

The 21st Century Centers of Excellence Program (COE Program)

The COE Program is a new project introduced in 2002 by Japan's Ministry of Education, Culture, Sports, Science and Technology. It's aimed to promote establishment of the world's top-class universities renowned for their vitality and level of international competitiveness in Japan. At this end, in order to enhance educational and research standards in this country and to foster creative leadership for the international academic community, the COE Program facilitates the development of a competitive academic environment, and supports the establishment of international research and educational centers in all fields of study.

FY 2003

Program Leader	Research Fields	Program Title	Contents
Medical Sciences Professor Kazuo Sugamura	General Medical Sciences	Center for Innovative Therapeutic Development for Common Diseases	Our aim is to cure "signal transduction diseases" caused by abnormalities in the signal transduction system, including immunologic diseases, cancer, metabolic diseases such as diabetes, and neurodegenerative diseases. Combining fundamental medical science and clinical science, an organically integrated series of research was carried out to investigate the molecular mechanisms responsible for the onset of signal transduction diseases, in order to develop new treatments. Through these studies, we hope to foster world-class researchers in the area of medicine and life sciences, as well as form an advanced treatment center for signal transduction diseases.
URL: http://www.med.tohoku.ac.jp/sugamuracoe/			
Mathematics, Physics, and Earth Sciences Professor Osamu Hashimoto	Physics	Exploring New Science by Bridging Particle-Matter Hierarchy	The program intends to establish an international center of excellence for education and research by exploring particle-, nuclear-, condensed matter- and astrophysics as well as interdisciplinary fields including mathematics. Thereby we aim at unified understanding of space evolution process and hierarchical structure of the universe. We explore new research fields of science by taking elementary particles, nuclei, atoms, molecules, stars, and galaxies formed with evolution of space since BIG BANG as the particle-matter hierarchy. Based upon research belonging to each hierarchy, we conduct bilateral educational programs in collaboration with overseas institutions in addition to domestic educational programs. By bridging particle-matter hierarchy in this way, we promote understanding the physical world, and contribute to the intellectual assets for mankind.
URL: http://www.phys.tohoku.ac.jp/coe/index-e.html			
Mathematics, Physics, and Earth Sciences Professor Eiji Ohtani	Earth and Planetary Science	Advanced Science and Technology Center for the Dynamic Earth	We aim to clarify the evolution of the earth, recognizing that changes occurring in vast space and wide time scale phenomena of the earth's fluctuations as a sequence of precursory events, catastrophic change, relaxation, and recovery. In particular, we develop unique, state-of-the-art earth science technologies to investigate dynamics of the earth, including the core and mantle dynamics, seismic and volcanic activities, climate changes, the solar and terrestrial system, as well as the assessment of effects of impacts on small celestial bodies during the earth evolution. At the same time, we aim to foster young creative research leaders who can play an active role in the international science community, have a flexible capability to respond to the current needs of science and technology, and possess outstanding skills of technical development and various field works.
URL: http://www.21coe.geophys.tohoku.ac.jp/index-e.htm			
Mechanical, Civil, Construction and Other Engineering Professor Tetsuo Shoji	Mechanical Engineering	The Exploration of the Frontiers of Mechanical Science Based on Nanotechnology	We establish a new academic field, "Mechanical Science based on Nanotechnology," to satisfy the social demands for the functional and structural designs for next-generation machines through the scientific rationale of nano-scale. We also establish a world-leading research and education center of mechanical science by "Double-spiral research and education programs," that enables doctoral students and young researchers to go through both the interdisciplinary and international research activities and to foster their serendipity and leadership.
URL: http://pm.mech.tohoku.ac.jp/21COE/21stCOE_e.htm			
Mechanical, Civil, Construction and Other Engineering Professor Shigenao Maruyama	General Engineering	International COE of Flow Dynamics	Our studies involve a variety of spatiotemporal flow dynamics from the nano scale, which identifies the movements of atoms and molecules, to the mega scale, which targets on the earth and space. We aim to clarify the flow mechanism and create the functions which lead to an effective use of force and energy, which contributes to resolving the 21st century problems related to the environment, energy, and life. As well as fostering human resources in leadership it plays an active role in global scenes through mutual internship overseas, educational programs focused upon individual talent, and in the international liaison offices.
URL: http://www.ifs.tohoku.ac.jp/21coe/index_E.html			
Social Sciences Professor Yoshimichi Sato	Sociology	Center for the Study of Social Stratification and Inequality	When society was poor, it was believed that once society became affluent, inequality would disappear. However, even in affluent modern society, various inequalities such as educational, career, and gender disparities still exist. Why do they exist? We are exploring this puzzle from the viewpoint of social science at our center. Furthermore, we are extending our research to the investigation of desirable "fair society."
URL: http://www.sal.tohoku.ac.jp/coe/index-en.html			
Social Sciences Professor Miyoko Tsujimura	Law and Politics	Gender Law and Policy in the Gender Equal Society	We focus upon the legal and political scientific research of theoretical problems on the gender-equal societies promoted by Japan and the world in the 21st century. We promote the global dissemination of research study and educational accomplishments of related gender laws and policies and also encourage the applied research of policy implementations in collaboration with numerous academic institutions, local governments and bar associations in Japan and around the world.
URL: http://www.law.tohoku.ac.jp/COE/english/index.html			

Total: 7 programs

FY 2004

Program Leader	Research Fields	Program Title	Contents
Innovative Academic Field Professor Yutaka Imai	Clinical Pharmacology and Therapeutics	Comprehensive Research and Education Center for Planning of Drug Development and Clinical Evaluation	For a certain drug to become useful in the health and welfare of mankind, it must pass through various processes, starting from the fundamental science of drug development to clinical application in humans. In particular, a drug in the clinical application requires the accumulations and integration of knowledge and experience covering the ethics and economics in addition to its medical and pharmaceutical values. This center fosters professionals with knowledge and experience, and the aims for establishing an academic research organization capable of proposing ideas for clinical development of drug and management for drug development and evaluation.
URL: http://www.crescendo.pharm.tohoku.ac.jp/index_e.html			

Total: 1 program

Global Centers of Excellence Program (Global COE Program)

The “Global Centers of Excellence (COE) Program” was based upon and established by Japan’s Ministry of Education, Culture, Sports, Science and Technology (MEXT) with results carried out on assessments and verifications of the FY2002, “21st Century COE Program.” The program provides for funding support and for establishing educational and research centers which perform at the apex of global excellence, elevating international competitiveness of universities in Japan. The program is aimed to strengthen and enhance the educational and research functions of graduate schools. It is also to foster highly creative young researchers, those who become world leaders in their respective fields; through experience and practical research in the highest of world standards.

FY 2007

Program Leader	Research Fields	Program Title	Contents
Life Sciences Professor Noriko Osumi	Neuroscience	Basic & Translational Research Center for Global Brain Science	The mission of this center is to educate and produce academics that are capable of integrating brain sciences, solving the fundamental problems of life science and/or solving various problems of social base. To accomplish our mission, we shall promote new brain science fields within and out of Japan through our cooperative research programs: (1) “Genomic Behavioral Neuroscience,” which covers the range from genes to the behavior of animals, (2) “Embodied Cognitive Neuroscience,” as understood from the mutual operations of brain functions and the body, and (3) “Interdisciplinary Brain Science,” which encompasses the range from environments surrounding people to the relationships among people. Moreover, we will provide outcome-oriented educational programs for the participating student to present achievements of individual goals in the fields of neurosciences. It will promote fostering of human resources in new disciplines from Japan; researchers in the fields such as brain imaging diagnostic, mathematical neuroscience, mental illness diagnostic treatment, and neuroeconomics, educators and welfare/care workers, the developers of new drugs and health care devices, and workers of health service, who can link the advancements of the neuroscience’s and educating the society.
Chemistry, Material Sciences Professor Masahiko Yamaguchi	Chemistry	International Center of Research & Education for Molecular Complex Chemistry	The characteristic features of chemistry, in fields of natural science and technology, are its capability to adopt a bottom-up methodology regarding sizes of substances. This program is aimed at proposing various research studies, of larger molecular systems ranging from 10nm to 0.1mm, by establishing giant molecules and complex systems. The programs focus upon the study of three-dimensional and time-dependent functions of various molecular systems, and are called the research fields of “Molecular Complex Chemistry”. Chemists who participate in this research field and along with this program will be involved in the next generation PhD education of chemists, who take the leadership in both national and international fields of advanced chemistry and their various related sciences.
Chemistry, Material Sciences Professor Takashi Goto	Materials Science	Materials Integration International Center of Education and Research	Materials science covers the infrastructure in every industry and without its development, our society cannot progress. Tohoku University has been leading in the position of materials science in the world. However in today’s society, more global competition and collaboration in research and development are inevitably urged. The Global COE focuses on four of the following research fields: (A) infrastructural and bio-materials, (B) electronic materials, (C) energy and environment-related materials, and (D) those of basic materials science. It also carries out educational activities on the basis of the materials integration concepts (creation of fields for interdisciplinary research collaboration in materials science). This education strengthens to foster internationally young researchers with a multilateral viewpoint which forms the next generation of researchers. We aim to innovate new functions and materials, and to develop new materials science.
Information, Electrical and Electronic Sciences Professor Fumiyuki Adachi	Electrical and Electronic Engineering	Center of Education and Research for Information Electronics Systems	With the idea that education and research are equally important disciplines, this center aims to foster young researchers who have a broad outlook, can create innovative science and technology, and conduct ground-breaking world-class research in wide ranging areas from basic science and technology to system applications. We will also conduct a wide range of collaborative NT/IT research from devices to information systems for realization of a global network for human-centric communications.
Interdisciplinary, Combined Fields, New Disciplines Professor Takami Yamaguchi	Biomedical Engineering	Global Nano-Biomedical Engineering Network Centre	As is widely recognized, nano-biomedical engineering is the major key to 21st century civilization of the world. Tohoku University Global COE programme, “Global Nano-Biomedical Engineering Network Centre” aims at organizing nano-biomedical engineering activities within the East Asia and Pacific Rim countries. This is not literally restricted to those areas but our intention is to start to organize the most active institutions in the hope that eventually worldwide collaboration will be implemented on the most rapidly growing area of the globe not only in terms of economics but also science and engineering. In order to maintain that infrastructure and growth our country and partner countries need to encourage our younger scientists and engineers to participate in a global environment. This will clearly help in the continued well-being of the nation’s and international health and economy.
Total: 5 programs			

Special Coordination Funds for Promoting Science and Technology

This is a Special Coordination Fund which is based upon the strategies of Council for Science and Technology Policy. The Funds are established for, and initiate the Promotion of Science and Technology; they are used in coordinating the Comprehensive Areas which arise on the Key issues of Science and Technology. Selected programs, which utilize this Promotion Fund, show and produce results of high effectiveness by government-led supports. These Programs are A) original and novel efforts found in policies of Offices and Ministries, B) in boundaries areas, having difficulty in proactive approaches in terms of Departmental Policies within existing organizations, C) expected to generate synergy effects, in cooperation with different organizations, D) for rapid and flexible actions, etc.

FY 2003

Program	Our Designated Program Title	Contents
Encouraging Development of Strategic Research Centers	Establishment of Center for Research in Advanced Biomedical Engineering	In a bid to develop novel biomedical interventions of engineering and technology, and to contribute to the advancement of QOL in patients, the university establishes the Tohoku University Biomedical Research Organization (TUBERO). TUBERO aims to develop an interdisciplinary research system, in life science and engineering fields, for establishing a World-Wide Biomedical Engineering Center.
Total: 1 program		

FY 2006

Program	Our Designated Program Title	Contents
Independent Research Environment Promotion Program for Young Scientists	Program for Exploring Advanced Interdisciplinary Frontiers	This program aims to train researchers with the ability to conduct world-class research in cutting-edge fields in the competitive global environment.
Supporting Activities for Female Researchers	Tohoku Women's Hurdling Project	Aims to support women in overcoming hurdles in their career paths as female scientists.
Creation of Innovation Centers for Advanced Interdisciplinary Research Areas	Nano/Micro Fabrication and IT-Converging Area	This program aims are to create future, next-generation industrial technology, industrial collaborations from the integration of technology in diverse areas of research, concentrating upon MEMS technology that leads establishment of an Innovation Center for Comprehensive manufacturing named "R&D Center of Excellence for Integrated Microsystems."
Total: 3 programs		



Tohoku Women's Hurdling Project ("White Paper on Science" Symposium in Sendai)