate earthquakes and tsunamis, performs medical activities to protect the lives and health of disaster victims, researches and studies how to relieve cultural assets and benefit society.

2 Project for the Reconstruction of Community Health Care

- The goal of the **Comprehensive Training Center for Community Medicine** is to teach advanced medicine, support medical recovery, and develop human resources to cultivate regional medicine and disaster medicine in the affected areas.
- **Tohoku Medical Megabank Organization** has been constructed to be a complex biobank to integrate medical and genome information, while conducting long-term health surveys of disaster victims and dispatching doctors to affected costal areas.

3 Project for Environmental Energy

Develops and studies next generation energy and energy management systems tailored to the local climate and geographical features revival of energy sources in the disaster-stricken areas, and solutions for the energy problems facing Japan.

4 ICT Reconstruction Project

Established the **Research Organization of Electrical Communication (ROEC)** to address solutions to problems in information and communication technology exposed in the wake of the earthquake, such as the disruption of communication lines.

5 Tohoku Marine Science Project

Ascertains the impact the earthquake and tsunami had on the marine ecosystem and the restoration process, and to contribute to recovery of Tohoku's seas.

6 Radioactive Decontamination Project

- **Research Center for Remediation Engineering of Living Environment Contaminated with Radioisotopes** strives for technological developments for remediation and restoration engineering of contaminated living environments, such as technology for contamination inspection and decontamination of soil.
- **Project for comprehensive exposure dose assessment for disaster-affected animals** examines the distribution of radioactive substances in the bodies of livestock and constructs an archive in order to understand exactly how internal exposure affects the environment, other living animals, and human beings.

7 Regional Industries Restoration Support Project

- **Regional Industries Restoration Research Project** tracks current restoration conditions and challenges, and suggests how the future social and economic structure in the Tohoku Region should look.
- The **Regional Innovation Producer school** trains managerial talent from local communities and support innovative businesses in local communities.

8 Industry-University Collaboration Development Project for Reconstruction

Aims to create stronger cooperation with industries and municipalities in Miyagi Prefecture, and to have the technological innovations of the University utilized and commercialized in local businesses.

In addition "Reconstruction Action 100+" has expanded with a diverse pool of more than 100 voluntary projects by faculty members.

ICT Reconstruction Project
Information communication experiment with the use of an outdoor speaker system

Tohoku Marine Science Project
Joint investigations with fisheries

Radioactive Decontamination Project
Radiation detector that can analyze food in bulk

Tohoku Medical Megabank Organization

Spearheading the effort for construction of a cutting-edge medical care system set in motion with the recovery efforts from the Great East Japan Earthquake

Now, two years after the Great East Japan Earthquake that occurred on March 11, 2011, there are many earthquake victims who still have to live in temporary houses. Not a few of them are suffering from health problems caused by stress since the occurrence of the earthquake.
Tohoku University has engaged in various medical support activities for recovery from the earthquake since its occurrence. It established the Tohoku Medical Megabank Organization (ToMMo) in February 2012 with the motto of "Creative Reconstruction" to actively support the recovery of the disaster-stricken areas.
In order to use genome analysis techniques that have rapidly evolved since the Human Genome Project was started in the field of medicine, it should be accelerated to construct a whole genome reference panel for Japanese so that the development of new medical technologies can use medical information that has been integrated into genetic information. While it engages in a health study on people in the disaster-stricken areas, ToMMo will store genetic information on people, and provide long-term preventive health care and medical support activities, in an effort to construct a system of medical care for the future.
"At present, ToMMo has a staff of 200 people including Genome Medical Research Coordinators (GMRC). GMRCs are certified by ToMMo to recruit those who agree to provide their genetic information to ToMMo for the project (joining a genome cohort). GMRCs are trained and nurtured in an internal training school. A genetic counseling course was newly established at the Tohoku University School of Medicine, because communication with genetic information providers to give them information on possible risks for diseases obtained from genetic information will become increasingly important," says Professor Yamamoto, Executive Director, ToMMo. He emphatically states that it is an important mission of Tohoku University to develop human resources that are able to work in the future medical care system so that they can provide outstanding medical services.
Construction on the central facility for the project will be completed in spring of 2014, and ToMMo should be ready to start full-scale operations by summer. It will be provided with a super computer and other cutting-edge equipment necessary for human genome analysis, and a mega-databank for genetic information. The facility will modify medical information and medical histories so that they can be handled by ICT, thus preventing data from being lost in disasters. ToMMo also aims to attract related medical industries so that they are able to utilize these resources as well. In this way, this facility will become a major center for advanced medicine.

A community resident cohort. GMRCs are giving an explanation of the study to them in person.

ToMMo Clinical Fellows presenting a report on their work to medical institutions located on the coastal areas of Miyagi Prefecture. They work there in a "system of dispatching physicians on a rotation basis" and meetings are held on a regular basis.

This state-of-the-art DNA sequencer reads a DNA sequence at a high speed and analyzes DNA samples.

ToMMo building will be completed in spring of next year.

Tohoku Medical Megabank Organization
Executive Director

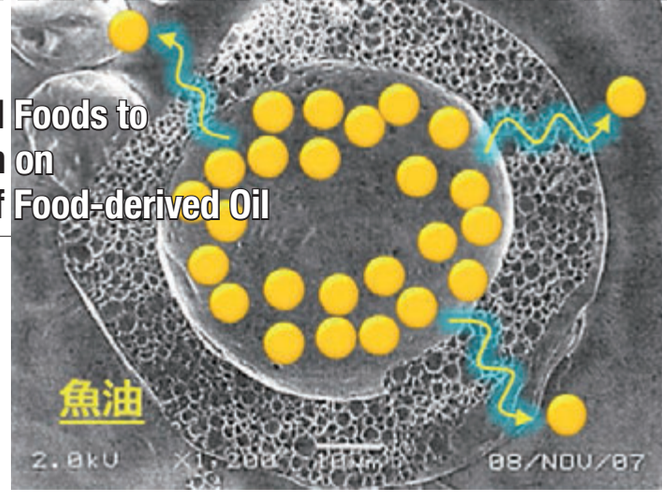
Masayuki Yamamoto

Born in 1954 in Gunma Prefecture. He graduated from Tohoku University School of Medicine in 1979. After finishing his doctoral course at the Tohoku University Graduate School of Medicine, he began working as Postdoctoral Fellow at Northwestern University in 1983, as Lecturer at Tohoku University School of Medicine in 1991, as Professor at the University of Tsukuba Center for Tsukuba Advanced Research Alliance in 1995, as Professor at Tohoku University Graduate School of Medicine in 2007, as Vice President and Dean at Graduate School of Medicine/School of Medicine at Tohoku University in 2008, and as Distinguished Professor at Tohoku University in 2010.
He has been in his current position since 2012.

Development of Fish Oil Powder

Aiming to Export Processed Foods to the World through Research on Antioxidation Technology of Food-derived Oil

The sustained-release fish oil is a smooth and dry white powder. It is expected to be used for processed foods, supplements, and health foods for the elderly.



The cross-linked structure of the gelatin containing transglutaminase is epoch-making. Being cut off from oxygen prevents oxidization, and the fish oils can be released gradually. Depending on the mesh size of the cross-linked gelatin, the amount of fish oil released is controlled.

In 2000 at Jean Mayer Human Nutrition Research Center of Aging, Tuffs University and at Massachusetts General Hospital in Boston, Professor Miyazawa performed high precision analysis of plasmalogens, which are brain phospholipids associated with Alzheimer's disease, and revealed their relationship with dementia. His achievements were highly regarded as a breakthrough in dementia treatment. There are many kinds of food oils. In particular, fish-derived lipids (fish oils) contain many high polyunsaturated fatty acids (DHA and EPA) that when consumed are expected of significantly maintaining healthy brain functions in addition to reducing cholesterol levels and blood pressure. However, fish oils are easily oxidized, have a strong smell and are liquid, which makes them difficult to process into powder.

Professor Miyazawa has become the first in the world to develop a fish oil powder called "sustained-release fish oil powder." The fish oil is clathrate in a cross-linked gelatin which contains the enzyme, transglutaminase. Because of this structure, the fish oil resists oxidation and can be released little by little in the human body. Depending on the size of the mesh of the cross-linked gelatin, the amount of fish oils released is controlled. When this fish oil power is consumed, the fish oil is released slowly and efficiently absorbed into the body. Large companies are paying attention to this ingredient. The fish oil powder has been made into a product in a joint development with a local enterprise and its basic patents have been applied for.

"Tohoku must not be a mere food supply base. Value-added food processing industry is important. Presently, a plan is progressing to open a research platform for developing advanced processing technology in collaboration with local enterprises. Tohoku University's research development capability in food bioscience is internationally at the highest level. To give birth to new foods that will contribute to people's health and longevity in the world by integrating Tohoku's abundant food materials, local enterprises and the university's research development capability. That is my dream and goal," says Professor Miyazawa.

He continues, "In my laboratory, I challenge both undergraduate and graduate students to grapple freely with new research themes. What is important is not only to cope with assigned tasks, but to be aware of problems themselves and maintain a positive attitude toward the research. Overcoming a setback or experiencing a sense of achievement when they have made a breakthrough by themselves is the way to foster excellent researchers."

In collaboration between the Graduate School of Agricultural Science, the New Industry Creation Hatchery Center and Tohoku's food industries, it is planned to open a new laboratory in Tagajo City, Miyagi Prefecture that will act as a center for research on food development.

The high-precision analyzer that was developed has been commercialized and sold.

At the laboratory, 18 graduate students are doing research creatively in an independent and supportive environment.

Food and Biodynamic Chemistry Laboratory, Division of Bioscience and Biotechnology for Future Bio-industries, Department of Applied Bioorganic Chemistry, Graduate School of Agricultural Science

Professor

Teruo Miyazawa

In 1982, he finished his doctoral course at the Graduate School of Agricultural Science, Tohoku University, specializing in food chemistry. After serving as an assistant and associate professor of the Graduate School of Agricultural Science, Tohoku University, he has been in his present position since 1998. Since 2013, he has also served as a professor and leader of the Food Biotechnology Project at Tohoku University's New Industry Creation Hatchery Center(NICHe). He is a Council member of the International Union of Nutritional Science(IUNS), President of the Japan Society of Nutrition and Food Science, and member of the Science Council of Japan.

http://www.agri.tohoku.ac.jp/kinoubunshi/index-j.html

Linear Collider Collaboration

Playing a Central Role in the Development of Detectors for the Next-generation Large-scale Linear Particle Accelerator – the ILC

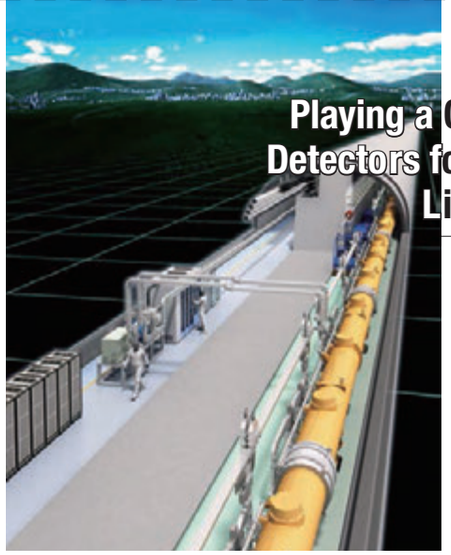
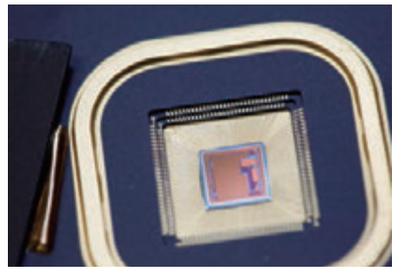


Image of the ILC project with the particle accelerator located in a straight 30-50 km tunnel excavated underground through the stable bedrock.



Prototype CCD image sensor using SOI technology, for the eye of ILC.

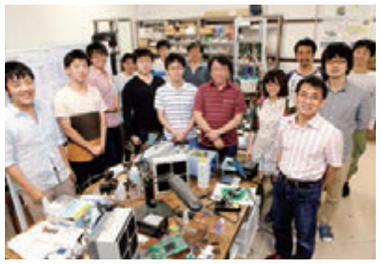
In 2012, the Higgs boson, as predicted by the standard model of particle physics, was discovered at the European Organization for Nuclear Research in Geneva, Switzerland. This was hailed worldwide as the discovery of the century, which will lead to great progress in the field of particle physics, although there remain more than a few questions yet to be solved.

To promote this research, the Linear Collider Collaboration was formally inaugurated in February 2012, and commenced its activities in June. The main goal of the project is to construct the International Linear Collider – a particle physics research facility to be constructed only one in the world. Professor Yamamoto is a director leading the section for physics and detectors, and is playing an important role in the research of the silicon tracker system and the design of the ILC detector. He is also extensively involved in developing new analysis techniques using physical detectors.

The ILC project is moving ahead with Japan as its primary candidate host and the Kitakami mountain range in Tohoku was chosen as its candidate site. The shape of the planned ILC accelerator is straight and long, extending over a length of 30-50 km. It will require excavation of a tunnel through the stable bedrock.

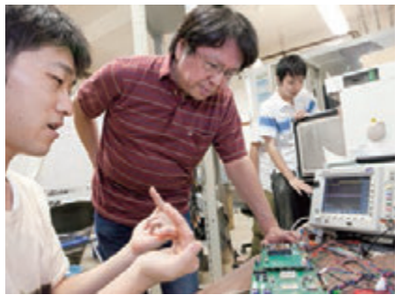
Professor Yamamoto's laboratory is presently developing a new sensor "silicon-on-insulator (SOI) image sensor." Their challenge is to develop a sophisticated sensor with ultra-high resolution that can withstand radiation in a high-energy environment.

"One of the achievements derived from elementary particle research is that, based on pure scientific findings, we can understand the origin of the universe. That gives us a glimpse of the roots of us human beings as well as a better understanding of nature. Another is that new technologies and detectors developed during research have useful applications in society. For example, miniaturization of heavy ion radiotherapy medical equipment and the image sensor mounted in the digital cameras that we use in everyday life are products that have been realized during research on high-performance accelerators. The economic benefits of such products to society are difficult to predict. And there is the feature of elementary particle research that challenges the unknown world," says Professor Yamamoto. Through Science Café for junior and senior high school students and the general public, he is continuously working to arouse interest in particle physics and educate about it.



It is expected to take about 25 years for the completion and commencement of operation of the ILC. Using the completed facility, some of his laboratory members may make the great discovery of the century.

Presently, SOI is at the phase of evaluation testing.



SOI was fabricated by research students under the guidance of Professor Yamamoto.

Experimental Particle Physics, Department of Physics, Graduate School of Science

Professor

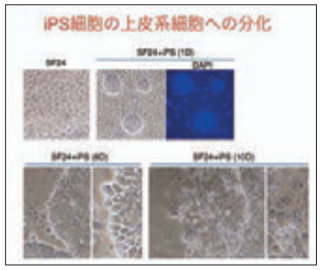
Hitoshi Yamamoto

Born in 1955 in Osaka Prefecture. He graduated from Kyoto University Faculty of Science in 1978. He graduated from California Institute of Technology Graduate School in1985. Professor Yamamoto began working as research associate at Stanford Linear Accelerator Center in 1986, and as senior research associate in 1989 at University of Chicago Enrico Fermi Institute, as assistant professor in 1991 and as associate professor in 1993 at Harvard University and as full professor at University of Hawaii in 1998. He has been in his current position since 2001.

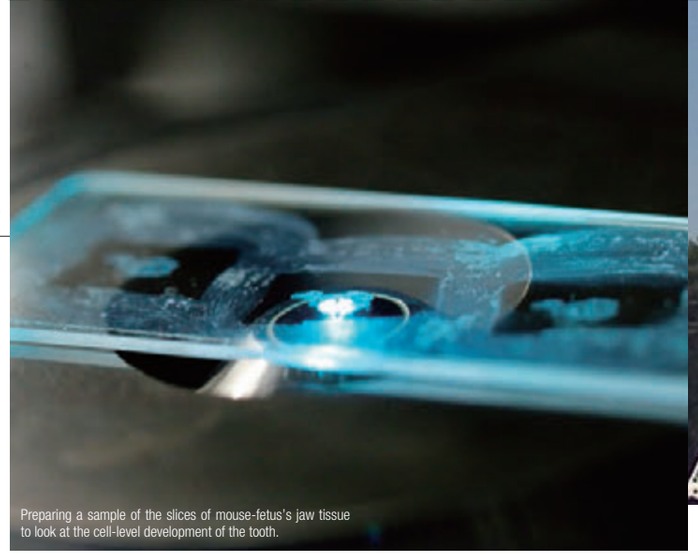
http://epx.phys.tohoku.ac.jp/eeweb/

Regeneration of Teeth

Successfully Induced Enamel Forming Ameloblasts from iPS Cells



After the adult teeth have been formed, the cells that play a role in producing enamel in a human's body disappear, and consequently new teeth are never formed again.



Preparing a sample of the slices of mouse-fetus's jaw tissue to look at the cell-level development of the tooth.

In humans, primary teeth are replaced by permanent teeth. Once permanent teeth are lost, they do not regenerate. Using mouse iPS cells, Professor Fukumoto succeeded, for the first time in the world, in producing the cells involved in the formation of enamel, which is the hardest substance of the tooth. This achievement may reveal the possibility for the regeneration of teeth that do not develop again once they have been lost.

Dental enamel is the hardest tissue in a human's body. Ameloblasts differentiated from dental epithelial cells that exist in the oral mucosa secrete enamel on the surface of the dentin of a developing tooth and enamel-covered teeth are formed. In humans, once the adult teeth have been formed, the ameloblasts disappear and teeth cannot be formed any more.

Professor Fukumoto pondered the discovery that human teratomas originally contain quantities of tissues of hair, bone and teeth, and he began to conduct regeneration research of teeth. "In 2006, Professor Yamanaka's research group at Kyoto University succeeded in producing iPS cells. Immediately, we were provided with their iPS cells and tried to culture them in the cell line of dental epithelium. We found that ameloblastin was expressed in the cultured iPS cells. The ameloblastin is one of the enamel matrix protein secreted by ameloblast. Our research had progressed to this stage by 2008, however, we lost every sample when the Great East Japan Earthquake occurred in 2011. We had to start from the beginning again," says Professor Fukumoto.

Professor Fukumoto is at present promoting gene-level research on how the kind and size of teeth are determined, which is an important point in regenerating human teeth. When this mechanism has been revealed, it will give great impetus to the research of regenerating lost teeth.

Besides actively doing research, Professor Fukumoto frequently holds visiting lectures for dentists, public health nurses, school teachers and elementary school students. "There is a long way to go before regeneration technology of human teeth is established. That's why we should take good care of our teeth," appeals Professor Fukumoto. Such words from a top researcher in the field of state-of-the-art technology are very persuasive.

Teeth formed in the human jaw (x-ray photograph).

The mechanism for regenerating teeth has been revealed, however, there are still many challenges to be overcome for regenerating human teeth.

Students gathering in this laboratory are those who have an interest in regeneration medicine.

Division of Pediatric Dentistry, Department of Oral Health and Development Sciences, Graduate School of Dentistry

Professor

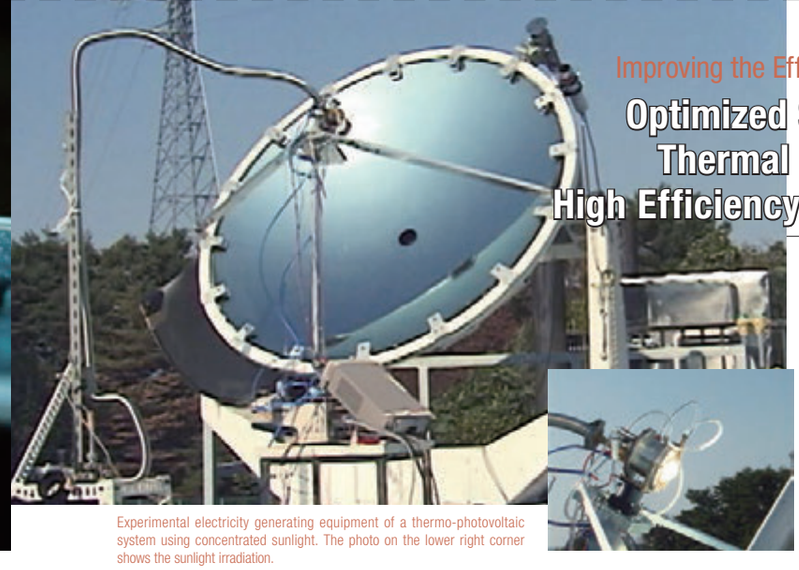
Satoshi Fukumoto

Born in 1969 in Okayama Prefecture. He graduated from the Nagasaki University Graduate School of Dentistry. He has worked at Nagasaki University, Nagoya University and National Institute of Health (NIH). After serving as associate professor at Kyushu University, Professor Fukumoto has served in his current post since 2007.

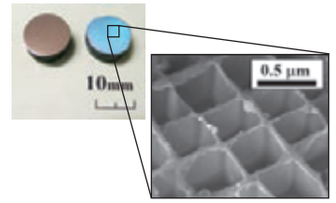
http://www.dent.tohoku.ac.jp/field/health/02/

Improving the Efficiency of Energy Utilization

Optimized Spectral Control of Thermal Radiation to Attain High Efficiency Energy Utilization



Experimental electricity generating equipment of a thermo-photovoltaic system using concentrated sunlight. The photo on the lower right corner shows the sunlight irradiation.



Research on energy conversion with high efficiency by spectral control of thermal radiation is at the stage of application for practical use.

Professor Yugami's laboratory is working on research involved with efficient utilization of renewable energy such as solar energy and hydrogen. One of their main research topics is the spectral control of thermal radiation, which relates to a technology to allow specific wavelength of light to be absorbed or reflected on microstructures fabricated on the surface of the material.

In conventional technology, only a 1 x 1 cm square or so square area of the microstructure could be fabricated on the surface of materials. For practical application, a much larger area of surface-microstructure is required, and the materials used for the product need to be tolerant of temperature above 600 degrees Centigrade. By optimally controlling the metal microstructure, Professor Yugami has successfully developed a technology to fabricate surface-microstructures over large area.

Today, solar thermo-photovoltaic power generation as well as photovoltaic power generation has become popular throughout the world, and the application of research achievements are expected in these fields. In addition, research on thermo-photovoltaic power generation is progressing. In photovoltaic power generation, electrical power is generated by solar radiation acting on solar cells. The conversion efficiency of the widely-used silicon solar cell panels is only about 15-16%. This low efficiency is due to poor matching between the silicon and the wavelength of the solar radiation. On the other hand, a thermo-photovoltaic system has an emitter that receives thermal energy and emits thermal radiation, which is converted into electricity with photovoltaic cells. Because of selective emission of radiation-wavelengths, spectral control of thermal radiation is possible, and this leads to the possibility of achieving a high generating efficiency. In addition to solar energy, thermo-photovoltaic systems are capable of using a variety of heat sources, including industrial waste heat. The current generating efficiency is about 15% at the maximum, but Professor Yugami predicts this can be greatly improved.

In 2012, Tohoku University launched a five-year Program for Leading Graduate Schools, which combines Master's Course and Doctoral Course. The Inter-Graduate School Doctoral Degree Program on Science for Global Safety is the first program that has been implemented in the Leading Program. The program is implemented in the collaboration between researchers in science and technology and researchers in human and social sciences, and covers a multidisciplinary field of safety and security. Global safety and security has become a prime issue after the 2011 Great East Japan Earthquake. Based on the three perspectives of "knowing safety and security," "creating safety and security" and "living in safety and security," Professor Yugami, serving as program coordinator, is devoted to fostering students to become excellent global leaders capable of playing noticeable roles involved in the science for global safety and security in the world.

In Professor Yugami's Laboratory, young researchers, who look ahead from an engineering viewpoint to future environmental issues.

Professor Yugami, who leads the Program for Leading Graduate Schools, is devoted to fostering the next generation of researchers.

Steady data accumulation leads to cues for new technological development.

Energy System Engineering, Department of Mechanical Systems and Design, Graduate School of Engineering

Professor

Hiroo Yugami

Born in 1960 in Fukui Prefecture. Awarded his doctoral degree in Engineering from Osaka University in 1987. After serving as assistant professor at the Research Institute for Scientific Measurements, Tohoku University, and as associate professor in the School of Engineering at the same university, Professor Yugami has been at his present post since 2001. Since 2012, he has been a program coordinator for the "Inter-Graduate School Doctoral Degree Program on Science for Global Safety," which is part of MEXT's Program for Leading Graduate Schools.

http://www.energy.mech.tohoku.ac.jp/

Forefront of Economics of Aging

Considering the Issues of Population Aging and Low Fertility with Economics

"Web Clock of Child Population in Japan"
'Time remaining to when the number of children in Japan will be zero' is being counted down.

"Strategies for Economics, Management and Regional Vitalization in Japanese Society by Equal Participation of Men and Women" led by Professor Yoshida as its project manager.

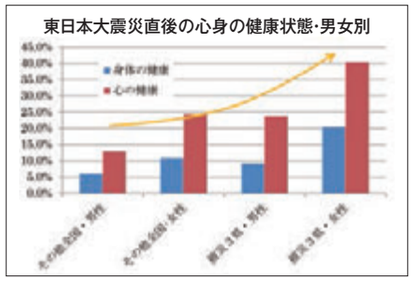
Economics of aging is a field of study and a profession that involves understanding issues such as population aging from a perspective of economics. Professor Yoshida specializes in economics of aging and he is analyzing the influence of the aging society combined with a low fertility on economics and the effect of our current society and economics on human lifestyle.

Professor Yoshida says, "The countermeasure to an aging society is to reverse the falling birthrate, and the countermeasure to the falling birthrate is the women's issue." Today's women are playing an important role that is indispensable in maintaining society, specifically, they bear and raise children and take care of elderly family members, even while many of them work outside of their homes. However, when comparing the men's and women's social activities in Japan, women's social activities are at a very low level compared to other developed countries. Professor Yoshida hopes that his research efforts will be able to support and encourage those who are promoting the equal participation of men and women in society.

Is Japan's current declining birth rate very serious? Professor Yoshida's laboratory is releasing a website called "Web Clock of Child Population in Japan" where the "Estimated number of children at the current time" is updated every second. Based on the current birth rate, the population of Japanese children up to age 14 will be "zero" in 1,800 years. Indicators using numeric numbers allow us to have a concrete image of future Japan. "As an example, one of my duties is to act like a speedometer of a car. The speedometer entreats drivers to control their speed based on the amount of gasoline left in their tank and the remaining distance to the destination," says Professor Yoshida.

He encourages students to actively attend meetings of debate and discussion with students of other seminar classes who are studying different economic policies as well as to exchange opinions at meetings with people of practical experience in society. Students are required to study both theory and practical knowledge in order to become such human resources that can manage society with warm hearts and cool heads.

It is often difficult to obtain understanding and sympathy from people when we refer to welfare and the number of children from the viewpoint of economics that is considered to be in line with profitable economic growth. However, it will be impossible to provide medical service and education to more and more people without such an approach in economics. Professor Yoshida's unique approach to economics attracts students.



A questionnaire survey was conducted to understand the health of the residents in the disaster-stricken areas. Survey results indicate that women are more stressed than men in the disaster areas.

Professor Yoshida and his seminar class students collecting and analyzing statistics data.

Professor Yoshida's seminar class is vivid and active.

Economics of Aging and Public Finance,
Graduate School of Economics and Management

Professor

Hiroshi Yoshida

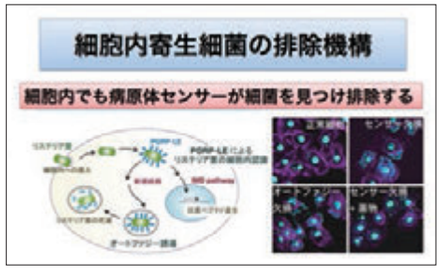
Born in 1964 in Tokyo. He graduated from Hitotsubashi University Graduate School of Economics (both master's and doctoral course). He has been specializing in the economics of aging and public finance. After serving as lecturer at Meikai University and as associate professor at Tohoku University Graduate School of Economics, Professor Yoshida has been at his present post since 2006.

http://www.bureau.tohoku.ac.jp/manabi/manabi30/mm30-2.html

Elucidation of the Immune System

World's First Identification of Drosophila melanogaster's Pathogen Recognition Sensor PGRP-LE

Fruit flies that are made to nap by CO_2 are classified into lines using genetic markers.



Conceptual diagram of the mechanism of the pathogen recognition sensor inside a cell that is working to induce the discovered bacteria to be removed.

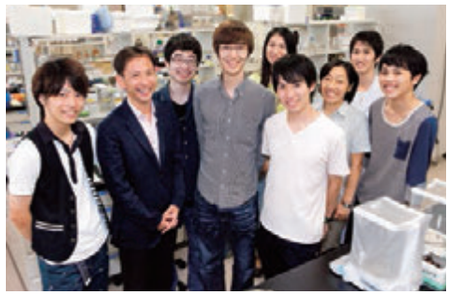
When humans get infectious diseases caused by pathogens such as virus and bacteria, they produce immunities in their bodies, and consequently subsequent infections will not be as serious or may not even cause diseases. This defense mechanism is called acquired immunity and is obtained by the development of antibodies resulting from an attack of infectious disease. Only vertebrate animals, which correspond to only 4% of all animal species, have this mechanism of acquired immunity. However, all multicellular animals have an infection preventive mechanism in their bodies. How then do these animals recognize pathogens entering their bodies and remove them? This infection preventive mechanism has not been well known before.

Professor Kurata is the first person who has identified the peptidoglycan recognition protein (PGRP)-LE which is the pathogen recognition sensor of the Drosophila melanogaster (fruit fly). Furthermore, based on the results he obtained, he elucidated the mechanism of PGRP-LE that produces antimicrobial peptides, induces autophagy and removes the bacteria that entered the cells.

There are 13 types of PGRP in the Drosophila melanogaster and 4 types in humans. The PGRP-LE molecule interacts with gram-negative bacteria, activating the IMD pathway to the gram negative bacteria and releasing antimicrobial peptides. Professor Kurata published his results in an article in 2002, but almost at the same time a group in France discovered the PGRP-SA interacts with gram-positive bacteria. This was a discovery of two separate pathways.

The finding of the protein that recognizes the pathogen using the Drosophila melanogaster has led to elucidation of the immune system. This protein exists not only in the fruit fly but also in humans, and will be a target of pharmaceutical development. Using this achievement, diseases caused by virus will be medicated by inducing autophagy, Professor Kurata says.

Tohoku University is implementing the "Science Angels" aimed at attracting female senior high school and university students to develop an interest in science and research. Science Angels are women PhD students, and Professor Kurata is responsible for the program. The "Science Angels Program" is steadily working to foster the next generation of motivated researchers.



"Audience attending lecture meetings are likely to feel close to young researchers, so I encourage my students to take a role in academic activities."

Specimen observation is indispensable for confirming the changes progressing inside a cell.

People may think, "Why are they doing fruit fly research?" Professor Kurata is researching the immune system of multicellular organisms and the fruit fly is used as a model organism.

Molecular Genetics Laboratory,
Department of Molecular Biopharmacy and Genetics,
Life Sciences Major,
Graduate School of Pharmaceutical Sciences

Professor

Shoichiro Kurata

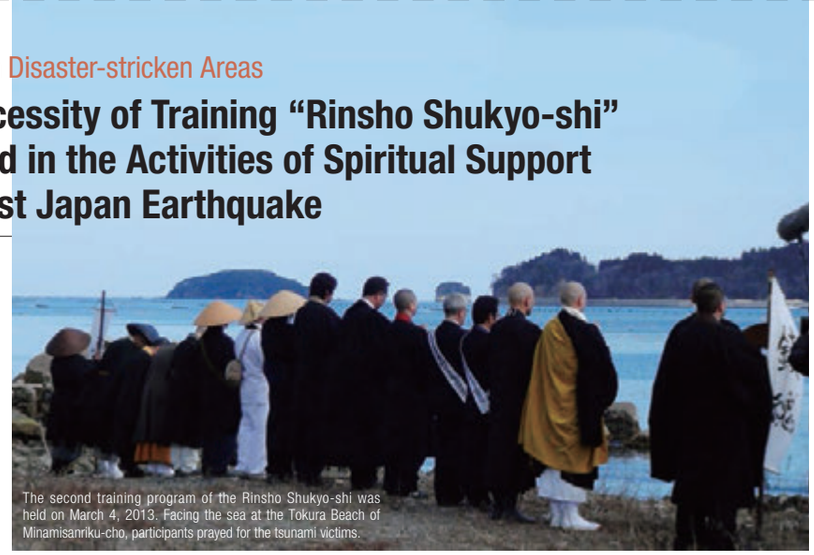
Born in1963 in Yamagata Prefecture. After finishing his doctoral course at the University of Tokyo Graduate School of Pharmaceutical Sciences, he was an assistant professor at the Faculty of Pharmaceutical Sciences of the same university. He studied the research method of the Drosophila melanogaster as postdoctoral fellow at the University of Basel in Switzerland from 1995-1998. Professor Kurata moved to Tohoku University Graduate School of Pharmaceutical Sciences in 1998 as associate professor and has been in his current position since 2007.

http://www.pharm.tohoku.ac.jp/~seimei/seimei_original.html

Providing Spiritual Care in Disaster-stricken Areas

Proposing the Necessity of Training "Rinsho Shukyo-shi" That Is Recognized in the Activities of Spiritual Support after the Great East Japan Earthquake

News Letter published from the Endowed Department of Practical Religious Studies. The series is published up to Vol. 3. Also released on the website.



The second training program of the Rinsho Shukyo-shi was held on March 4, 2013. Facing the sea at the Tokura Beach of Minamisanriku-cho, participants prayed for the tsunami victims.

At the "Endowed Department of Practical Religious Studies," a program to train "Rinsho Shukyo-shi (or Interfaith Chaplains)" is being carried out. The "Rinsho Shukyo-shi" are people who are capable of providing spiritual/religious care to victims of various religious backgrounds. The program is being managed by Professor Iwayumi Suzuki as head, and Associate Professors of Hara

After the Great East Japan Earthquake, attention was paid to religious leaders who were providing "religious support" using their religious characteristics of sutra recitation and spiritual-comforting. Before then, many local Japanese religious leaders expended most of their efforts giving interpretations of the teachings of their own denominations to the limited number of their believers. After the earthquake, however, when religious leaders were conducting relief efforts in disaster-stricken areas, they had to provide support to people having various religious backgrounds. This has led to the development of a program in which people are trained as special professionals who can provide spiritual care regardless of their religious viewpoints. Professor Suzuki says, "Because our university is a national university that is neutral in terms of religion, we could open this endowed department. Other reasons Tohoku University was chosen were that it has a Department of Religious Studies with a 90-year history and a School of Medicine that allows us to extend our activities into the mental health area with the cooperation of medical professionals.

The program expects that participants will improve their capabilities of "listening attentively," "spiritual care," "inter-religious dialogue," and "cooperation between religions" by attending lectures, group sessions, mourning pilgrimage, and practical training. In addition to providing suitable religious care, participants will be trained about approaches for collaboration with other organizations other than religious bodies. Program operating expenses are funded by donations. In March in 2013, the Japan Buddhist Federation and, in the following June, the Japan Association of Religious Organizations decided to recommend and support the Department of Practical Religious Studies. The department started as a three-year duration program. People involved in this activity hope that donations will increase and allow the department to continue operating beyond the duration limit that comes the year after next.

Professor Suzuki thinks, "Japan is entering a time of hyper-aging society with a high death rate. I hope that, in our future society, Rinsho Shukyo-shi will be permanently established at all medical and care facilities where people may seek salvation before the end of life."

What is necessary at disaster-stricken areas and at medical institutions is not to instruct or guide people there but to attentively listen to them while thinking how they are feeling. Participants performed the activity of attentively listening to the survivors using the skills they acquired from the training program.

Cooperation in religions starts with coming into contact with people, but not for the promotion of specific religion.

Staff members of the Endowed Department of Practical Religious Studies. From left: Associate Professor Yozo Taniyama, Ms. Chihiro Sato, Professor Iwayumi Suzuki, and Associate Professor Hara Takahashi.

Human Culture Religious Studies,
Department of Human Sciences,
Graduate School of Arts and Letters

Professor

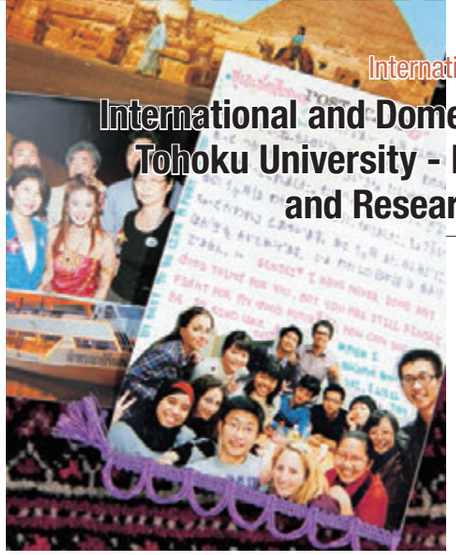
Iwayumi Suzuki

Born in 1951 and raised in Tokyo. He finished his master's program and acquired the credits of the doctoral program at Tohoku University Graduate School of Arts and Letters. He has been specializing in the science of religion, anthropology of religion and the folklore of religion. After serving as associate professor at Shimane University, he was an associate professor at Tohoku University Faculty of Arts and Letters and has been at his present post since 1997.

http://www.sal.tohoku.ac.jp/p-religion/top.html

International Student Support and Intercultural Education

International and Domestic Students Joint Study Class at Tohoku University - Improving the Quality of Education and Research by Putting Theory into Practice



Photos of Professor Suematsu's tour memories and picture postcards from students who have gone back to their home countries.

Various events are planned and executed within the theme of campus internationalization at Tohoku University.

Center for International Exchange at Tohoku University is mainly involved with educational support for its international students and assistance for domestic students who are to be delegated to its partner universities. Before serving as head of the center, Professor Suematsu created various educational opportunities at the Division of International Education and Exchange in the Graduate School of Economics and Management.

One of the activities, to which she currently gives high priority, is the improvement and expansion of the exchange program for liberal arts students. As the leader, Professor Suematsu has continued to negotiate with each of the liberal arts faculties to develop the program further and explain the advantages of accepting international students.

With her own experience of studying abroad, Professor Suematsu is able to provide sophisticated care to international students. Her activities start from making arrangements with domestic students and support groups to pick up international students at Sendai Station on their first visit in Japan, taking them to their dormitories, and helping them find jobs, while collaborating with domestic students and support groups for international students. Using external funds, she also provides support for childbirth and child-raising to international students and their families.

There is also an organization of domestic students to support international students. It is the "IPLANET" that was launched by students who support the exchange students in the International Program in Liberal Arts (IPLA). IPLANET aims to give exchange international students the opportunity to have the same experiences that domestic students have during their 1-year stay in Japan. A variety of support activities and events are held to expand the network of international exchange at the university.

Intercultural education programs are also extensive. Professor Suematsu is specializing in intercultural education. She is implementing a Problem (Project) Based Learning (PBL) in a co-learning environment class, which is still rare at Japanese universities. In this class, groups of 7-8 domestic and international students conduct discussions from various perspectives and carry out projects together. The range of the projects is broad and includes planning of a club trial event to mediate between clubs and international students, making a restaurant map for international students, and introducing Japan through manga/comics. Professor Suematsu encourages students to improve themselves during the process of project development. "Joint study between international and Japanese students will be important for international education and for fostering global human resources. It is necessary to complete the cycle of researching the educational effects and putting them into practice. Students are saying that they are going to change what they think 'they can't do' into what they can," says Professor Suematsu.

Students often visit the professor's room equipped with comfortable sofas to make them feel at ease and relaxed when talking.

A brochure produced by Japanese students to introduce Japanese culture to international students.

"NO CLUB NO LIFE" introduces clubs in which international students can participate.

Center for International Exchange

Professor

Kazuko Suematsu

Raised in Osaka Prefecture. After graduating from the Department of Economics of the Rutgers University of New Jersey in the United States, she worked at an international trading company. Then, she was awarded her master's degree and doctoral degree from Indiana University. She is specializing in the education of international students, international education and intercultural education. She was a lecturer and associate professor in charge of international students at the Division of International Education and Exchange, Graduate School of Economics and Management, Tohoku University, and has been in her current position since 2013.

http://www.insc.tohoku.ac.jp/cms/index.cgi

Faculty Awards and Honors

(July 2012-August 2013)

2012 Order of Culture

Awarded in November 2012

Professor Emeritus Shigeru Oda

Dr. Oda arrived as a lecturer at Tohoku University in 1949. Immediately after that he went to the United States by a grant from the Rockefeller Foundation as one of the first exchange students after World War II. In 1953, he became Assistant Professor (presently Associate Professor) and in 1959 Professor at Tohoku University School of Law. In 1968 Professor Oda was inaugurated as an attorney for the German Government, and in 1976 as a judge of the Permanent International Court of Justice (presently the International Court of Justice), He worked as the judge for 27 years, and currently has the longest tenure on record.
In 1985 He was appointed Professor Emeritus of Tohoku University, in 1991 inaugurated as the Vice President of the International Court of Justice, in 2003 awarded the Grand Cordon of the Order of the Sacred Treasure, and in 2007 selected as a Person of Cultural Merits.

Medal with Purple Ribbon Autumn 2013

Awarded in November 2012

Professor Emeritus Tokuji Miyashita

Recognized for his great contributions to polymer chemistry. In 1997, Dr. Miyashita received the Award from the Society of Polymer Science, Japan, and in 2012 the award for Outstanding Achievement in Polymer Science for his research on polymer nanosheet assemblies, in 2000 the BCSJ Award from the Chemical Society of Japan for his research on an innovative polymer sensor and polymer imaging system, in 2004 the Award of the Society of Pure and Applied Coordination Chemistry for the development of photoelectric conversion and photodiode systems, and in 2011 the Commendation for Science and Technology by the Minister of Education, Culture, Sports, Science and Technology (Prizes for Science and Technology) for his research on polymer nanosheet assemblies for film electronics. He has also contributed to the development of new hybrid polymer films with thermal stability and high transparency.

Medal with Purple Ribbon Spring 2013

Awarded in April 2013

Professor Tetsuya Terasaki, Graduate School of Pharmaceutical Sciences

Tackling "research to clarify the mechanism of the drug distribution in the brain," Professor Terasaki has developed methods to investigate mechanisms in which the drug and/or endogenous compounds are pumped out from the brain to the blood across the capillary endothelial cells. These methods involve a novel technology for the simultaneous quantification of functional proteins by Shot-Gun LC-MS/MS method combined with in silico peptide selection criteria. This selection criterion is covered by a patent issued for Tohoku University in Japan, the United States, and EU. He is currently a Distinguished Professor who also works for the Tohoku Medical Megabank Organization and the Graduate School of Medicine.

Japan Academy Prize

Awarded in March 2013

Professor Masataka Nakazawa, Director of the Research Institute of Electrical Communication

Succeeded in achieving a compact and a highly reliable erbium-doped fiber amplifier (EDFA) for the first time in the world. EDFA uses erbium-doped optical fibers and amplifies optical signals at a 1.55μm telecommunication window. EDFA has about 1000 times larger channel capacity than an electric amplifier. Since it is compact, uses little electric power, and has long service life, it has become to be extensively used in the world as optical repeaters for optical fiber communication systems. Thus, our highly informative society has been realized, where people around the world can exchange information instantly.

Professor Emeritus Eimei Sato

Professor Sato elucidated the mechanism of selective production of outstanding ova within the ovary. This discovery is indispensable for improving the propagation efficiency of mammalian. Namely, he discovered many important factors such as follicle stimulating hormones, factors for promoting ovum survival, an angiogenic growth factor, and ovum maturity suppression factors involved in ovum selection and maturization. Based upon these findings, not only has he contributed to develop efficient production technologies for large livestock such as cattle and swine but also for clinical application for human ovarian insufficiency.

The 2012 IEEE GRSS Education Award

Awarded in July 2012

Professor Motoyuki Sato, Center for Northeast Asian Studies

At the international conference IGARSS 2012 held in Munich, Germany, Professor Sato received the Education Award from the Institute of Electrical and Electronic Engineers Geoscience and Remote Sensing Society (IEEE GRSS). This Award is granted to members who have made significant educational contributions to the field of remote sensing research. GRSS recognized that he has energetically lectured at graduate schools, for intensive courses, etc., including activities in foreign countries such as China and Russia in the field of Ground Penetrating Radar and microwave remote sensing, and contributed to researcher cultivation.

Medical Award of The Japan Medical Association

Awarded in October 2012

Professor Hiroaki Shimokawa, Graduate School of Medicine

Professor Shimokawa is the authority in the world in the research of coronary artery spasms, which is important because it plays an important role in the pathogenesis of ischemic heart disease. He was awarded this time, because his achievements on "Experimental and clinical research on ischemic heart disease in the Japanese" were highly regarded. His broad fundamental and clinical research clarified the molecular mechanism and resulted in the development of new drugs. In addition, he contributed considerably to the world in research on vascular endothelium. He plays an active part also in Japan as Chairman of Tohoku University Medical Association and Chairperson of the Miyagi Prefecture Medical Association.

The French 'Officier dans l'Ordre des Palmes Academiques'

Awarded in March 2013

Professor Emeritus Tadashi Nomura

This award is one of the traditional awards of culture established by Napoleon I in 1808. He was praised for promoting France-Japan exchange over the years and having had significant results. Through the activities in the field of marine science and technology including his expertise aquafarming, biochemistry for marine organization and biological oceanography, he has supported France-Japan exchange. When oysters were on the verge of extinction in France, he was committed to exchange of oyster populations. He is also the pioneer who spread the technology of thalassotherapy in Japan.

The IUPAC 2013 Distinguished Women in Chemistry or Chemical Engineering Award

Awarded in August 2013

Professor Kazue Kurihara, Advanced Institute for Material Research/Institute of Multidisciplinary Research for Advanced Materials

The International Union of Pure and Applied Chemistry (IUPAC) established the award as one of the projects for the International Year of Chemistry 2011. She was the second award winner from Japan. 1997 Professor at Tohoku University Research Institute for Reaction Chemistry, 2001 Professor at Tohoku University Institute of Multidisciplinary Research for Advanced Materials (due to reorganization), 2010 Professor at Tohoku University Advanced Institute for Material Research. Also, she acts as the Director of the Chemical Society of Japan and the Chairperson of the Committee for Chemistry of the Chemical Committee of Science Council of Japan.

Innovations that lead the way to a New Society

Effective organization and management that can forge a splendid future

Center for Innovative Integrated Electronic Systems completed

In April 2013, the "Center for Innovative Integrated Electronic Systems" (established in October 2012) was completed at the Aobayama New Campus, which was funded wholly by the private sector.

Exterior of the Center for Innovative Integrated Electronic Systems

Completion ceremony

This center has already started industry-university joint research projects in a wide variety of integrated electronics fields such as for next-generation semiconductor memory, high-performance printed-circuit board technology, packaging technology, and image processing technology. In the field of next-generation semiconductor memory, the center has a program for R&D of spin-transfer torque magnetic random access memory (STT-MRAM) where Tohoku University leads the world. The center was the first among Japanese universities to develop a trial 300 mm-wafer process line and is working on R&D together with domestic and oversea semiconductor device/equipment companies, universities and research institutions.

It is expected that the center will become a worldwide R&D base for integrated electronic technologies, and play a leading role in the "Reconstruction of Tohoku and Regeneration of Japan" through various industry-university joint research projects and cultivation of highly talented human resources in such an environment. Consequently, the center will contribute to enhancing the international competitive power of Japan in this field and create new industries which will lead to the realization of an energy-saving society in the future.

The center has received official support from Miyagi Prefecture through utilization of the system of special zones for the promotion of private investment (information service related industries) that was applied for jointly by the Miyagi prefectural government and municipal governments in the prefecture. The center has also received official support from Sendai City through an amount corresponding to the fixed property tax, etc., according to an agreement made by Tohoku University and Sendai City.

Frontier Research Institute for Interdisciplinary Sciences inaugurated

On April 1, 2013, the Frontier Research Institute for Interdisciplinary Sciences was inaugurated, integrating the Center for Interdisciplinary Research and Institute for Synergistic Interdisciplinary Research and the International Advanced Research and Education Organization. On April 30, the signboard hanging ceremony was held.

The Frontier Research Institute for Interdisciplinary Sciences consists of three educators' organizations, the Managing and Planning Section, the Advanced Research Section and the Innovative Research Section. The institute plans to attract young researchers currently enrolled at graduate schools or research institutes of Tohoku University, to develop and promote interdisciplinary research, combining different field's works.

By integrating the features and roles of both former organizations, the new body possesses an extremely strong approach to advanced interdisciplinary research, in which both organizations have already had a firm foundation. With this strong base of advanced research, the institute is expected to actively support and nurture young researchers.

20th anniversary of the Graduate School of Information Sciences

The ceremony marking the 20th anniversary of the foundation of the Graduate School of Information Sciences (GSIS) was held on November 30, 2012. GSIS was established in April 1993 as Japan's first graduate school in information science and was also the first independent graduate school at Tohoku University. There were nearly 100 participants including special guests, alumni, and those involved inside and outside the University. Masanao Ozawa, Professor at Nagoya University who is a former professor of the Graduate School of Information Sciences, made a speech entitled "Quantum information technology and uncertainty principle" on "Ozawa's Inequality" principle which is a world-class discovery that corrects the uncertainty principle.

A special panel discussion on "The role of information science in building our society in the future" was held with five professors in the Graduate School introducing details of their present research projects and offering a glimpse of the future from their work. Discussion was held on the contributions and potential for building a future society that can be created from the information sciences.

Panel discussion

Congratulatory address by President Satomi

Institute for Materials Research established a logo for its 100th anniversary

Institute for Materials Research (IMR) was established in 1916 by Dr. Kotaro Honda as the 2nd Division of the Provisional Institute of Physical and Chemical Research and will celebrate its 100th anniversary in 2016. To date, IMR has been conducting both basic and applied research on a variety of materials such as semiconductors, ceramics, compounds, organic materials, and composite materials including metals. It has also been working to create new materials that will benefit society as well as to nurture and educate human resources.

IMR plans to hold anniversary events such as a commemoration ceremony and open house on May 21, 2016. For these projects, IMR accepted entries for a commemorative logo from the general public, and the logo was selected from 765 candidates. The design represents the "tradition" of IMR in the form of the building at the time of its foundation and the "future" for realizing a fulfilling life by a continuous straight line. The logo conveys the message that past tradition and history can create the future. Mr. Koichi Oide, who is a teacher at the Interior Department of the Miyagi Technical High School, created the logo.

100 1916-2016 Institute for Materials Research Tohoku University
IMR
創立百周年 東北大学金属材料研究所

TOPICS

Tohoku University has retained the first position for "Overall Rating" in University Rankings for 9 years running

Japanese University Ranking by Asahi Shimbun

According to the "University Rankings 2014" published by Asahi Shimbun, Tohoku University ranks first for "Overall Rating" for 9 years running as ranked by senior high schools in Japan and first for "Greatest Improvement After Entering University" for 7 years running. It can be said that this reputation comes from the daily effort put into education and research, students' achievements, career guidance, etc., by Tohoku University.

University Rankings (evaluation from senior high schools)	
Overall Rating	Ranks 1st for 9 consecutive years
Greatest Improvement After Entering University	Ranks 1st for 7 consecutive years

Academic paper citation ranking

Thomson Reuters, an American company that is the world's leading source of intelligent information, annually releases the rankings of research institutions based on number of citations in published academic papers. This year, Tohoku University ranked in the world's top 30 following last year in terms of academic paper citations. It was ranked 6th in materials science, 12th in physics, and 28th in chemistry. These results reflect one of Tohoku University's fundamental principles, that of "Research First."

6th in the world (2nd in Japan)	in materials science
12th in the world (2nd in Japan)	in physics
28th in the world (6th in Japan)	in chemistry

Compilation period: January 1, 2002 to December 31, 2012 (11 years)

Offering diverse support to meet the needs of the times

Educational programs designed to stimulate the intellect for the next generation

Program for Leading Graduate Schools: Inter-Graduate School Doctoral Degree Program on Science for Global Safety

The Inter-Graduate School Doctoral Degree Program on Science for Global Safety develops human resources through integrated education in the 5-year doctoral program across departments at the University for students in the humanities, sciences and technologies. It develops top leaders in the area of global safety who have a substantial knowledge of liberal arts, international adaptability, high sense of moral, and a clear vision, and are able to think and act appropriately on this basis. They are expected to make contributions to the protection of human lives, societies and industries from global disasters such as the Great East Japan Earthquake.

In this program, interdisciplinary cutting-edge education and research are conducted on the basis of "practical disaster prevention studies" in the International Research Institute of Disaster Science (IRIDeS), with participation by the Graduate Schools of Science,Engineering, Environmental Studies, Arts and Letters, etc., so that this integrated program can combine knowledge from the natural sciences, social sciences and liberal arts. This program aims to develop excellent human resources with core specialties, an ability to apply them in various areas, and other required abilities for leaders, through activities at recovery sites from the Great East Japan Earthquake and conducting world-class researches.

Model of excellent human resources in multiple areas (like a confeito)

Preparing Future Faculty Program for graduate students

The Tohoku University Preparing Future Faculty Program (Tohoku U. PFFP) cultivates the skills required of university faculty in graduate students who aspire to become faculty, postdoctoral fellows, and researchers. New faculty can feel confusion and stress because of the broad range of their duties, which encompass teaching, research, management, and social contribution. To ensure that faculty can develop their early careers smoothly, the program fosters the acquisition of the necessary skills and knowledge.

Orientation for participants

Lecture at GSI Teaching & Resource Center (intensive course at UC Berkeley)

Fukkou University Alliance / Training and Education for Future Fukkou Leaders

"Fukkou University Alliance" was established by member institutions of The Academic Consortium of Sendai to support in the FUKKOU (meaning "reconstruction") from the unprecedented Great East Japan Earthquake of 2011.

Tohoku University offers six courses in the Training and Education for Future Fukkou Leaders Program: "Politics for FUKKOU," "Economics for FUKKOU," "Sociology for FUKKOU," "Thoughts for FUKKOU," "Science of Living for FUKKOU," and "Science and Technology for FUKKOU" for students of the member universities. This program aims to develop human resources that are able to deal with problems new to them such as in the case of natural disasters, in a swift and flexible manner, on site. They are expected to take the leadership in FUKKOU from disaster anywhere in Japan or in the world. This program offered a public lecture to the general public on February 2013, with an audience of 447 in total (including multiple counts).

Field study of "Thoughts for FUKKOU" course in Natori City, Miyagi Prefecture

Scene from lecture in "Science and Technology for FUKKOU" course

Open Campus

Tohoku University holds an "Open Campus" for two days around the end of July every year. Each faculty and graduate school of the University provides model classes, simulated experiments, facility tours, and other events. A lot of individuals or groups of students from high schools who are interested in attending the University, or their parents, visit the Open Campus. In 2012, 57,445 people (including multiple counts) visited the Open Campus during the two days. This number was the third largest among all the universities in Japan, and first among the national universities (according to "University Ranking 2014," Asahi Shimbun Newspaper Publishing). In 2013, a total of 61,600 (including multiple counts), exceeding the number for last year, came to the Open Campus.

Offering diverse support to meet the needs of the times

Educational programs designed to stimulate the intellect for the next generation

University Contribution Award in Education

The purpose of this award is to recognize those who have shown excellence in the liberal arts curriculum at Tohoku University through improvements in classroom teaching, educational methods and instructional skills. This award honors faculty members who have attained exceptional success in their classrooms or with their educational methods as well as those who have achieved positive results with their original and innovative methods of teaching. The awards ceremony was held on January 7, 2013.

Professor
Mitsuru Haga
Center for the Advancement of Higher Education

In charge of the Future Global Leadership Program, Professor Haga provides one of the finest intercultural and linguistic environments for students enrolled in the program. In addition to educational activities, he encourages various exchanges in research programs and teaching practice to advance the quality of all fields of study.

Associate Professor
Masatoshi Koizumi
Graduate School of Arts and Letters

Associate Professor
Jo Matsuzaki
Miyagi University of Education

These two educators are in charge of the Current Topics course "Introduction to Sign Language." Through the study of sign language, students are able to understand and empathize with persons who are hearing impaired. This long-continuing course has great social significance and students who have taken this course all have high praise for the class.

Presidential Prize for Educational Excellence

The Presidential Prize for Educational Excellence is given to faculty members who have shown excellence in teaching that has been carried out with sincerity and passion in accordance with the educational principles of Tohoku University. On March 27, 2013, an awards ceremony was held at the Sendai Gymnasium.

Center for the Advancement of Higher Education
Mitsuru Haga, Professor

In the Future Global Leadership Program, Professor Haga has applied his remarkable language skills to promote understanding between Japanese and international students in a learning environment with cultural and linguistic diversity. His classes involve acquiring a multifaceted approach to thinking and have received high praise from students.

School of Dentistry
Toshihiko Suzuki, Assistant Professor

In addition to giving lectures and practical training in anatomy to students, Professor Suzuki has successfully created a new next-level achievement system for students to raise their ability to resolve problems proactively. He has also worked to identify victims of the Great East Japan Earthquake of 2011 and has relayed his experiences to his students. He has made an immense contribution to education in disaster medicine and has an excellent reputation with his students.

"ν-QI School" Graduate School of Engineering

The "ν-QI School" is part of the Global Center of Excellence (COE) educational program. Participation in the structure, planning and management of the "ν-QI school" (sphere for conducting interdisciplinary, international, industry and academic research) has fostered human resources who are extremely creative and can resolve a variety of research problems through a challenging and interdisciplinary approach, thus making a major contribution to the doctoral program at Tohoku University.

Graduate School of Information Science Information Literacy Education Program

This project supports programs at the elementary and secondary school levels and actively sponsors public lectures for the general public so that they will be able to use Information and Communication Technology (ICT). While making a contribution to society, this program allows graduate students interested in a career in information education to gain practical experience.

Steering Committee "Exploring-Germination-and-Growth Program for Young Scientists" (EGGS)

This educational program for high school students nurtures them to become scientists for the next generation. This program has received wide acclaim for its use of interactive programs and has become a model for successful collaboration between high schools and universities. Also, many of the students who have completed this course decide to enroll at Tohoku University.

Activities that have been designated "Joint Usage/Education Center"

In the program, the University and other universities jointly work at the "Joint Usage/Education Center," to offer a high quality of education to respond with the needs of society and universities using human and physical resources of the University. This program was created in 2009 by the Ministry of Education, Culture, Sports and Science (MEXT) to make it possible for one university to share its best human resources in various fields with other universities. In addition to the Center for the Advancement of Higher Education, Tohoku University has two other centers that have received certification by MEXT.

Research Center for Marine Biology, Graduate School of Life Sciences

The Research Center for Marine Biology located in Aomori City was established in 1924 and since then, has been a place where undergraduate and graduate students in marine biology from various universities throughout the Tohoku region come to gain practical experience. The center also cooperates with universities to carry out maritime training. It has been carrying out world-class research on the abundant marine life in Mutsu Bay. It also holds various educational programs in marine life for undergraduate and graduate level students so that they can observe marine life in its natural environment and carry out experiments in its original state. In addition, the center sponsors activities for the general public and children to educate them about marine life.

Kawatabi Field Center, Graduate School of Agriculture

The Kawatabi Field Center, Located in the city of Osaki in Miyagi Prefecture is the largest farm in Japan that is affiliated with a university. This farmland covering an area of 2,200 ha consists of a variety of natural features that include mountainous as well as low-lying regions. The landscape is a unique mixture of forests, grassland, and farmland. Cultivated farmland, grassland and forests do not exist in independent ecosystems but instead share water and nutrients in a circulatory system with a variety of flora and fauna living in coaction in a complex arrangement, making this farm an ideal place for conducting a variety of advanced agricultural research. As a "Joint Usage/Education Center," Kawatabi Field Center offers students a place to learn first-hand about "food," one of the basic needs of human beings, and about "farming" and the "environment" where food is produced. In addition, it carries out educational activities for the general public and children.

Advanced information technology in education

The Information and Computer Literacy (ICL) classroom and Computer-Assisted Language Learning (CALL) classroom are located in the Multimedia Education and Research Complex at the Kawauchi-Kita Campus where mainly first and second year undergraduate students study. Over 800 computers are available for use and a variety of services are provided for students and liberal arts curriculum.
The "Basic Information Science" course in liberal arts curriculum is taken by all students and is used to improve academic and social skills. The course is designed to fit all students regardless of their major. In order to acquire foreign language skills, various kinds of e-learning jobs are provided and students can access these materials not just from the CALL classroom but from home as well, thus creating an excellent learning environment.

Our students demonstrate individuality in various fields

Pursuing their potential and improving themselves through friendly rivalry

JASSO Students of the Year for 2012

To help nurture students, the Japan Student Services Organization (JASSO) runs the Students of the Year program, which recognizes those who make outstanding achievements in academic studies, the arts and culture, sports, and social contributions, and awards them prizes paid out of donations.
In 2012, Hiroto Honma, a third-year student in the School of Engineering, received the Student Encouragement Prize in the field of social contributions. JASSO valued his volunteer activities in space education and his efforts since 2010 to provide spaces for children in the disaster-stricken areas to hold scientific experiments and make handcrafted items.

Human-Powered Aircraft Club wins the Birdman Rally

In the 35th Japan International Birdman Rally held at Lake Biwa on July 28-29, 2012, the Human-Powered Aircraft Club 'Windnauts' won its fourth victory in the HPA-Distance section, following its victory the previous year. The team recorded a great flight of 14,129.34 m and won the championship for two years running for the first time.

Brass Band Club wins the Gold Prize in the All Japan Ensemble Contest

In the 36th All Japan Ensemble Contest held on March 20, 2013 at the Iwate Prefectural Civic Center, the Brass Band Club brilliantly won the Gold Prize in the University Category with a saxophone quartet. In the previous year, the club won the Silver Prize with a clarinet quartet.

Triathlon Club and Orienteering Club wins the 2012 Sendai City Sports Prize

The Sendai City Sports Prize recognizes groups and individuals who make outstanding achievements in amateur sports. The Triathlon Club, a member of the Students' Friendship Association, received the Glory Prize as a group, and the Orienteering Club, a member of the Students' Friendship Association, received the Encouragement Prize as a group and three members received the individual prize in an awards ceremony held on February 5, 2013.

Group Award
Glory Prize for Triathlon Club
Encouragement Prize for Orienteering Club

Individual Prize
Encouragement Prize for Orienteering Club
Shunsuke Sugimura (Second-year student in Faculty of Science)
Masanori Monguchi (Second-year student in School of Engineering)
Yuusi Watanabe (Second-year student in Faculty of Science)

Intramural commendation

Presentation ceremony for 2012 Ishida Cup and Umino Award for non-sports club

Award	Club/Club member awarded
[Ishida Cup] Clubs that contribute to the development and promotion of the association's non-sports clubs through annual activities	◎Japanese Music Club (performance in a cultural project in Indonesia, etc.)
[Umino Award] Clubs that achieve excellence or contribute to the University or the local community	◎Art Club (volunteer activity to work together with school children in disaster-stricken areas to create handcrafted items)

Sports Club Four Awards/Chairman's Award

	Award	Club/Club member awarded
Sports Club Four Awards	[Kurokawa Cup] Awarded to a sports club that achieves the best performance during the year	◎Triathlon Club
	[Shimura Cup] Awarded to a sports club that makes the most outstanding achievement in competition during the year	◎American Football Club
	[Suzuki Award] Awarded to sophomores considered to be the most promising sports talents	◎Kouichi Okubo, School of Law, Japanese Archery Club ◎Shunsuke Sugimura, Faculty of Science, Orienteering Club ◎Aiko Takahashi, Faculty of Agriculture, Skiing Club ◎Kazuya Kamiyama, School of Engineering, Triathlon Club
	[Otani Award] Awarded to a sports club that wins a championship at the annual Seven Universities Athletic Competition	◎Men's Basketball Club ◎Men's Track and Field Club ◎Men's Volleyball Club ◎Women's Soft Tennis Club ◎Women's Table Tennis Club
	[Chairman's Award] Awarded to a senior who has consistently achieved an outstanding performance in a sports club throughout the four years at university	◎Momoko Ishikawa, School of Engineering, Wind Orchestra Club ◎Mai Yanase, Faculty of Education, Swimming Club ◎Shuko Endo, School of Law, Table Tennis Club ◎Shogo Terajima, Faculty of Science, Cart Racing Club ◎Keita Sakuma, Faculty of Arts and Letters, Baseball Club

Tohoku University Fund Global Hagi Foreign Exchange Student Encouragement Award

Recognizes outstanding students who will study abroad at universities and colleges that have concluded international partnership agreements for academic exchange with the University. The award is given twice a year to coincide with the times when students go abroad to study. In FY2012, 12 undergraduate and graduate students received the award.

Tohoku University Fund Encouragement Award for Extracurricular Activity

Recognizes student groups who make outstanding achievements in extracurricular activities or make considerable contributions to the University and local community. In FY2012, six groups were awarded the prize:

◎Rowing Club ◎Human-Powered Aircraft Club
◎Badminton Club ◎Orienteering Club
◎Track and Field Club ◎Electronic Organ Circle MUSICA

Promoting local industries with the world's top level research and technology

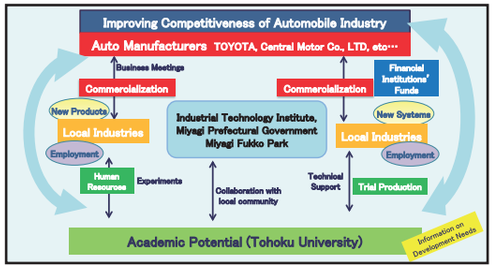
University-industry collaboration to tackle new challenges

The beginning of large-scale, university-industry-government collaboration projects for recovery from the earthquake and tsunami damage

Tohoku innovative materials technology initiatives for reconstruction

Tohoku University, which is a world leader in materials science, serves as a center of a broad range of cooperative activities between universities and businesses in the Tohoku region. With this cooperation, the University will aim to bridge the creation of innovative technologies and commercialization in three main areas: ultra-low friction technology, ultra-low loss magnetic core materials, and high efficiency rare elements extraction.

Kickoff symposium



Conceptual diagram

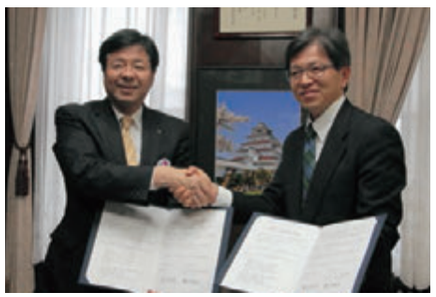
Next-generation automobiles in Miyagi prefecture area

Expectations are spreading that next-generation automobiles will be a key factor for recovery and restoration from damage caused by the Great East Japan Earthquake. In this project we are aiming to establish sets up a center for research and development of next-generation automobiles, taking advantage of world-class cutting-edge innovation and technology that Tohoku University and other research institutions in this area have. whereas, we are, while enhancing the technical abilities of local automobile-related businesses to vigorously promote recovery from the earthquake and tsunami damage with hoping that Miyagi prefecture and other parts of the Tohoku region could sustain the development as a great automobile industrial cluster area.

Knowledge-based medical device cluster in Miyagi prefecture area

The Council for Founding the Center for Knowledge-based Medical Device Cluster/Miyagi Prefecture Area was established by five institutions: Miyagi Prefecture, Tohoku University, Tohoku Economic Federation, The 77 Bank, and the Intelligent Cosmos Research Institute. The council aims to create new medical devices by introducing intellectual property, human resources, and funding into advanced electronics, precision machinery, IT industries, etc., in the region. It also works towards an establishment of a global industrial area as part of the Miyagi Prefecture Disaster Recovery Plan.

Conceptual diagram



Concluding the memorandum of understanding with Aizuwakamatsu City

Opening of satellite schools for Regional Innovation Producer School

Satellite schools for Regional Innovation Producer School will be opened at Hanamaki City, Iwate Prefecture, and Aizuwakamatsu City, Fukushima Prefecture. The School was established at the Katahira Campus of Tohoku University as the principal school for developing human resources for business management, business leaders who can create and manage innovative businesses that promote and accelerate industrial and economic development, create new job opportunities, and promote recovery from earthquake and tsunami disaster damage in the region in FY2012. The School concluded a memorandum of understanding with Hanamaki City on April 12, 2013, and Aizuwakamatsu City on April 26, 2013. It is expected that a lot of human resources for management who can make innovations across the Tohoku region will be developed through the satellite schools so that the regional industry/economy will grow and job opportunities will be created.

University-industry collaboration events

"Tohoku University Innovation Fair 2013"

Tohoku University Innovation Fair 2013 was held at the Sendai International Center on January 17, 2013 to match cutting-edge innovative research at the University with the commercial needs of society. At this event, the University presented its approaches to the recovery from the earthquake disaster in a special exhibition, and set up more than 70 booths for exhibition, including demonstrations of "Next-generation Mobile System" and "Robotics for Extreme and Uncertain Environments". About 1,000 people visited the fair.

Picture of Innovation Fair

Picture of laboratory tour

"Tohoku University Lab Tour"

On February 19 and 22, 2013, Tohoku University and The 77 Bank held a Tohoku University Lab Tour as a joint project. In the event, local business people visited laboratories of the University in order to increase the technical abilities of local businesses and help develop young engineers. Instructors from the University presented state-of-the-art technology and unique research related to the automobile industry to visitors from manufacturing industries, while the visitors made a tour around research facilities and equipment. This tour was the first university-industry collaboration project that Tohoku University concluded with a financial institution.

TOPICS

Professor Kuriyagawa, School of Engineering, Tohoku University, was honored with Minister of State Award for Science and Technology Policy.

Professor Tsunemoto Kuriyagawa, School of Engineering, was honored with the 10th Minister of State Academia Partnership Award for Science and Technology Policy as a part of a Commendation for Contributions to University-Industry-Government Collaboration for remarkable individuals or groups recognized to have made great contributions to university-industry-government collaboration efforts that have produced significant results. The title of research on which the professor was honored with the Award is "Development of Nano-Precision Machining and Molding Method for Aspherical Glass Lens," which was based on the results of the consortium headed by Professor Kuriyagawa, and reflected current industrial needs.

Picture of Award presentation ceremony
(courtesy of Cabinet Office, Government of Japan)

Creating the future from a worldwide perspective

International exchange to transmit our ideas aiming at great achievements

APRU Multi-Hazards Program

From September 20 through 22, 2012, Tohoku University (headed by the International Research Institute of Disaster Science) organized the 8th APRU Research Symposium on Multi-hazards around the Pacific Rim, based on the subject of "Towards Disaster-Resilient Societies: The Role of Universities in Reducing Risks of Catastrophic Natural Disasters."
Triggered by this symposium, reinforcing the Pacific Rim network in the field of disaster science has even grown in importance, and Tohoku University has been assigned the task of functioning as the hub of the APRU Multi-Hazards Program for three years from April 1, 2013. Tohoku University has taken a leading role in this field globally, providing researchers and students of the member universities of APRU with various programs, such as training programs, summer schools, and workshops, to make further international contributions through the APRU network. The first Summer School was held from July 23 through 25, 2013 as part of this program.

8th APRU on Multi-hazards around the Pacific Rim Research Symposium

Association of Pacific Rim Universities (APRU)

APRU was established in 1997 by major universities in the Pacific Rim area with the aim of increasing exchange among the universities to cooperate in the fields of education and research and contribute to solving important issues. Consisting of 45 universities from 16 countries and areas in the Pacific Rim.

32nd AEARU Board of Directors Meeting

The 32nd AEARU Board of Directors Meeting

Tohoku University has been serving as a member of the AEARU Board of Directors since January 2012, and hosted the 32nd AEARU Board of Directors Meeting on May 10 and 11, 2013 in Sendai (participants: National Tsing Hua University, Nanjing University, Hong Kong University of Science and Technology, Osaka University, Peking University, Seoul National University, and Tohoku University). The members actively discussed the shape of further collaboration, showing originality and regionality, in the fields of research and education and discussed specific efforts to promote exchange and other activities within the AEARU framework. The next meeting will be held at National Tsing Hua University (Taiwan) in December 2013.

Association of East Asian Research Universities (AEARU)

AEARU was established in 1996 with the aim of creating close relationships among member universities by providing a place for exchange among the heads of major research universities in East Asia as well as among faculty members and students. Consisting of 17 universities in four countries and areas (Japan, China, Korea, and Taiwan)

International symposium and workshop

The Advanced Institute for Materials Research (AIMR) of Tohoku University held an international symposium at the Sendai International Center from February 19 through 21, 2013. The lecturers from around the world included 32 researchers, among Professor Eiichi Negishi, a Nobel prize winner, other invited lecturers, and researchers from AIMR. The 240 participants from 14 countries, including the United States, China, and the United Kingdom, who attended the symposium, exchanged opinions actively. The theme of this symposium was "Challenge for green materials innovation through the fusion of materials science and mathematics." With many mathematicians attending the symposium, the fusion of mathematics with materials science that AIMR has been developing was actively discussed.
On January 15 and 16, 2013, the Research Institute for Electrical Communication (RIEC) of Tohoku University held a Tohoku-Harvard Joint Workshop: "New Directions in Materials for Nanoelectronics, Spintronics and Photonics" together with Harvard University, where researchers from both universities presented research results follwed by lab tours at RIEC and AIMR. Tohoku University concluded a Academic Cooperation Agreement with Harvard University to promote further exchange and joint research.

Attendees at AIMR International Symposium (AMIS) 2013

Attendees at Tohoku-Harvard Joint Workshop

Seminars/Forums abroad

On September 3, 2012 Susumu Satomi, President of Tohoku University, was invited and gave a keynote speech at the 2012 Taiwan-Japan Science and Technology Forum. This forum was held on the subject of "Restoration of Japan following the Great East Japan Earthquake, and Cooperation between Taiwan and Japan," so that top leaders in Taiwan and Japan in areas of science and technology are able to share their expertise, and experiences in policies and public administration, in order to help develop strategic plans for leading research, science, and technology. There were more than 400 participants. President Satomi gave a speech on "Tohoku University and the Great East-Japan Earthquake: Our Role, Responsibility and Mission", which was well received. During the forum, he participated in a panel discussion titled "Japan Industrial Restoration Plan: Future of Energy Policies, and Taiwan-Japan Cooperation".
On December 10, 2012, the First Japan-Russia Medical Forum was held jointly in Moscow by Tohoku University and Moscow State University. At this Forum, Victor Sadovnichy, Rector of Moscow State University, and President Satomi signed a joint statement with the aim of promoting further joint research and confirming that the second Japan-Russia Medical Forum will be held in Sendai in 2014.

President Satomi giving a keynote speech at the 2012 Taiwan-Japan Science and Technology Forum

President Satomi giving a speech at the First Japan-Russia Medical Forum

Promotion of international education: the Project for Promotion of Global Human Resource Development

Tohoku University was selected for the Project for Promotion of Global Human Resource Development by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) in FY2012. Within that framework, the Global Learning Center launched the Tohoku University Global Leader Program (TGL) to develop and implement a curriculum to prepare students for the global stage in the future. This constitutes a fundamental effort to increase international industrial competitiveness and strengthen bonds with other countries. The University mainly relies on the Tohoku University Global Leadership (TGL) program to send its students overseas.
As a part of this program, Tohoku University established Tohoku University Center at University of California Riverside Extension (UCRE), to expand the "Short Visit Program" and further enhance the environment for overseas study and education.
In addition, Tohoku University provides 16 courses conducted in English in its Future Global Leadership (FGL) program with a subsidy from MEXT under the framework of the "Global 30 Project for Establishing Core Universities for Internationalization" that enables it to accept more excellent students from abroad.
Overseas, Tohoku University held the Japan-Russia University Fair at Novosibirsk, Moscow, and Vladivostok, and sent representatives to overseas study fairs and high schools in various foreign countries to provide information about education/research activities and entrance examinations at the University to attract more international students.

Tohoku University Center opening ceremony at UCRE

TGL program seminar

In the spirit of our "open-door policy," we look to the future hand in hand with our community

Preserving tradition, contributing to a changing society and promoting gender equality

Project commemorating 100th anniversary of first women students at Tohoku University

First three women to study at Tohoku University (Chika Kuroda, Ume Tange, Raku Makita)

Logo commemorating 100th anniversary of first women students at Tohoku University

In 1913, Tohoku University welcomed its first female students. At the time, it was considered unthinkable to accept a woman as a legitimate student and in spite of the fact that the Ministry of Education (present Ministry of Education, Culture, Sports, Science and Technology) requested documents explaining the reason for accepting female students, Tohoku University decided to admit women, making it the first university in Japan to do so.
Various activities to promote gender equality have been carried out throughout 2013 to commemorate the 100th anniversary of the first women to study at Tohoku University. On August 8, 2013, as part of our commemorative activities, a symposium was held on the theme "100 Years since the First Women Scientists Studied at Tohoku University and Fostering Future Female Leaders" with the participation of top female scientists from throughout Japan and the world. In addition, a 10-year "Action Plan" was announced to promote gender equality by fostering female leaders and scientists for the next generation and supporting faculty and staff members who want to work while raising a family.

Logo created in commemoration of the 100th anniversary of the first women students to be admitted to Tohoku University

The woman holding a test tube symbolizes Chika Kuroda and Ume Tange, the first women entrants to the Department of Chemistry, Faculty of Science. The *Shichiyo Mon* emblem represents a space-filling problem in mathematics, symbolizing Raku Makita who entered the Department of Mathematics, Faculty of Science. This emblem also represents the symbol of the University, the Big Dipper that guides and shines in the northern sky. The rich carmine (pinkish red) color is associated with Ms. Kuroda, also known as the *Carmine Doctor*, who received a doctorate in her studies on natural pigments such as carmine.

*The photographs of Chika Kuroda and Raku Makita are courtesy of the Tohoku University Archives and the photograph of Ume Tange is courtesy of Japan Women's University Naruse Memorial Hall.

Hosting of NHK Program Public Recording

Scene from the "Rocket Classroom"

Science Café Special Program

On February 11, 2013, the Hosting of "NHK Public Recording 'Disaster Recovery Support for the Future' at Tohoku University" was held at the Kawauchi Campus with 5,400 audiences taking part in many different programs.
As part of Tohoku University's activities, a "Water Rocket Workshop" for children was conducted by FROM THE EARTH, a group from the Students' Friendship Association. The children made their own water rockets and launched them. They also launched rockets with the use of explosives. In addition, three special programs of "Science Café" have been offered. "Science Café" is usually held once a month at the Sendai Mediatheque in order to help people in the local community learning the joy of science.

"Justice with Michael Sandel at Tohoku University"

On February 22, 2013, Michael J. Sandel, a professor at Harvard University came to Japan and presented a special lecture entitled "Justice with Michael Sandel at Tohoku University" under the theme of disaster reconstruction and was held at the Kawauchi Hagi Hall at Tohoku University. A total of 1,100 people, including 500 Tohoku University students, attended this lecture.
At the lecture, Professor Sandel asked difficult questions such as "Do you think social workers or firefighters should put their lives at risk at times of disasters?" or "Which do you think is more important, taking speedy action for reconstruction, or getting everyone to agree on the right action even if it might take longer?" You can view this lecture on Tohoku University's video channel on YouTube.

Answering a difficult question from Professor Sandel

Professor Michael Sandel

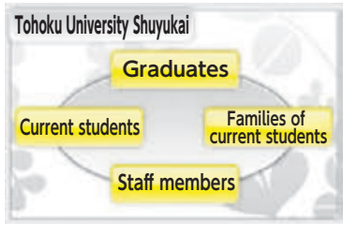
Bringing together people and organizations affiliated with Tohoku University

Tohoku University Alumni Association Shuyukai

The Tohoku University Alumni Association Shuyukai was created in 2007 to commemorate the 100th anniversary of the establishment of the University and to set a course for its next 100 years. In addition to the 140,000 alumni members of the organization, there are 18,000 current students and their families, and 6,000 members of the faculty and staff. Shuyukai is working to deepen the bonds among its members and to contribute to its development by strengthening communication between the University and members, thus creating a high awareness and closer ties as members of the "Tohoku University Community."

Fostering a sense of community among Shuyukai members

The Shuyukai holds events such as Homecoming Day and regional exchange meetings for its members to promote friendship and communication.
Class reunions are held every 10 years from the year of graduation, and secretaries selected from among alumni by year of graduation organize a reunion of that class. By the end of the 2012 academic year, secretaries of the alumni association have been chosen from among graduates of classes of 2006 through 2012.



Tohoku University 105th Anniversary Homecoming Day

Tohoku University Homecoming Day was planned to provide an opportunity for graduates to meet their old friends and teachers, and current students. The intention of this event is to say "Welcome to your University." Since 2007, Homecoming Day has been held in October every year.

Date: Saturday, October 6, 2012 Venue: Centennial Hall (Kawauchi Hagi Hall), Kawauchi Gymnasium, Kawauchi Cafeteria

- Shuyukai general meeting
- Sendai Seminar
  "Creating Close Ties among the Japanese: Our Hearts and Minds after the Disaster of March 11, 2011"
- Get-together meeting between current students and graduates
- Autumn culture festival
- Lobby performance
- Concert for Tohoku University 105th Anniversary Homecoming Day

Shuyukai general meeting

Anniversary concert

Get-together meeting between current students and graduates

Regional exchange meetings

Since 2009, regional exchange meetings have been held targeting the graduates and parents of the current students. It aims to foster a sense of community among members in each region by explaining the current status of the University and the achievements of its cutting-edge research activities.

Lecture

Get-together meeting

Exchange Meeting in Kanto on the 105th Anniversary	**(attended by about 400 participants)**	**Date and time: Sunday, July 29, 2012 from 15:00 to 19:00 Venue: Tokyo Station Conference (5F, Sapia Tower)**
Exchange Meeting in Kyushu on the 105th Anniversary	**(attended by about 100 participants)**	**Date and time: Sunday, November 11, 2012 from 15:00 to 19:30 Venue: Hotel New Otani Hakata**
Exchange Meeting in Kyushu on the 106th Anniversary	**(attended by about 130 participants)**	**Date and time: Saturday, February 23, 2013 from 14:00 to 18:30 Venue: Kyoto Tower Hotel**

3rd Shuyukai premium alumni meeting

On May 24, 2013, a performance of the musical "Cats" performed by the Gekidan Shiki theater troupe was held solely for Shuyukai members at the Tokyo Electron Hall Miyagi as part of the 3rd Shuyukai premium alumni meeting.
On this day, over 900 Shuyukai "Premium Members," including alumni, faculty and staff, current students and their families, attended this performance. The two and a half hour musical passed by swiftly as the audience watched mesmerized, clapping to the beat of the music and laughing out loud with joy. Although the members of the audience came from different walks of life, on this day, everyone was united as they shared the thrill and excitement of this special time.

Performance of "Cats" held exclusively for Shuyukai members

Achieving world-class status

Tohoku University Campus Report for the Future

Aobayama North Campus

Start of construction of the “Science Complex C”

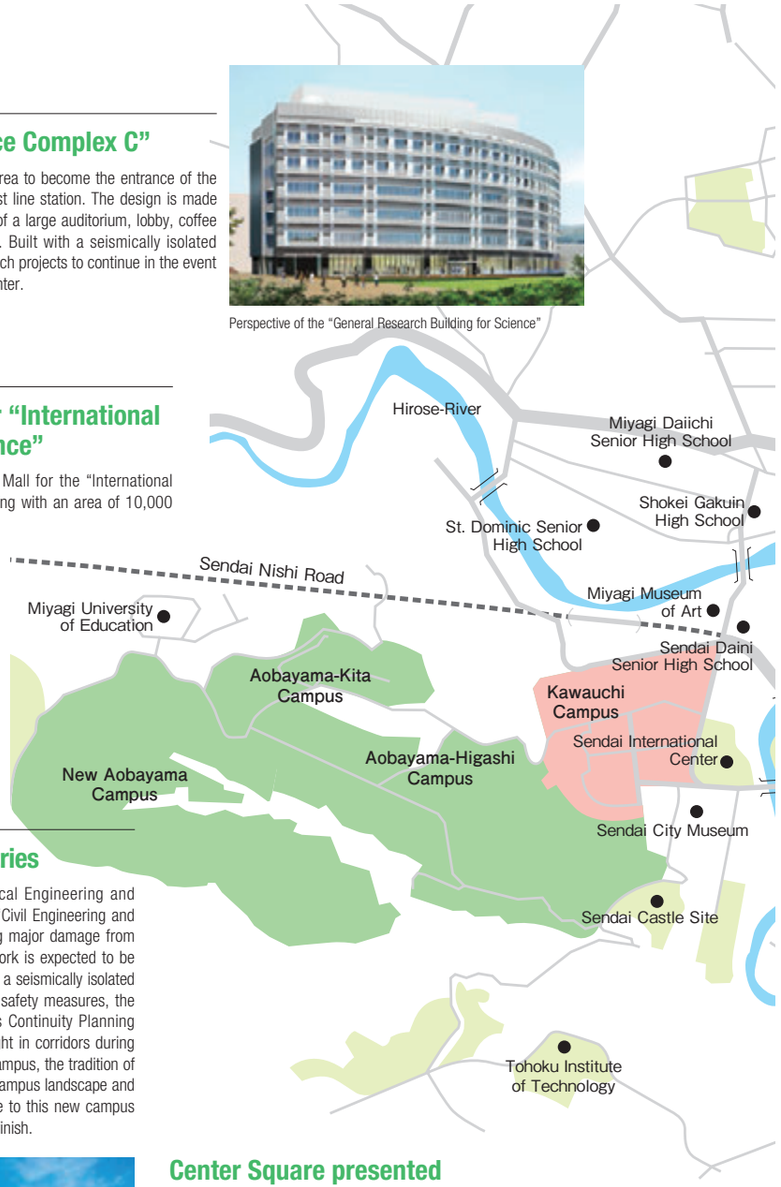
Construction has begun on the “Science Complex C” at an area to become the entrance of the Aobayama North Campus towards the new subway East-West line station. The design is made to blend in with existing structures. The lower level consists of a large auditorium, lobby, coffee shop, etc. and with an open space that welcomes visitors. Built with a seismically isolated structure, this facility has special features that will allow research projects to continue in the event of a disaster and will also function as a disaster-prevention center.

Perspective of the “General Research Building for Science”

New Aobayama Campus

Start of construction of building for “International Research Institute of Disaster Science”

In April 2012, construction was begun along the Campus Mall for the “International Research Institute of Disaster Science” This five-story building with an area of 10,000 square meters will have an seismically isolated structure able to withstand damage from earthquakes or other disasters and, in accordance with the design code of the new campus, “scratch tiles” will be used to emphasize the vertical design of the facade. On the first floor, there will be a large auditorium and exhibition space so that various kinds of presentations can be made and will also function as a center for information transmission in times of disaster. Also, plans for moving the Graduate School of Agricultural Science to this campus are under way.



Aobayama East Campus

Renovation of Experimental Laboratories

Experimental laboratories in the departments of “Electrical Engineering and Applied Physics,” “Materials Science and Engineering” and “Civil Engineering and Architecture” are undergoing reconstructions after sustaining major damage from the earthquake of March 11, 2011. Rebuilding and repair work is expected to be completed in the first half of 2014. In addition to constructing a seismically isolated structure and installing emergency generators as part of its safety measures, the School of Engineering is implementing additional Business Continuity Planning (BCP) and low-carbon measures such as letting in natural light in corridors during blackouts, installing “smart-meters”. At the Aobayama East Campus, the tradition of modernism is maintained, giving a sense of continuity to the campus landscape and at the same time, bringing out a Spartan-chic modern image to this new campus using the special texture of the materials used for the exterior finish.

Perspective of the “Experimental Laboratory Building for Electrical Engineering and Applied Physics”

Center Square presented Good Design Award and BCS Award

Built in 2011, the Center Square’s main building/ BOOOK (BOOK Café) received high acclaim for its total design, including its front courtyard and the furniture used and, in 2012, received the prestigious Good Design Award and BCS Award.

Kawauchi South Campus

Renovation of Beautiful Outdoor Greenery

At the Kawauchi South Campus where graduate schools in the humanities are located, the former parking area for bicycles and motorbikes is undergoing a facelift to become a pedestrian mall where people can take leisurely strolls in a comfortable environment. Located adjacent to the Sendai Castle Site and the Botanical Gardens of Tohoku University, this area will provide a place of abundant greenery where people can meditate in quiet solitude or have lively exchanges with each other.

Seiryo Campus

Center for Cutting-Edge Medical Research

At the Seiryo Campus, various construction projects are underway to make the campus a center for cutting-edge medical research. The “Center for Tohoku Medical Mega Bank Organization” located in the “Academic Mall” a planned open square in front of the Medical School’s main gate. This organization is working to create an advanced medical system in the Tohoku region to help in its recovery from the devastating earthquake and tsunami and to develop world-class cutting-edge treatment in medical genomics. As visitors enter the entrance to the building, they will see a soaring four-layered atrium with areas for intellectual discussion among researchers. Expectations are high for the development of new medical treatments through collaboration with the business world and local communities.

Katahira Campus

Opening of Katahira Kitamon Commons

The recent opening of the Katahira Kitamon Commons has given the Katahira Campus a new look with a renovated open space around the North Gate. With the cafeteria which opened in 2011 and the preserved rows of cherry trees, the shop and interaction spaces make a place that helps facilitate communication. The 3rd to 8th floors are “University House Katahira” (accommodations for students and researchers). The 6th to 8th floors contain rooms for researchers, either as single-person units or as family units. The 3rd to 5th floors serve as a student dormitory. On the 2nd floor, the Kitamon Lounge is open to alumni of the Shuyukai Association. “Espace,” a 72-seat seminar room and “Cerisier,” a combination lounge and reception room for honored guests, are also located on this floor. In spring, visitors can enjoy a magnificent view of cherry blossoms in full bloom.

The WPI-AIMR Main Building received the Nikkei New Office Award and the Tohoku Architecture Award

Originally built in 1924 to house the Tohoku Imperial University Metallurgical Engineering Laboratory, the WPI-AIMR Main Building was reconstructed to preserve its historic facade. This building received the 25th Nikkei New Office Award sponsored by the Nihon Keizai Shimbun Inc. and the New Office Promotion Association, and the 33rd Tohoku Architecture Award sponsored by the Architectural Institute of Japan.

Completion of “University House Sanjo II”

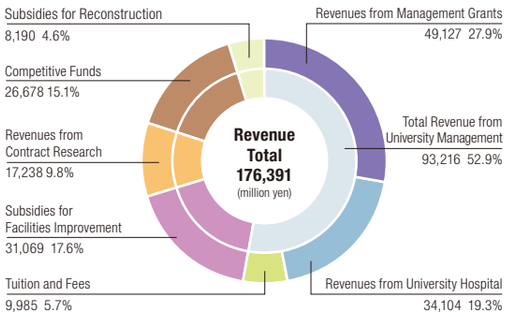
The “University House Sanjo II,” an addition to the student housing facility located in the Sanjo district, has been completed. With the completion of this new building, a further 216 persons will be able to live in this housing complex, and when combined with the existing “University House Sanjo I,” it will be able to accommodate up to a total of 632 residents. As in the “Sanjo I,” “Sanjo II” has open living spaces that can be shared by clusters of 8 rooms each, and Japanese and international students live together to develop more global human resources. The inner garden located between the existing structure and the new building is a quiet oasis that serves as an ideal spot for international gatherings and exchanges among abundant greenery.

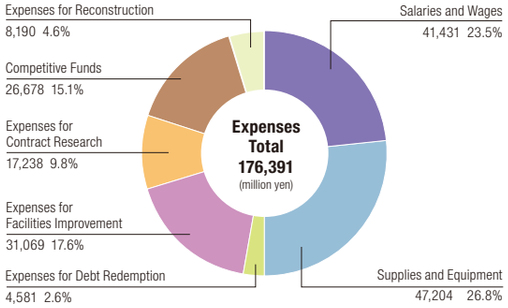
Data and Overview of Tohoku University

Number of Students (as of May 1, 2013)

	School enrollment	International students
Undergraduate students	11,003	156
Graduate students (Master's course, Professional Degree Program)	4,169	466
Graduate students (Doctoral Course)	2,677	537
Students at Affiliated Schools	38	0
Research students/Others	459	277
Total	**18,346**	**1,436**

FY2012 Financial Summary





Number of Faculty and Staff Members (as of May 1, 2013)

President		1
Board of Directors		7
Auditors		2
Faculty Members		3,116
	Professors	859
	Associate Professors	729
	Senior Assistant Professors	176
	Assistant Professors	1,169
	Research Assistant	183
Administrative/Technical staff/Others		3,085
Total		**6,211**

Agreements on Academic Exchange (as of May 2013)

Agreements on the University Level	32 countries/regions	179 institutions
Agreements on the Department Level	43 countries/regions	332 institutions

Overseas Office (as of May 2013)

Liaison offices	9 countries	13 centers
Overseas offices	3 countries	4 offices

Number of International Students (as of May 2013)

	78 countries/regions 1,436

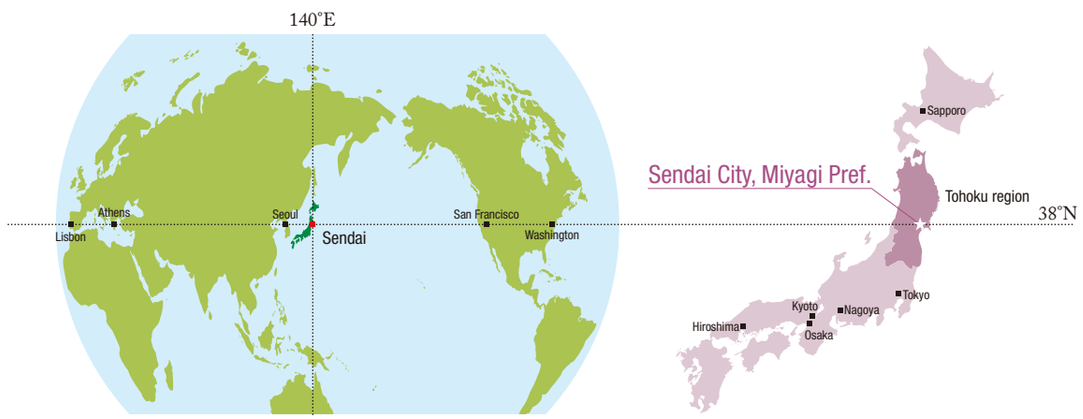
Number of Exchange Students Based on Academic Agreements (FY 2012)

To overseas	34 countries/regions	59
From overseas	60 countries/regions	146

Endowed Chairs and Research Divisions (as of May 2013)

Endowed Chairs	30
Endowed Research Divisions	10

Location of Tohoku University



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