WISE Program
Doctoral Program for World-leading Innovative & Smart Education
As we look at today’s world and see sweeping changes in the political and economic underpinnings of society, I believe that rapidly accelerating advances in science and technology are what will pioneer a completely new world. On the other hand, there’s an urgent need to respond to the increasingly tangible impacts that the expansion of human activities is exerting on the environment. Against this backdrop, it will be imperative for Japan to create new key industries rooted in transformative concepts and technologies (that is, to realize “Society 5.0”) if it is to progress sustainably while retaining its aspirations for the future. It will be a new generation of professionals who acquire high levels of knowledge and expertise that will be the incubators of the new societies. These “knowledge professionals” will be cultivated in graduate schools positioned at the apex of higher education. These graduate schools are expected to produce the knowledge professionals who will be capable of generating new genres of knowledge and knowhow and merging new knowledge assets with new societal values.

Currently, however, there are concerns that talented students in Japan are shying away from matriculating doctoral courses for a variety of reasons, which include not having the financial means or not feeling post-graduate education to be an attractive option. In response, it must be said that the graduate school education in Japan faces challenges in terms of both quality and quantity.

Given this situation, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) launched the “Doctoral Program for World-leading Innovative and Smart Education” (WISE Program) in FY 2018. The WISE Program has as its aim the fostering of excellent doctoral students, who will be the high-level “knowledge professionals” who can take a lead in generating and applying new knowledge, and spark the innovation and create the values that will define the next generation. In working to reform Japan’s leading graduate schools, the WISE Program expects each university to take the lead in creating doctoral programs that amplify their unique institutional characteristics and strengths and in making program proposals that give expression to their own free ideas.

During the period up to FY 2020, 140 applications had been received from Japanese national, public and private universities, among which a total of 30 programs were selected. Each selected university is now creating and implementing doctoral degree programs, reforming graduate education, and/or taking other measures to initiate system reforms.

Administrators and faculty of selected universities are now asked to take the initiative under the president’s lead in creating a system to implement the WISE program, through which an all-out effort is made to reform the university’s entire graduate program. The WISE Program Committee carries out follow-up reviews of the universities’ WISE programs and from FY 2021 has been conducting mid-term evaluations of them via which it provides support for each program.

The onset of Covid 19 has spawned a period of transition within Japanese universities. Now, we expect each program to foster the high-level knowledge professionals who will overcome and transcend problems imposed by the pandemic while personifying in their careers the WISE creed. We also strongly anticipate and look forward to the results attained through the WISE program being used to advance university reform throughout Japan.
At its core, what propels the WISE Program is each university leveraging its unique strengths and capabilities. Building upon their heretofore accomplishments in campus reform, these universities carry out systematic collaborations with other universities, research institutions and corporations in and outside Japan. By establishing integrated master’s-doctoral programs, which over a 5-year period endow their students with a melding of top world-class educational and research prowess, these universities cultivate the kind of outstanding PhD professional who can pilot forward various sectors of society. Concurrently, the program propels the establishment of excellent academic hubs capable of sustainably advancing human resource development and exchange and of generating new joint research initiatives.

The WISE Program’s Purpose and Backdrop

Spearheading the generation and use of new knowledge, the WISE Program works to create the values that will bolster the next generation. Concomitantly, the program fosters the kind of high-level knowledge professionals who can enrich society with new genres of innovation while taking on the challenge of solving difficult societal issues.

On one hand, Japan has increased the number of master’s and PhD graduates via a quantitative expansion of its university graduate schools and has moved forward in improving the research environment of its universities and in increasing the number of research fields in which the country is globally competitive. On the other hand, Japan’s international presence is wavering amid the country’s declining economic growth. Recent years have seen a situation that can be called “PhD flight,” in which excellent young Japanese students are not going on to take doctoral courses. This foretells a future decline in the nation’s intellectual creative capacity, which will weaken Japan’s international competitiveness including its scientific and technological innovative prowess.

To sustain and grow the affluence currently enjoyed in Japan, the government is expected to take the lead in creating the new key industries of the future while staying ahead of the quickly advancing global industrial structure propelled by rapid changes in the world economies and societies. To that end, university graduate schools in Japan are expected to be a wellspring of the new knowledge and technologies needed to create new key industries while being an incubator of talented people attired with the social values attending these innovations.

In and after 2015, the government’s Council on Investments for the Future and its Central Council for Education proposed the establishment of a top-notch graduate program that could provide cutting-edge education via universities collaborating with corporations, overseas institutions, and other entities in fields in which Japan excels, after which the Ministry of Education, Culture, Sports, Science and Technology (MEXT) and the Japan Society for the Promotion of Science (JSPS) began to consider a concrete system design for that graduate program.

Then, in FY 2018, the “Doctoral Program for World-leading Innovative and Smart Education” (WISE Program) was launched. It is positioned as a component within the government’s innovation strategy.

Through the WISE Program, national, public and private universities with established graduate schools take the lead in generating and utilizing new knowledge while creating values that will drive forward the next generation. To foster high-level knowledge professionals, the program establishes a clearly defined profile of the kind of persons to be fostered and works to build and develop a degree program for them—one that maintains a consistent level of high quality across its master’s and doctoral curricula. In endeavoring to return Japan’s leading graduate schools, the WISE Program expects each university to create programs that amplify their own unique institutional character and strengths and to make program proposals that give expression to their own free ideas.

— Targets of support: National, public and private universities with established doctoral programs
— Period of program support: 7 years (At the 4-year mark, an overall program assessment is conducted in addition to an evaluation of each individual doctoral program. On and after the eighth year, a program extension is considered based on these evaluation results.)

— Amount of support: Up to ¥423 million
— Domains for proposal calls: For the purpose of fostering excellent PhD professionals, the following four recruitment domains are established:
(1) Research fields in which Japan has an international position of predominance or particular excellence
(2) Domains that fuse the sciences and humanities, that are interdisciplinary, or that are new and can create diverse values and systems within society
(3) Domains that are at the core of the industrial structure and that create new industries which contribute to economic development
(4) Domains in which Japan is expected to make contributions from a perspective of preserving academic diversity in the world
— Follow-up: Program officers (POs) are staffed within the WISE Program. They regularly examine and ascertain the state of progress of the selected programs and provide them with consultation and advice.

Q&A

Q How can I enter the WISE Program?
A To enter the WISE program, you will need to take a selection exam and carry out the entrance procedures. For details, please inquire directly to your preferred WISE program in the university.

Q What is studying like WISE doctoral programs?
A To enter a WISE program, you will need to have earned a bachelor’s degree. In the program, you will study for a period of five years via an integrated master’s and doctoral course-curricula. At course completion, a qualification exam is carried out based on the program’s own standards.

Q Can I receive a different degree from a WISE-affiliated graduate school? Is there a joint degree program?
A The WISE Program does not issue PhD degrees. They are issued by your affiliated research department. However, some universities have joint degree programs. For details, please inquire directly to your preferred WISE program in the university.
Applications and Selections

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<tr>
<th>Fiscal year</th>
<th>Number of applications</th>
<th>Number of selections</th>
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<tbody>
<tr>
<td>FY 2018</td>
<td>38</td>
<td>13</td>
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<tr>
<td>FY 2019</td>
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<td>9</td>
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<tr>
<td>FY 2020</td>
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</table>

Global Pro-Active Real Technology Program


List of Programs


List of Programs Selected in FY2018


Waseda University (1)  
Kanazawa University (1)  
Osaka University (1)  
Kyoto University (1)  
University of Tsukuba (1)  
Tohoku University (3)  
Hokkaido University (4)  
University of Tokyo (3)  
Kansai University (1)  
University of Medicine and Health Care (1)  
University of Science and Technology (1)  
University of Marine Science and Technology (1)  
Hokkaido University (1)  
Kanazawa University (1)  
Kobe University (1)  
Osaka University (2)  
Chiba University (2)  
The University of Tokyo (3)  
Waseda University (1)  
Tokyo Institute of Technology (3)  
Tokyo University of Agriculture and Technology (1)  
University of Tsukuba (1)  
Nagoya University (1)  
Kyushu University (1)  
Nagasaki University (1)  
Hiroshima University (1)  

No. | Names of programs | Names of universities | Names of Program Coordinator | WISE cooperating institutions |
--- | ----------------- |-----------------------|-----------------------------|-----------------------------|
1801 | WISE Program for One Health Frontier Graduate School of Excellence | Hokkaido University | HOSHIDA Motokazu | Osaka University |
1802 | Advanced Graduate Program for Future Medicine and Health Care | Tohoku University | YAMAMURA Rika | Tohoku University |
1803 | WISE Program for AI Research Program | University of Tsukuba | YAMAGUCHI Takeo | University of Tsukuba |
1804 | Ph. D. Program in Humanities | University of Tsukuba | HIRAI Tomohiro | University of Tsukuba |
1805 | World-leading Innovative Graduate Study Program for Life Science and Technology | The University of Tokyo | WADA Hironori | The University of Tokyo |
1806 | Excellent Leader Development for Super Smart Society by New Industry Creation and Diversity | Tohoku University of Agriculture and Technology | OKAWA Naoki | Tohoku University |
1807 | Creating sustainable societies through materials-information multi-talented human resource development | Institute of Technology | YAMASAKI Takao | Institute of Technology |
1808 | Global Pro-Active Real Technology Program | Nagoya University of Technology | UMEZU Minoru | Nagoya University of Technology |
## List of Programs

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<tr>
<td>1809</td>
<td>Graduate Program of Transformative Chem-Bio Research</td>
<td>Nagoya University</td>
<td>YAMAGUCHI Shigeyuki</td>
<td>Institute for Molecular Science, National Institute of Natural Science / National Institute for Basic Biology, National Institutes of Natural Science / the Graduate University for Advanced Studies / Institute of Physical and Chemical Research / Kaneka Co. / Konica Minolta, Inc. / ITT-ONCOS consortium</td>
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<tr>
<td>1811</td>
<td>Innovation of Advanced Photonics and Electronic Devices</td>
<td>Kyoto University</td>
<td>KIMOTO Tatsunori</td>
<td>University of Cambridge / Humboldt University of Berlin / ETH Zurich / Delft University of Technology / Nagoya University / Suntory Science Institute / National Institute for Materials Science / National Institutes of Quantum and Radiological Science and Technology / Central Research Institute of Electric Power Industry / National Institute of Advanced Industrial Science and Technology / Mobi Corporation / Mitsubishi Electric Corporation / Shinzoku Corporation / Sumitomo Electric Industries, Ltd.</td>
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</tr>
<tr>
<td>1812</td>
<td>Transdisciplinary Program for Biomedical Entrepreneurship and Innovation</td>
<td>Osaka University</td>
<td>MISHIMA Eichi</td>
<td>Pfizer Inc. / Novartis Pharma K.K. / Johnson &amp; Johnson Innovation / ISID Solutions Japan K.K. / EBI Lif, Japan K. K. / Fujifilm Pharmaceutical Co., Ltd. / Osaka Pharmaceutical University / Sumitomo Electric Industries, Ltd. / Sharp Corp. / Eli Lilly Company Limited</td>
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<tr>
<td>1813</td>
<td>The Fristeter Development Program for Genome Editing</td>
<td>Hiroshima University</td>
<td>YAMAMOTO Takashi</td>
<td>Hiroshima University School of Biotechnology / Hiroshima University / Department of Molecular and Cellular Biology / Hiroshima University / Technical Research Center, Mazda Motor Corporation</td>
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</tr>
<tr>
<td>1814</td>
<td>Global HealthElite Programme for Building a Healthier World</td>
<td>Nagasaki University</td>
<td>ARIPUSHI Hoyas</td>
<td>London School of Hygiene and Tropical Medicine / Hokkaido University Research Center for Zoonosis Control / National Research Center for Parasitic Diseases, Okayama University / National Institute of Agriculture and Veterinary Medicine / School of International Health, Graduate School of Medicine, The University of Tokyo / National Institutes of Global Health and Medicine / JICA / National Research Institutes of Medicine Parasites / Synzyme Corporation / Shionogi &amp; Co., Ltd.</td>
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<td>1815</td>
<td>Graduate Program for Power Energy Professionals</td>
<td>Waseda University</td>
<td>HIRAKOSHI Yutaka</td>
<td>Hokkaido University / Tohoku University / University of Fukui / University of Tokyo / Tokyo Metropolitan University / Yokohama National University / Nagoya University / Osaka University / Hiroshima University / Kitasato University / Kakehashi University of the Rockies / The University of Tennessee, Knoxville / University of Chicago / University of Washington / Tsinghua University / University of Oxford / Kagoshima University / National Institutes of Natural Science / the Graduate University for Advanced Studies / Institute of Physical and Chemical Research / Kaneka Co. / Konica Minolta, Inc. / ITT-ONCOS consortium / Tokai University / The University of Tokyo / National Institutes of Natural Science / the Graduate University for Advanced Studies / Institute of Physical and Chemical Research / Kaneka Co. / Konica Minolta, Inc. / ITT-ONCOS consortium</td>
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## List of Programs Selected in FY2019

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<tr>
<td>1812</td>
<td>Applied Humanities Program for Cultivating Global Leaders</td>
<td>Chiba University</td>
<td>FUKUSHIMA Chiyu</td>
<td>Okayama University / Nagasaki University / Kumamoto University / The Graduate University for Advanced Studies / Chieko Sanogahara University / Institute for Oriental and Classical Studies, National Research University / Higher School of Economic Research / National Museum of Japanese History / Japan Environmental Foundation / AEDON Co., Ltd. / JTB Tourism Research &amp; Consulting Co. / Chiba Bank / Ako Bank</td>
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<tr>
<td>1814</td>
<td>Forefront Physics and Mathematics Program to Drive Transformation</td>
<td>The University of Tokyo</td>
<td>SUGAWARA Makoto</td>
<td>Nippon Steel Corp. / MIT Corp. / Macromill, Inc. / Ecole Polytechnique / California Institute of Technology / UC Berkeley / Korea Institute for Advanced Study / National Taiwan University / ETH Zurich / Tsinghua University / Seoul National University / Harvard University / Princeton University / Peking University / ENE du Japon / NIKKEI / National Institutes of Mathematical Sciences Research Institute / IIES / Paul Scherrer Institute</td>
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<tr>
<td>1815</td>
<td>World-leading Innovative Graduate Study - Advanced Business Law Program</td>
<td>The University of Tokyo</td>
<td>IWAMURA Yoshiki</td>
<td>Harvard Law School / Peking University / Seoul National University / National Taiwan University / University of Strasbourg / Hitachi Ltd. / UniFrance Corp. / Toyo Keizai Corp. / Takenaka Corp. / Mitsubishi Life Insurance Co. / Intellectual Property Department, Takada Pharmaceutical Co., Ltd. / Google Japan Ltd. / Ginbuts Japan K.K. / The Asia Information Center / East Japan Railway Company / Institute for Monetary and Economic Studies, Bank of Japan</td>
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<tr>
<td>1816</td>
<td>Engineering Education Program for Super Smart Society based on Advanced Quantum Science</td>
<td>Tokyo Institute of Technology</td>
<td>SAKUGUCHI Kae</td>
<td>National Agriculture and Food Research Organization / National Institutes of Quantum and Radiological Science and Technology / RIKEN Center for Advanced Intelligence Project / Japan Agency for Marine-Earth Science and Technology / NICT Wireless Networks Research Center / IITRI Nanotechnology and Human Factors / JETNET Corporation / NEC Corporation / NSL Ltd. / Yokohama Electric Corporation / Asahi Corporation / Yokogawa Electric Corporation / Kodens Electronics Co., Ltd. / KDDI Corporation / Softbank Corp. / Kurokawa Japan / SHO-BON Corporation / Astrium/CENDOS Corporation / Iod Ljak Ltd. / Kawasaki Heavy Industries Ltd. / Nipponkoa Industries Ltd. / Komatsu Ltd. / Panasonic Corporation / Mitsubishi Electric / Casitral Japan Railway Company / Rubicon Mobile / Kansai Electric Co. / City of Vienna / Ministry of Agriculture, Forestry and Fisheries / Ocean Policy Research Institute / Google LLC / IDEA Ltd / National Taiwan University of Science and Technology / University of Twente / University of Rome Tor Vergata / The Ohio State University / Thammasat University Thailand / Uni Glaeser / Technical University of Munich / Fraunhofer Heinrich-Hertz Institute / National Institute of Advanced Industrial Science and Technology / Institute of Bioinformatics Research / Cornell University / University of Vienna / BMFT-Aachen University / AIP / Japanese Chamber of Commerce &amp; Industry of N.Y. / The Henry Suméni School of Engineering / University of California, Irvine / Georgia Institute of Technology / University of Melbourne</td>
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### List of Programs

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<tr>
<td>1907</td>
<td>Development of WISE (World-leading Innovative &amp; Smart Education) Program to foster AI (Artificial Intelligence) Professionals for Marine Industries</td>
<td>Tokyo University of Marine Science and Technology</td>
<td>WSHA Ruti</td>
<td>Japan Agency for Marine Earth Science and Technology / Japan Fisheries Research and Education Agency / National Institute of Maritime, Port and Aviation Technology / Technical University of Denmark / BEMAC Corporation / IDEAS Consultants, Inc. / Innova Inc. / Marine Naviining Corporation / Nippon Sake Kadohni Ltd. / Ocean Policy Research Institute of Sasebo Peace Foundation / Japan Weather Association / NPO Marine Technology Research Institute</td>
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<td>1908</td>
<td>WISE Program for Nano-Precision Medicine, Science, and Technology</td>
<td>Katsura University</td>
<td>HANAMASA Rikinari</td>
<td>Imperial College London / University of British Columbia / Nieuw Stadion Co., Ltd. / Pfizer Japan J.K. Co., Ltd. / FLUFFEM Makar Pure Chemical Corporation / Olympus Corporation / Daiso Chemicals / Photomicroscopy Technologies K.K. / Shihayama Chemical Company / Canon, Inc. / Japan National Chemical Corporation</td>
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<tr>
<td>1909</td>
<td>Conduction of Informatics and Biomedical Sciences On Clinical Alliances</td>
<td>Nagoya University</td>
<td>KATSUMO Matsusaka</td>
<td>Gifu University / National Institute for Physiological Sciences / Aichi Cancer Center / National Center for Geriatrics and Gerontology / Chubu Developmental Disability Center for Developmental Research / Institute of Statistical Mathematics / University of Aukland / Lewis University / Albert Ludwigs-Universitat (Freiburg) / University of Nottingham / The Chinese University of Hong Kong / University of Tokyo / University of Hongo / University of Tokyo / Heidelberg University / National University of Singapore / University of Queensland / Heidelberg University / Kavli Institute for the Physics and Mathematics of the Universe / National Institute of Advanced Science and Technology / National Institute of Technology and Research in Materials Structure Science / Cyclotron and Radioisotope Research Organization / Institute of Particles and Nuclear Physics / National Institute of Maritime, Port and Aviation Technology</td>
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<tr>
<td>1910</td>
<td>Graduate Program for Medical Innovation</td>
<td>Kyushu University</td>
<td>KATANANE Dai</td>
<td>University of California, San Diego / University of Toronto / National Taiwan University / The PRRC Institute of Molecular Oncology / National Institutes of Health / Max Planck Institute / Neurupin / RIKEN / Institute of Biomedical Research and Innovation / Foundation for Biomedical Research and Innovation at Kobe / Takeda Kobay Medical Research Institute / Aichi Medical University / Bioinformatics Research Institute, Kobe University / School of Life Sciences / RIKEN Corporation / Delphi Thetis Consulting LLC / mri, Inc. / KBM, Inc. / MDEC, Inc. / Daiichi Sankyo Co., Ltd. / Takeda Rausch Pharmaceutical Corporation / Kyodai Pharmaceutical Corporation / KDDI R&amp;D Laboratories Co., Ltd. / Chugai Pharmaceuticals Inc. / Taisho Pharmaceutical Corporation / Kyowa Hakko Kirin Co., Ltd.</td>
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<tr>
<td>1911</td>
<td>Multidisciplinary Program for Promoting Quantum Beam Application</td>
<td>Osaka University</td>
<td>NAKANO Takashi</td>
<td>High Energy Accelerator Research Organization Institute of Materials Science / High Energy Accelerator Research Organization Institute of Particles and Nuclear Studies / National Institute for Quantum and Radiological Science and Technology / Japan Synchrotron Radiation Research Laboratory / Tsukuba University / Research Center for Electron Physics, Tohoku University / J-PARC Center / Kyoto Institute of Technology / Graduate School of Informatics, Kyoto University / Isotope Science Center, The University of Tokyo / KEK for the Physics and Mathematics of the Universe / The University of Tokyo / RIKEN / TUM / The University of Queensland / Heidelberg University / Hiroshima University / National Institute of Science and Technology / Institute of Materials Science / Institute of Advanced Materials Science / Institute of Molecular and Cell Biology / Institute of Atomic Energy / Institute of Statistical Mathematics / Institute of Statistical Mathematics / Institute of Statistical Mathematics / Institute of Statistical Mathematics / Institute of Statistical Mathematics / Institute of Statistical Mathematics / Institute of Statistical Mathematics</td>
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<tr>
<td>1913</td>
<td>2002 Graduate Program for Life Revolution based on Transdisciplinary Mobility Innovation</td>
<td>Nagoya University</td>
<td>KAWASHIGCHI Nozomi</td>
<td>Gifu University / University of Michigan (USA) / Virginia Institute of Technology / The Ohio State University (USA) / Chalmers Institute of Technology (Sweden) / National University of Singapore (Singapore) / Chulalongkorn University (Thailand) / Hany University of Science and Technology (Egypt) / KIT / INRIM / XINHE Nanjing Envirom Co., Ltd. / KDD Research, Inc. / Centrex Systems / ThBrisco, Inc. / Senog Security Services Co., Ltd. / Semco Japan Insurance Co., Ltd. / Central Japan International Airport Co., Ltd.</td>
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<td>1915</td>
<td>2004 Graduate Program of Mathematics for Innovation</td>
<td>Kofu University</td>
<td>SAKI1 Osamu</td>
<td>The Institute of Statistical Mathematics / RIKEN Center for Advanced Intelligence Project / Interdisciplinary Theoretical and Mathematical Sciences Program / Fujitsu Research, Fujitsu / Bravura Mind / Mazda Motor Corporation / Sumitomo Electric Industries, Ltd. / The National Institute of Advanced Industrial Science and Technology / Topshina City Planning department, Regional Promotion Division / IMPORT TELEPHON AND TELEPHONE CORPORATION / Department of Mathematics, University of Illinois at Urbana-Champaign / Department of Mathematics, University of California, San Diego / Department of Mathematics and Statistics, La Trobe University / Department of Mathematics, National University of Singapore / Department of Mathematics, National Taiwan Normal University / Institute of Mathematics, Leiden University / Mathematical Institute, Utrecht University / Mathematical Institute, Utrecht University</td>
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Aim for One Health

Zoonosis and emerging and re-emerging infectious diseases, such as influenza, Ebola hemorrhagic fever, tuberculosis, and antimicrobial-resistant bacterial infections appear one after another and threaten public health. In the past 30 years, more than 30 new pathogens have emerged and a million people die each year from mosquito- and tick-borne infections. Transboundary animal infectious diseases, such as foot-and-mouth disease and classical swine fever, cause severe economic damage once they enter.

Hazardous chemicals discharged into environment include poisonous metals, pollutants such as dioxin, and persistent organic pollutants, are known to have caused global-scale contamination and threaten the health of humans and animals. Environmental pollution, rather than disease, is the leading cause of death in developing countries, with one-sixth people estimated to die.

There are many diseases such as cancer, neurological and muscular disorders, which are commonly observed in humans and animals, other than infectious diseases. Based on the concept that researches on physiological difference and similarity of diseases greatly contributes to both human and animal health, “Zoobiquity”, which proposes the reinforcement of collaboration between medicine and veterinary medicine, is recently drawing international attention.

Health and socio-economic problems by infectious diseases and hazardous chemicals are continuously occurring. Contemporary humans, who have been receiving lives of convenience, are obliged to pass soundness and integrity of living environment on to the next generation. Zoobiquity also aims to further improve the health of people and animals.

“Health and coherence between humans and animals and planetary health” is the critical concept of this program “One Health” with the aim of fostering experts who can contribute to its achievement.

The Human Resources Network fostered by PhDs is a supreme property of this program

To foster “One Health”, multi-disciplinary collaboration such as medicine, veterinary medicine, and environmental science, and trans-sectoral cooperation with human and animal health sectors, education, research and development institutions, and risk management authorities, in other words, “One Health Approach”, is essential.

In this program, we promote advanced researches using excellent research and human resources and outstanding experiences on infectious diseases, chemical hazard, and animal and the sciences for contributing One Health. Additionally, PhDs will gain a variety of experiences of international collaborative research with reliable counterparts, cooperative activity with international organizations such as WHO, WOAH, and JICA, and/or development research in collaboration with public institution and company. This program aims at fostering superior PhD who will be able to tackle and resolve problems related to One Health, with a definite idea for disease control and prevention, a holistic viewpoint, a well-balanced international sense, and a comprehensive competence for decision-making and problem-solving. They show their great expertise in the field of administrative and international cooperation to help to prevent disease spread. In the field of global cooperation, they contribute to innovations essential for disease prevention, such as the development of new vaccines, diagnostic and treatment methods, and early detection systems of anomalies. They also play a key role in fostering human resources and the accumulation of scientific knowledge in universities and institutions, through education to prevent and overcome diseases as well as basic and applied research to bring about novel innovations. The network fostered by PhDs who share the philosophy of One Health is a supreme property in a global society. With them, this program, and related organizations with the shared aim of One Health, we hope to accelerate the creation of One Health, a social benefit that should be shared by human society.

The abilities of PhDs fostered by this program, a wide range of fields in which they play active roles, and social contributions.

SassON International symposium provides cutting-edge knowledge and networking in the field of One Health. We are holding an international symposium planned and implemented by students and young faculty members to cultivate students’ independence, communication skills, and planning ability every year. This event allows students to gain cutting-edge knowledge and network with overseas guests who are leading experts in One Health fields, as well as providing a training opportunity to be involved in the global stage. Also, the symposium includes the Active Discussion Session and the Student Session to hold workshops to develop planning and solving abilities. For example, this year’s Student Session, students organized and practiced a special board game related to Covid-19 which required metanalysis planning and awareness. The aim of this event is to produce experts who can exercise their leadership at the site of a pandemic or chemical hazard.

Good Practice

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The abilities of PhDs fostered by this program, a wide range of fields in which they play active roles, and social contributions.

To foster “One Health”, multi-disciplinary collaboration such as medicine, veterinary medicine, and environmental science, and trans-sectoral cooperation with human and animal health sectors, education, research and development institutions, and risk management authorities, in other words, “One Health Approach”, is essential.

In this program, we promote advanced researches using excellent research and human resources and outstanding experiences on infectious diseases, chemical hazard, and animal and the sciences for contributing One Health. Additionally, PhDs will gain a variety of experiences of international collaborative research with reliable counterparts, cooperative activity with international organizations such as WHO, WOAH, and JICA, and/or development research in collaboration with public institution and company. This program aims at fostering superior PhD who will be able to tackle and resolve problems related to One Health, with a definite idea for disease control and prevention, a holistic viewpoint, a well-balanced international sense, and a comprehensive competence for decision-making and problem-solving. They show their great expertise in the field of administrative and international cooperation to help to prevent disease spread. In the field of global cooperation, they contribute to innovations essential for disease prevention, such as the development of new vaccines, diagnostic and treatment methods, and early detection systems of anomalies. They also play a key role in fostering human resources and the accumulation of scientific knowledge in universities and institutions, through education to prevent and overcome diseases as well as basic and applied research to bring about novel innovations. The network fostered by PhDs who share the philosophy of One Health is a supreme property in a global society. With them, this program, and related organizations with the shared aim of One Health, we hope to accelerate the creation of One Health, a social benefit that should be shared by human society.

The abilities of PhDs fostered by this program, a wide range of fields in which they play active roles, and social contributions.

SassON International symposium provides cutting-edge knowledge and networking in the field of One Health. We are holding an international symposium planned and implemented by students and young faculty members to cultivate students’ independence, communication skills, and planning ability every year. This event allows students to gain cutting-edge knowledge and network with overseas guests who are leading experts in One Health fields, as well as providing a training opportunity to be involved in the global stage. Also, the symposium includes the Active Discussion Session and the Student Session to hold workshops to develop planning and solving abilities. For example, this year’s Student Session, students organized and practiced a special board game related to Covid-19 which required metanalysis planning and awareness. The aim of this event is to produce experts who can exercise their leadership at the site of a pandemic or chemical hazard.

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The abilities of PhDs fostered by this program, a wide range of fields in which they play active roles, and social contributions.
Fostering leaders who will drive future medicine and health care, based on co-creation with society, developing HR to lead the transformation of future society

In addition to conventional discipline-based degrees offered by its graduate schools, Tohoku University aims to build a graduate school that is appropriate for a world-class research university by enhancing various "degree programs" that transcend the boundaries of disciplines, national borders, and organizations such as industry and academia, and by developing a world-class research environment and financial support, centered on the Advanced Graduate School. In this context, the WISE Program plays a major role in the "creation of new value" through co-creation with industry and other sectors of society. Now in its fifth year of operation, this program is making progress in fostering human resources to lead the future of medicine (medicine that realizes health, prevention, and treatment through data science, technology, and social infrastructure) based on co-creation with society.

At the on-site training, students form a backcast training group with three or four students. Since the members of this group have different research specialties, they gather valuable experience. For example, even if students see the same thing, they interpret it differently, or even if they notice similar issues, they propose completely different solutions. In the process of learning about the differences, searching for a better solution from among the students not only discover issues on their own knowledge and ways of thinking, but also learn what activities are needed to solve them and push each other to initiate activities. Beyond the boundaries of expertise and graduate school, the various groups of students born from the sharing of issues have further involved others and are working hard to solve the issues as a larger group. Although it will take some time before practical application is realized, it is highly anticipated that the issues discovered from a young perspective will be solved in the near future with the help of the students in the program.

Graduates of this program play an active role as professionals with broad knowledge and deep expertise, who are able to draw synergy among experts, and to quickly and accurately identify and solve the needs of various fields and society.

Inquiries
022-717-8031
Good Practice
FY 2018
WISE Program for Artificial Intelligence Electronics

Name of the program to be noted: WISE Program for Artificial Intelligence Electronics
URL https://www.aie.tohoku.ac.jp/english/

Message from the President
OHNO Hirotoshi
President, Tohoku University

Fostering outstanding human resources to create innovations

For realizing the fourth industrial revolution and an ultra-smart society (Society 5.0), it is essential to fuse real and cyber space in every aspect of society to create new value and bring it to society, our life and industries.

Research and development are required not only in algorithms and computer programs to process big data, but also in spintronics and electronics to develop devices in computer architecture for designing processors that make low-power consumption and high-performance computation.

The WISE program for AI Electronics aims to foster outstanding human resources for continuous innovation by providing educational courses to learn algorithms and computer programs for the AI and architecture, centering on spintronics and research on spin devices, ultra-sensitive sensors, and other high-speed/power devices.

Education with industry-academia social collaboration

The WISE program for AI and Electronics (AIE) places the highest priority on areas that contribute toward new value creation. The program builds a five-year integrated graduate school education system consisting of “interdisciplinary education” and “industry-academic collaborative education”. The interdisciplinary education is constructed by highly specialized researchers in diverse academic fields to develop students’ abilities to take a bird’s eye view to penetrate real and cyber space, and a multidimensional interconnection in Society 5.0. The industry-academic collaborative education is for students to develop practical skills to realize social issues cooperating with industries and society.

The five-year integrated education is divided in three courses: basic course, advanced course, and professional course. In the basic course, leader seminars are held with industry-academic collaboration. PBL (Project Based Learning) subjects are built up in the advanced course with collaborations between researchers from partner companies and faculty members. The students in the program can take up to four PBL subjects.

They are expected to acquire the ability to solve problems and to become leaders who can play an active role in the industrial world. In the advanced and professional courses, the AIE program prepares an international internship program to foster outstanding doctoral students who will play a central role on the international stage, and a long-term corporate internship program aiming for further development of practical skills necessary in industry.

In addition, “Employment System in School” is formed, which allows students to get a job at a company even while they are still in school. This system will pave a new path to build diverse career paths.

Message from WISE Cooperating Institution
YODA Saburo
Senior Manager, Engineering Planning Office, Engineering
Graduate School of Engineering, Tohoku University

Good Practice

Every year, we hold a symposium on outcomes from Project Based Learning (PBL) subjects, which produce and implement learning content in collaboration with partner companies. In the subjects, 4 or 5 students are researching, proposing solutions and verifying the issues presented by each company to develop bird’s-eye view and practical skills. Each subject has its own characteristics in setting content in collaboration with partner companies. In the subjects, 4 or 5 students are researching, proposing solutions and verifying the issues presented by each company to develop bird’s-eye view and practical skills. Each subject has its own characteristics in setting content in collaboration with partner companies.

New value Creation from University and Industry Collaboration

The AIE program has immense potential as a place for the university and partner companies to collaborate and take on the challenge of creating new value. We hope the collaboration will make the distance between the university and companies shorter and make it easier to understand the characteristics of research and development in advanced industry and academia. This will lead to a productive industry-academic collaboration.

Message from WISE Cooperating Institution
KUMIDA Koichiro
Director, Scalable Optical Transport Research Group, Transport Innovation Environment in Laboratory, Mechatronics, and Information System (DOTA) Research Institute, Keio University

Outstanding doctoral student who will play a central role on the international stage, and a long-term corporate internship program aiming for further development of practical skills necessary in industry.

Programs selected in FY 2018: Tohoku University

Inquiries: 022-795-5667
[Office and section in charge] AI Electronics Education and Research Center

Data

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The Humanities program is a Ph.D. program that ensures interdisciplinary, leading-edge, world-class standards of education by combining top-tier national and international instructors and students with academic, industry, and governmental circles across disciplines.

As student-led new initiatives, the “double-mentor system” and “reverse mentor system” are adopted. Basic study of biomedical sciences is given to students having studied in physical sciences/engineering/informatics fields, and vice versa. Until now, an educational course, where students having graduated from a 6-year medical course can learn physical sciences/engineering/informatics such as the Humanities program, was hard to be established in Japan, so that this is a true educational course for MD-Ph.D. students.

Under these new initiatives, we develop outstanding talents who can challenge “ZERO to ONE.”

Creating a new paradigm — Developing outstanding talents who can challenge “ZERO to ONE” —

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Creating the “Humanics” by integrating biomedical sciences and physical sciences/engineering/informatics, and having the expertise to combine these bi-disciplinary knowledge and skills. They should also have flexible, multifaceted creativity which can be applied to the ubiquitous future, based on the expertise. Through the development of expertise applied skills, this Ph.D. program cultivates individuals capable of independently uncovering basic principles of human life, creating systems to reconstitute and assess the validity of discovered principles, and building new theories of life.

The program aims to develop outstanding talents who can challenge to create a qualitatively different paradigm that goes far beyond the common sense of biomedical sciences — that is, ZERO to ONE — by always incorporating the knowledge and technology from different fields.

Outstanding features

This program 1) has a remarkable characteristic of creating a new dimension of study, termed “Humanics,” under the cross-sectoral collaboration among internationally competitive, outstanding research institutions which are specialized in biomedical sciences and physical sciences/engineering/informatics, respectively, both inside and outside of the University of Tsukuba. In addition, the program 2) cultivates individuals' bi-disciplinary expertise with doctoral-level knowledge and skills by a full “double mentor system” in which each student is guided by two faculty members, one from the field of biomedical sciences, and the other from physical sciences/engineering/informatics, in their respective laboratories in the course of pursuing joint research projects, and 3) offers prospective students an opportunity to have an interdisciplinary background of the program before enrollment as a pre-admission program in their undergraduate years, which creates a seamlessly integrated system for transition to graduate education. Furthermore, the program 4) aims at a self-sustainable operation in collaboration with enterprises after the period of governmental funding.

Good Practice

Career Platform for Humanics: CPs, an originally developed portfolio-based competency achievement assessment system

Ph.D. Program in Humanities has developed the Career Platform for Humanics (CPs) as a system to assess the competency achievement of each student. CPs provides the evidence-based, quantitative assessment of the experience obtained from lecture and research activities through evaluating tangible and diverse “skills” that constitute the each competency. These are 12 different skill sets that can be selected according to the future image of students. CPs allows students to self-reflect and set their own learning goals.

Message from WISE Cooperation Institute

Programs selected in FY 2018 - University of Tsukuba

[Office and section in charge] Office of School of Integrative and Global Majors

[Inquiries] 029-853-7076
The University of Tokyo

World-leading Innovative Graduate Study Program for Life Science and Technology

Program Coordinator
KIKKAWA Masahide (Professor, Graduate School of Medicine, The University of Tokyo)

Fields of diploma: Doctor of Medical Science, Doctor of Engineering, Doctor of Philosophy

Message from WISE
FUJII Teruo
President, The University of Tokyo


Human talents who can create new academic fields and contribute to human health

The World-leading Innovative Graduate Study Program for Life Science and Technology (WINGS-LST) is now in its fifth year of operation, intending to develop "talents who will significantly contribute to human health from a long-term perspective" with deep insights outside the boundaries of existing fields. The program covers a wide range of life science and technology research fields, from elucidation of basic principles to applied technologies that lead to clinical practice. WINGS-LST will cultivate doctoral students with a global perspective, high ethical standards, and tenacious practical skills, who will have expertise in their own fields and create new academic fields and technologies. By further accelerating the reform of education in graduate school through this program, we hope to meet the University's social mission of fostering outstanding researchers who can address the resolution of global challenges faced by human society.

Fostering leaders who will contribute to human health by exploring the truth of life science with deep insights outside the boundaries of existing fields

The World-leading Innovative Graduate Study Program for Life Science and Technology (hereinafter "this program") aims to develop talents who will significantly contribute to human health from a long-term perspective. For this reason, it covers a wide range of life science and technology research fields, from the elucidation of basic principles to applied technologies that lead to clinical practice. In this program, we aim to foster human talents who can create new academic fields in the future by co-developing excellence in three areas: expertise in specialized disciplines, breadth of scientific perspective, and agile engagement with others to develop new opportunities.

(2) Development of human talents at the forefront of life science and technology

In this program, we aim to foster human talents at the cutting edge of life science and technology disciplines: we promote discoveries and elucidation of mechanistic insights in all phenomena of life using new technologies, while we also develop novel and advanced technologies based on scientific principles and theories of life. Innovative perspectives through development of big picture thinking skills and meeting with experts in a variety of fields, and developing interdisciplinary research by engaging others.

Specialized expertise: Specialist capability that makes an individual second to none with regard to a particular purpose or area of knowledge.

Broader perspective: Based on the expertise above, ability to survey various academic fields and identify fundamental cross-disciplinary problems. Faculty members who will provide guidance to the program students are leaders conducting cutting-edge research in their own discipline, while remaining flexible and open to methods and ideas of other fields.

Agile engagement: Ability to think about the way research should proceed based on the big picture, and to develop research by building collaborative relationships with researchers in appropriate fields. Communication skills, capacity for understanding, information gathering ability, etc., are also included.

Integrate technology and mechanistic elucidation, and take initiative in the development of academic disciplines and industries that contribute to human health.

A unique feature of this program is that students are able to learn about both the elucidation of life phenomena (related to basic medical sciences and technology) and their application in the real world. This program provides students with the opportunity to explore new fields of research and to contribute to the development of academic disciplines and industries that contribute to human health.

Message from WISE

KIMURA Hirotoshi
Institute of Science Management & Innovation Laboratory, The University of Tokyo

Follow current trends, or find essential problems and pursue solutions?

The term INNOVATION reduced to more formally. Defining a word is important, however what is the essential problem? What to do first, and what to solve now? The importance to keep thinking in an environment blurred with knowledge: the university, Lisa straight at one's thoughts, utilize them as stepping stones, and with the enriched intelligence, keep challenging after graduation. That is what I expect of the graduates. My contribution would expose you to the momentum of cutting-edge life science business in Europe and the USA.

Student's Voice

Yui Sakurai
1st year Doctoral Student, Department of Molecular Science in Medicine, The University of Tokyo

To become a leading scientist in life sciences

WINGS-LST offers a great opportunity to acquire a broad knowledge in life sciences and to interact with other graduate students who are active in various fields of life sciences. I decided to join this program with the aim of becoming a leading scientist in life sciences who can contribute to human health. The twice a year events include research presentations and group discussions. The interactions with other program students at the events are always inspiring time.
Tokyo University of Agriculture and Technology

Excellent Leader Development for Super Smart Society by New Industry Creation and Diversity

[Program Coordinator] OHTSU Naoko (Director of Organization for WISE Program, Professor, Graduate School of Agriculture, Agricultural Production Sciences course, Tokyo University of Agriculture and Technology)

[Fields of diplomas] Doctor of Philosophy (Agriculture), (Engineering), (Philosophy), (Life Sciences), (Veterinary Medicine)

[Name of the program to be noted] Doctoral Program for World-Leading Innovative & Smart Education


Message from the President

CHIBA Kazuhiro
President, Tokyo University of Agriculture and Technology

Moving forward with the Concept of Excellence

Sustainability of the earth is in a critical condition and it is uncertain even in 2050. It is abilities beyond conventional concepts are required for the human resources in order to lead the future society. It is important to act toward the common goal with strong will and courage, and with mutual dialogue together with people of diverse backgrounds even if we have difficulty. We need to identify what should we achieve in the next stage, not merely promoting cutting-edge research. If we pioneer a new world and attract people even it has not yet been focused on them, we can naturally establish an outstanding figure of the world and it will be recognized in the near future. I hope you will challenge with all your conviction, without sticking to formally.

Driving Super Smart Society by New Industry and Diversity

The WISE-TUAT Program bases on agriculture and engineering and fosters excellent doctoral human resources who can execute research conceptualization, team formation and leadership. In the second step, students try to launch joint projects and construct joint research team through the “Joint Project of Agriculture and Engineering” fund. In the third step, students will develop an action plan to effectively apply their own research achievements to society. In cooperation with the 19 partner institutions in Japan and abroad, we will produce highly skilled “knowledge professionals” who have comprehensive perspective, originality, and high-level specialization, and who will bring new ideas and new developments to academia, industry, international organizations, and other fields.

Leaders for Academia, Industry, International Organization

To foster excellent leaders, education in global perspective is indispensable. We have the world top-class universities in North America, Europe and Asia as our partner institutions. Foreign researchers from those top-class institutions commit in the education in this program. They are responsible for the global lectures and “international workshop” in which students from TUAT and the partner institutions engage in group discussions. They help students improve their international and English discussion skills. We will also be in charge of encouraging students for overseas training and study abroad, and will activate international joint research. For this purpose, we support their “Overseas Activity Expenses”. In addition, students’ research activities are supported by “Rakus expenses.” Furthermore, research project teams of students from both agriculture and engineering backgrounds are financially supported by the Joint Project of Agriculture and Engineering Fund. The Consortium for the Creation of New Industries, consisting of companies and public research institutions, is also committed to the curriculum, and industry and academic sectors work together to develop human resources. In the first step of the curriculum, students learn about companies’ research activities through lectures by practitioners from partner companies. In the final step, students present their own research needs to experts in companies and academia, receive feedback, and formulate an action plan to put their research achievements in practice in society.

To complete the program, students have to pass the Qualifying Examination (KII) by taking the courses provided by the WISE Program besides completing their department in graduate school. Students will take the KII in the last semester of the 2nd year of the master’s course and in the 3rd year of the doctoral course.

Message from WISE Cooperating Institution

Message from WISE Cooperating Institution

Dr. IIDA Satoshi
Senior Technical Advisor, KUBOTA Corporation

Human resources development by field-based industry-academia partnership

Our company now promotes research and development with the keywords of “innovation,” “field-based research and development,” “smart agriculture” and “ICT agricultural machinery.” We also promote diversification and globalization in our general business operation. The value of the WISE Program fits with our policies, thus, we would like to cooperate with the creation of new industries and development of excellent leaders by applying the knowledge of how our company has cultivated to the education.

Graduates’ Voice

To Learn Essential Attitudes for a Researcher

I participated in this program because it is essential to broaden my horizons for becoming a researcher. Through international activities and lectures by partners, I have become more conscious of mainly two things (1) practically planning research with looking toward application and (2) maintaining considerable communication. I want to proceed with my research while utilizing the attitude I learned from the program.

[Office and section in charge] Educational Affairs Office [Inquiries] 042 - 367 - 1546

This curriculum has three learning steps, in which respective goals are set to foster excellent leaders who drive super-smart society. Support systems have also been established to enhance the learning.

Excellent Leaders who can lead the Super Smart Society by New Industry Creation and Diversity

Programs selected in FY 2018 — Tokyo University of Agriculture and Technology

Programs selected in FY 2018 — Tokyo University of Agriculture and Technology

Good Practice

Development of “Biofertilizer “Yume-bio” a material that promotes plant growth by microorganisms

Biofertilizer “Yume-bio” has been developed by Tokyo University of Agriculture and Technology in cooperation with a public corporation. In order to realize sustainable agriculture, Japanese government has formulated the “Strategy for Sustainable Food System,MealBM” in 2011. One of the major issues is to cut down chemical fertilizers, which have a significant environmental impact. Yume-bio enables cultivation with 20-30% less fertilizer use when it is applied to rice. It is the mission for university to scientifically develop technologies that are required in society. The study and research in the WISE Program have contributed to the efforts for the implementation.

Data

[Number of students recruited (For FY 2013, number of students to be recruited)]
[Number of people enrolled in the program]
All students (21 students) in 2013, 18 students in 2014, 17 students in 2015, 15 students in 2016, 15 students in 2017, 13 students in 2018, 14 students in 2019, 12 students in 2020, 9 students in 2021, 12 students in 2022
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Projects selected in FY 2018 — Tokyo University of Agriculture and Technology

Projects selected in FY 2018 — Tokyo University of Agriculture and Technology

2018 Fiscal Year (FY)
Fostering individuals who can create new industries

The program empowers students to become “multitalented individuals” who utilize informatics to conceptualize new ideas through multidisiplinary thinking and a broad perspective as well as contemplate new social services when approaching original research on materials and informatics. Multitalented individuals are expected to create new industries that link materials and informatics to build a sustainable society. Although the manufacturing industry in Japan (such as Japanese Monozukuri industry) is very strong, industry growth necessary to continue to lead the world will be difficult using the conventional way of thinking.

Due to advances in informatics such as data science, simulation, and machine learning, the discovery and design of new materials and social services are becoming possible. The era utilizing information technology and shifted into areas with high information value. A path forward is to create industries with high value information built upon materials. Currently, no education program fosters talent who can create such industries. Although double-major programs in some countries allow students to study materials science and informatics independently, opportunities for cross-disciplinary interactions among students and faculties as well as to connect ideas from molecules to social services are lacking. The characteristics and excellence of the program are to produce “multitalented individuals” who are unprecedented “knowledge professionals”. Knowledge professionals attain a sustainable society, and global leadership ability to introduce new services to the world.

Message from the President

MASU Kazuya
President, Tokyo Institute of Technology

“Multitalented individuals” empowered by this program can freely move across complex space with areas of materials science, information, and social services. Due to diverse training, they flourish professionally.

Program characteristics and excellence

The program focuses on “new industry creation” and “new field creation”, which is the foundation of new industry. We aim to create new industry by advancing from materials-based industries to next-generation industries. Financial, trading, and software industries have incorporated with information technology and shifted into areas with higher information value. In contrast, materials-based industries have yet to fully utilize high information value. A path forward is to create industries with high information value built upon materials. Currently, no education program fosters talent who can create such industries. Although double-major programs in some countries allow students to study materials science and informatics independently, opportunities for cross-disciplinary interactions among students and faculties as well as to connect ideas from molecules to social services are lacking. The characteristics and excellence of the program are to produce “multitalented individuals” who are unprecedented “knowledge professionals”. Knowledge professionals are materials scientists systematically educated in state-of-the-art informatics or information scientists who understand and can systematically apply state-of-the-art materials research. Not only do they recognize the connection of materials to social services, but they are also passionate about creating new industries.

Developing Multitalented Individuals at Practice School

The National Institute of Advanced Industrial Science and Technology (AIST) has implemented the program to help students to become multitalented individuals by the TAC-MI program with Tokyo Institute of Technology for five years. We would support the development of leaders having the practical ability through the discussion and suggestions toward the realization of a sustainable society at the Practice School.

A Valuable Opportunity to Step up as a Professional Researcher

I researched the film growth and new materials to develop magnetic memory devices with low-power consumption. This program’s appeal is that we can learn various cutting-edge research in a wide range of areas. By lacking consummate practical issues through laboratory rotation and practice school, I can apply materials informatics to explore new materials effectively. From this valuable experience, I aim to broaden my research abilities and improve as a professional researcher.
Global Pro-Active Root Technology Program

**Program Coordinator**
OMEDA Minoru (Executive Director - Vice President, Nagaoka University of Technology)

**Programs**
[1] Global Pro-Active Education Infrastructure
[2] Global Pro-Active Education Infrastructure (Cooperating Institution)
[3] Global Pro-Active Education Infrastructure (Cooperating Institution)

**Message from the President**
Development of human resources for root technologies able to contribute to the realization of SDGs

Our University was appointed as a World Hub University for the United Nations Sustainable Development Goals (UN SDGs) (World resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation) of the United Nations Academic Impact Program (only one institution in the world appointed for each of the 17 SDGs initiatives) as a university serving as a model for innovative efforts related to the SDGs. This is a testament to the recognition that the University and its graduates are contributing to infrastructure development, innovation, and sustainable industrialization globally. Our University is the only institution selected from the East Asia region, including Japan.

This program brings together the world’s highest level of research capabilities and pioneering educational methods, to which the University has continuously made contributions. Specifically, this “Root Technology” that forms the basis of all industries and that integrates “IT,” “materials science,” and “electrical engineering” contributes to the realization of the SDGs in collaboration with domestic and overseas industries and the world’s leading research facilities. This is a five-year integrated education program for doctoral candidates geared towards training knowledge professionals. In this program, the following four competencies will be honed to the “world-class leader” through “Global Pro-Active Education”:
1. Ability to pioneer innovative academic fields to foster leadership in various aspects of business and research. Students have already experienced a number of setbacks and difficulties while engaging in advanced work at their home and overseas destinations. After returning to the University, the students share their experiences and continue to work with their academic advisors and mentors to overcome these obstacles while studying during their second dispatch. This is a teaching method referred to as “training by dispatch,” and is designed to provide the experience of re-learning what was lacking in the university environment and of tackling challenges in the field. In addition, as the human resources who will lead the next generation of Social Innovation, they will be equipped with the latest IT technologies, all students enrolled in this program will build proficiency with the latest IT technologies such as AI, IoT, and data science. In order to maximize the effectiveness of such learning, we will promote the establishment of a suitable learning environment together with collaborating universities, research institutes, members of industry, and government agencies in Japan and abroad.

**Idea Development Dojo to strive and train together with corporate employees**

The Idea Development Dojo opened in October 2019 as an education program for human resource development focused on producing ideas for new innovation. Its activities are carried out using the SPARK Dome that was built thanks to the generosity of SPARK. At the Dojo, students and young R&D personnel of companies have been working together to form ideas with the “ability for idea development,” using these ideas to develop and carry out the production and marketing of new products with successful results. We look forward to the participation of more companies who wish to carry forward projects with us.

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**Message from the President**

KAMADO Shigeharu
President, Nagaoka University of Technology

**Establishing a world-class base for applied root technology instruction**

A variety of students participate in this outstanding graduate program, including those with corporate experience; those from other higher learning institutions, as well as international students. We believe that it is extremely important for students with such diverse backgrounds to actively engage with equally diverse faculty in various regions of the world in the pioneering of new academic fields. In addition, the application of “Root Technology” combining IT, power electronics, and materials science provides many solutions for new lifestyles. Numerous overseas universities, domestic and foreign enterprises, and local governments who support the idea of developing knowledge professional human resources are newly participating in the program. We look forward to your continued support.

**Establishing an environment for making global pro-active education**

Since its foundation, our University has adopted pioneering teaching methods, such as requiring on-the-job training (long-term internships) at companies in Japan and overseas for approximate half-year terms. The world’s top research achievements in the fields of materials science and power engineering, as well as unique practical competencies form the source of graduates empowered to play an active role as leaders. This program demonstrates pioneering teaching methods that can only be achieved through a long-term program of five years of master’s and doctoral degree-focused instruction. That is what we refer to as “Global Pro-Active Education.” “Global Pro-Active Education” incorporates a collaborative education model (dual system) in which advanced European industry members and academic collaborators, and share experiences to foster leadership in various aspects of business and research. Students have already experienced a number of setbacks and difficulties while engaging in advanced work at their home and overseas destinations. After returning to the University, the students share their experiences and continue to work with their academic advisors and mentors to overcome these obstacles while studying during their second dispatch. This is a teaching method referred to as “training by dispatch,” and is designed to provide the experience of re-learning what was lacking in the university environment and of tackling challenges in the field. In addition, as the human resources who will lead the next generation of Social Innovation, they will be equipped with the latest IT technologies, all students enrolled in this program will build proficiency with the latest IT technologies such as AI, IoT, and data science. In order to maximize the effectiveness of such learning, we will promote the establishment of a suitable learning environment together with collaborating universities, research institutes, members of industry, and government agencies in Japan and abroad.

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The advancement of science and technology is rapidly changing the world. Achieving a breakthrough in the challenges confronting society and technology requires researchers who will not only promote existing areas of their individual studies but also daringly explore interdisciplinary frontiers and open up new horizons.

GTR intends to develop such researchers who will advance interdisciplinary frontiers and become future experts. For this purpose, GTR provides practical opportunities to help acquire genuine research power to open up interdisciplinary studies while conducting studies in different research environments and performing challenging innovative interdisciplinary research. GTR’s mindset and its method of exploring interdisciplinary frontiers are spreading throughout the entire university and are closely reflected in its planning of doctoral education programs.

Beyond interdisciplinary frontiers to achieve breakthroughs

To achieve sustainable development of society, the human race must solve many challenges, including environmental and energy problems, stable food supply, the development of materials leading to industrial and technological innovations, and life science research that contributes to the promotion of health. Accordingly, the roles of science and life science are expected to increase in importance. To make breakthroughs in these challenges confronting science and society, we need to pioneer interdisciplinary research fields that will open new horizons. To overcome the walls between conventional disciplines that stand in the way of such efforts, an excellent research power to break through is essential. The research power to break through consists of two elements: the ability to overcome and the power to connect. The former involves a frontier spirit, power of execution, and confidence that can be developed only by taking the initiative in carrying out attractive and high-quality research. The latter involves connecting different disciplines, leading to the creation of innovative ideas for solving problems through free and open-minded discussions.

Program of Transformative Chem-Bio Research (GTR) intends to cultivate this research power to break through and train researchers who will advance interdisciplinary frontiers and create the knowledge of the future. Each year, GTR trains around 30 researchers who have acquired an excellent research power to break through and who challenge themselves to create new knowledge that will aid in the development of society.

The “Mixed Lab” Concept offers optimal opportunities

GTR consists of three pillars of programs and courses. A high degree of expertise is required for conducting high-quality cutting-edge research, and a broad range of knowledge must be acquired with curiosity to break into different fields of study. To achieve this, GTR provides a curriculum aimed at developing foundational strengths, covering a wide range of disciplines including material transformation/functions, advanced nano-measurement, chem-bio/drug discovery, systems life science, neuroscience, and biomass/breeding. GTR also offers a course for cultivating comprehensive research power. With a variety of activity plans, the course develops foresight, inventiveness, research creativity, ability to create personal connections and human networks, and an international mindset. The last and most important of the three is the program of developing research power to break through.

The Institute of Transformative Bio-Molecules (ITbM), the parent organization of GTR, has produced many prominent findings that could have materialized only through interdisciplinary research in chemistry and biology. The key to success lies in the mixed lab concept, in which researchers of different disciplines work together to generate innovative ideas through daily discussions, and then collaborate to realize these ideas. The mixed lab, which allows world-class researchers to enthusiastically work on interdisciplinary studies, offers an optimal opportunity for researchers in training. The GTR program further expanded the mixed lab concept to develop research power to break through. This program encourages students to create a proposal for interdisciplinary research at an early stage so that they establish a strong mindset for crossing boundaries. They are then required to do a joint study in an international environment (in multiple laboratories) with a foreign collaborating institution or a company. At the final stage, students complete their doctoral dissertation under the guidance of two mentors. Thus, GTR trains capable researchers who will play a pivotal role in the next generation, making full use of the knowledge accumulated in R&D in its realization of the mixed lab concept.

Three powers fostered by GTR: Basic knowledge across chemistry and life science, comprehensive research power to advance, and research power to break through only acquired by active involvement in interdisciplinary research.

Message from the President

The research power to break through via the mixed lab concept involves four steps: early proposal of interdisciplinary study, research in a different environment, working in foreign organizations, and receiving guidance from two mentors.

Program selected in FY 2018 of Nagoya University

Program of Transformative Chem-Bio Research

The GTR Student Support Office

[Office and section in charge] The GTR Student Support Office

[Inquiries] 052 - 789 - 2954

Original and Creative Planning on the Part of GTR Students Make the Program Even More Attractive

GTR sciences and supports the events which students plan and execute themselves. The events conducted thus far include exchange programs among the students under COVID-19 pandemic conditions, lectures by students on different disciplines, projects to promote communication with foreign students, and tours of laboratories of different disciplines. In addition, some of the funds for lectures by the Graduate School and the GTR Program that qualify for credits, have been initiated by students. The planning conducted by graduate students, therefore, imitates the spirit of the GTR Program, which intends to create an interdisciplinary frontier, and has become an excellent opportunity for creating and linking cohesive and collaborative networks among the students.

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**Program Name:** DII (Deployer-Innovator-Investigator) Collaborative Graduate Program for Accelerating Innovation in Future Electronics

**Date:** FY 2018

**Main Features:**
- **Fostering of diverse doctoral human resources who connect science and technology to innovation**
- **Accelerating product innovation from 30 years to 10 years**

**Program Coordination:** AMANO Hiroshi (Professor, Director of the Institute of Materials and Systems for Sustainability Center for Integrated Research with Industry, Nagoya University)

**Fields of disciplines:** Doctor of Engineering

**Message from the President**

SUGIHARA Naoshi
President, Nagoya University

**Accelerating product innovation from 30 years to 10 years**

In this program, on the basis of its experience that it took 30 years from the start of research and development on gallium nitride crystal to practical use of LED (Light Emitting Diode), the DII (Deployer-Innovator-Investigator) Program Coordinator fosters three types of human resources who will play different roles in the rapid and continuous creation of product innovation in future electronics. Since the key to accelerating innovation is the fostering of the three types of human resources, we named this “DII collaboration,” with DII standing for Deployer, Innovator, and Investigator. Based on this idea (DII), the program offers a curriculum to acquire the necessary skills to conduct the DII Collaborative Project and improve skills in fields of expertise according to the three types.

**Curriculum to acquire necessary skills to conduct the DII Collaborative Project and improve skills in fields of expertise according to the three types**

International perspectives, foresight, and planning abilities. The curriculum makes you a center of research and development and aims to relevant fields and collaborate with external organizations and other institutions to create products to solve social issues. In this collaboration with external organizations and other institutions, you will cultivate an entrepreneurial spirit and thinking about creating innovation with highly motivated colleagues and learn to work together to solve challenges for future electronics in the real world.

**Message from DII Collaborating Institution**

KASHIWADA Tsukasa
Executive Director, DII Collaborative Project Office

**Table:**

**Good Practice**

- Fostering future colleagues to move forward through the trackless desert
- Valuable experiences for thinking about “creating innovation”

**Message from DII Collaborating Institution**

MORITA Tomoyuki
Executive Director, DII Collaborative Project Office

**Table:**

**Further reading:**
- DII Collaborative Project with external collaborators and cooperating institutions
- DII Collaborative Program for Accelerating Innovation in Future Electronics
In 2021, Kyoto University established the Graduate School Education Support Office to enhance its liberal arts programs and general education courses, and centrally manage its diverse graduate degree programs. The new office promotes collaboration and cooperation among graduate schools in diverse aspects of education and research. It will ensure that the university continues to provide unique high-quality programs under the government’s Doctoral Program for World-leading Innovative & Smart Education (WISE Program). WISE programs are provided in close cooperation with leading companies and world-class research institutes in Japan and leading universities around the world with the aim of cultivating advanced “knowledge professionals” and promoting the reform of the university’s graduate schools.

**Objective**

Human society is currently entering a period of significant transformations focused on electronics such as the IoT (Internet of Things) revolution, wearable information devices, self-driving and electric cars, and smart grid. In such a society, many high-performance photonic and electronic devices function as the core of the hardware while being integrated, and require further performance enhancement and creation of new functions in the future. On the other hand, the explosive expansion of knowledge, due to advances in science and technology in recent years, has given rise to the problem of a lack of comprehensive outlook as a significant subdivision of specialized fields was developed. In particular, it is considered that specialized education in a specific discipline is not enough to solve issues of a wide range of fields of human society such as advanced information-oriented society, environment, energy, and artificial intelligence. It is essential to nurture talents who can make right decisions while looking at everything, from fundamental theories to system application, with a holistic perspective, resolve challenging issues, and lead the critical fields in the future.

At Kyoto University, we have our original scientific concepts and key technologies that should be called “Originated in Our University”. This WISE Program promotes combined vertically integrated education focused on the field of photonic and electronic devices, extending from deepening the understanding of fundamental physics and theory to the management and application of systems and information. Also, we collaborate with private enterprises representing Japan around the world, national and public research institutes with the highest level of research capabilities, and top-class and leading overseas universities. Moreover we systematically implement education and quality assurance of a global standard and raise world-class professionals of knowledge who create “Advanced Photonic and Electronic Devices” through an integrated 5-year doctoral degree program.

**Nurture Talent**

With the common philosophy of “Challenging the physical limits and developing an information-oriented and energy-saving society”, the WISE Program (Doctoral Program for World-leading Innovative & Smart Education) aims at nurturing international pioneers who can lead the field of advanced photonic and electronic devices as well as related academic fields, specifically, those with the following abilities.

1. Originality
2. Holistic perspective
3. Challenge ability
4. International mindedness
5. Self-dependence

“e-Wise Cafe”, a place for students to interact with other research fields or faculty members, which is planned and operated by the students themselves.

Since 2019, we have been holding the “e-Wise Cafe” as a place to promote the interaction among students from different fields as well as faculty members. The e-Wise Cafe is planned, operated, and lectured by the students themselves. In the lecture, they introduce their research contents to other students in different research fields in an easy-to-understand manner. In addition, they introduce the hardships and longevity of their own studies, failure stories, and personal life or their hobbies. After the lecture, they have a round-table conference to further interact with each other.
Osaka University

Transdisciplinary Program for Biomedical Entrepreneurship and Innovation

Program Coordinator: MORII Eiichi (Professor, Graduate School of Medicine, Osaka University)
[Fields of disciplines] Doctorate (Medicine), Doctorate (Health Sciences), Doctorate (Nursing), Doctorate (Dentistry), Doctorate (Pharmaceutical Sciences), Doctorate (Pharmacy), Doctorate (Frontier Biosciences), Doctorate (Science), Doctorate (Engineering)

Name of the program to be noted: Completion of Transdisciplinary Program for Biomedical Entrepreneurship and Innovation

URL: https://www.med.osaka-u.ac.jp/pub/bei/en/

Offering a new program to train doctoral students with practical research and entrepreneurial (social implementation) skills to drive innovation in medical, dental, pharmaceutical, and life sciences

Japanese biomedical research, despite producing various original and internationally superior research findings, is lagging behind that of other countries in translating the results of basic research for application to society. At Osaka University, we have been developing doctoral qualified human resources with practical research skills to produce internationally superior research results and overcome biomedical science, as well as entrepreneurial skills to implement the research results in society. Such human resources will be the experts in knowledge that are needed in society.

Students develop their practical research skills through discussion with our outstanding researchers. The program provides opportunities to broaden their horizons.

Academia-industry-government network

To foster “experts in knowledge” who translate research results for application in the society, we aim to cultivate individuals capable of tackling various societal issues through co-creation with society. We hope that this program will produce opinion leaders who are globally active in creating a society where everyone can enjoy a comfortable and happy life.

uniqueness of their own research.

To develop their entrepreneurial skills, we offer lectures to provide students with detailed knowledge about the market and needs analysis, intellectual property strategy, and regulatory science, which is later put into practice by students. Furthermore, by visiting the companies that participate in social implementation of research findings, students cultivate a bold attitude that involves taking high risks and learn social implementation through their experience.

Quality Assurance of the Degree

At the end of the 3rd year of the 5-year program (the 2nd year of the 4-year program), students will take the Qualifying Examination (QE). In the QE, practical research skills acquired through practice will be assessed by examining original and international competence in research that will lead to social implementation. At the end of the program, students will take the Final Assessment. In the assessment, entrepreneurial skills will be assessed. Students present own research for its implementation to society and its problem-solving plan. In addition, students defend their doctoral theses at the graduate school of their affiliation.

Academia-industry-government network

We promote an educational system in which industry, government, and academia together develop qualified doctoral human resources possessing both practical research skills and entrepreneurial skills.

In addition to offering the conventional specialized education provided in graduate schools.

Therefore, our program promotes education through a global academia-industry-government network.

Osaka University has many scientists who lead cutting-edge research and produce internationally outstanding research results in areas such as immunology and autophagy. This program provides students with an environment in which their practical research skills are strengthened through active cross-departmental research and education.

In partnership with the Graduate School of Medicine, Dentistry, and Life Sciences, Research Institute for Microbial Diseases, Immunology Frontier Research Center Osaka University Hospital.

Familiarization with sites participating in societal implementation of biomedical science

Students visiting companies and laboratories that foster societal implementation of biomedical science research findings, gaining workplace experience. While deepening their understanding of how companies are responding to society’s needs and learning about open innovation and the corporate research environment and mindset, students can strengthen their own research with corporate researchers.

Students present their educational experiences to other students and faculty members in industry, government, and academia, and the wide network of faculty members in industry, government, and academia, and the wide network of faculty.

[Office and section in charge] Academic Office for the Transdisciplinary Program for Biomedical Entrepreneurship and Innovation (WISE), Graduate School of Medicine [Inquiries] 06-6210-3231
Welcome to Hiroshima University: ‘The Frontier Development Program for Genome Editing’ on the theme of ‘Developing a Future Society with Genome Editing’

Genome editing is drawing attention worldwide as it is a biotechnology capable of modifying genomic information of various organisms by using artificial DNA-cutting enzymes; it is thought to bring a revolution to anything from selective breeding to medical applications. Coupled with some of the top-class researchers in Japan in the field of genome editing, Hiroshima University has been promoting various projects as it intends to become one of the leading institutions in Japan for the education of genome editing. While making sure to take a reasonable care for implementing genome editing research in terms of clearing its safety and ethical issues, the program above focuses on developing researchers who will lead the future of genome editing research in the world with a view to successfully designing their career path. The university is hoping to attract well-motivated students who are capable of creating new industries that can unlock world’s future.

What are the capabilities trained by the program?

Genome editing, which is a new technology to freely modify various organisms’ genomic information by using artificial DNA-cutting enzymes (genome editing tools), has rapidly expanded in recent years. This is due to technologies that can be used in a wide range of applications, from microbes to animals and plants, as well as the fact that competition to develop the technologies has been intensifying. It is imperative to promote research and development in genome editing for industrial and medical applications such as selective breeding, drug discovery, and gene therapy, in addition to basic research with ethical considerations in mind in Japan. In particular, the cutting-edge research style has changed a lot with the development of CRISPR-Cas9, a new genome-editing tool introduced in 2012. While genome editing using CRISPR-Cas9 is becoming more popular in Japan at a constant speed due to its simplicity, there are only a few developers and experts on Japan’s unique genome editing technology. Despite this situation, genome editing technology’s intrinsic value is its use in genetic engineering and disease treatment in biological species that have been difficult to modify genetically up until now, and possibly for industrial applications.

Hiroshima University is one of Japan’s leading universities in genome editing research and is affiliated with several researchers who run the Japanese Society for Genome Editing. Moreover, Program on the Consortium of Innovation for Bio-Digital Transformation (BioDX), COI-NEXT has conducted with companies in a variety of fields for the project of developing the basic technologies to use industrial genome editing and also advanced the research and development, including human resources development and career path formation in collaboration between industry and academia. According to a curriculum conducted by top national and international genome editing researchers, this program develops human resources that can respond flexibly to industrial structure changes based on new industries and social trends to them.

Courses offered: Life Science Course/ Medical Course

This program has two courses and after the third year under the organizational structure to experience the speed of cutting-edge research, features the development of advanced and practical research and development abilities by acquiring the ability to develop in society (the ability to implement in society) through collaborative research with participating companies and partner institutes of the Consortium of Innovation for Bio-Digital Transformation (BioDX), COI-NEXT.

Overview of Life Science Course

This course is a five-year degree program (transfer students can also take this course from their third year). We develop the leading-edge human resources for future genome editing by teaching students the basics to advanced knowledge and skills of genome editing in the first and second year, from the third year with practicing research to utilize the acquired knowledge and skills through basic courses and internships for social implementation.

Overview of Medical Course

We develop the advanced human resources for genome editing working in the field of related medicine through advanced training at partner institutions in Japan and abroad while practicing doctoral thesis research using the acquired knowledge and skills after systematically learning the basic to advanced knowledge and skills of genome editing in the first and second year.

We hold regular series of advanced science seminars focusing on “Developing a Future Society with Genome Editing” to the public.

We are holding a total of four seminars per year with the title “Developing a Future Society with Genome Editing” to give easy-to-understand explanations of the potential of genome editing to the public. A wide range of people participate, from high schools, universities, companies, and other organizations. Past seminars have included a variety of themes, such as “Genome editing technology for the safety of biological products” and “Genome editing technology for biofuel development in microalgae.” Some examples of favorable comments from participants are as follows: “I obtained a lot of the latest information”; “This seminar opened my eyes and answered my questions about genome-editing technologies.”

Novel educational methods:

This program gives the opportunity to achieve high quality research.

Genome editing technology has become indispensable in a wide range of research fields. This program provides opportunities to master this technology through the education by top-level researchers in Japan. In addition to lectures and practical training on the latest technologies, we get chances to interact with researchers who have experiences in various careers. I believe that this program is a valuable opportunity to improve not only my research but also myself.
Train global health professionals who can build a healthier world

In the 21st century, the globalization of economy, industry and distribution has rapidly progressed. This rapid growth in globalization has brought both social and environmental issues to increase which requires global attention. In particular, emerging and re-emerging infectious diseases such as HIV/AIDS, Ebola virus disease and Malaria have become global health issues and cause for concern throughout the world. Hence, we believe there is an urgent need to promote global health and encourage international societies to work together to eliminate the problems we are facing on a global scale. In order to innovate graduate school education, it is important that this programme strives to become a driving force that can effectively strengthen the education systems of the university. Having the strong partnership between Nagasaki School of Tropical Medicine and Global Health and London School of Hygiene and Tropical Medicine as a foundation of our WISE Programme, we are committed to foster leaders in the field of global health through working in collaboration with both internal and external research institutions. We believe that the focus of the programme to train experts with hands-on experience is very important in addressing health challenges and improving health worldwide from a global perspective.

Establish ‘Highly Practical Professional Training Program’ to foster professionals who can tackle pandemic and contribute to public health policymaking and implementation

Students in this programme include medical doctors who participated in the medical humanitarian assistance at the San Lazaro Hospital in the Philippines and for the COVID-19 crisis in a cruise ship at the Nagasaki Port. These experiences have encouraged students to seek new research topics to enhance their knowledge in this field. Taking advantage of the experience we gained through living with the new disease in this unprecedented times, we have established a Doctor of Public Health Programme (DoPH) in October 2022 with aims to strengthen our programme for fostering professionals with high-level leadership and management skills in public health, who can tackle the global issues regardless of the academic disciplines and contribute to policymaking by adopting scientific evidences, decision-making, and implementation of the policy.

Good Practice

We believe that being selected as part of the WISE Program offers students an important opportunity to assist Nagasaki University in achieving its goal “to become a world-class center of global health education and research that contributes to human health on a global scale”. In order to innovate graduate school education, it is important that this programme strives to become a driving force that can effectively strengthen the education systems of the university. Having the strong partnership between Nagasaki School of Tropical Medicine and Global Health and London School of Hygiene and Tropical Medicine as a foundation of our WISE Programme, we are committed to foster leaders in the field of global health through working in collaboration with both internal and external research institutions. We believe that the focus of the programme to train experts with hands-on experience is very important in addressing health challenges and improving health worldwide from a global perspective.

Train truly outstanding global health professionals who can build a healthier world.

Specifically, we focus on training leaders who have the ability to understand the health challenges on a field level and are dedicated to addressing health issues utilizing their academic knowledge and practical skills in areas such as global policy planning and implementation. In addition to strengthening our collaboration with accredited international institutions such as LSHTM, we are dedicated to training leaders and pursuing common goals throughout the various internal departments such as Nagasaki University Institute of Tropical Medicine (NITM), Graduate School of Biomedical Sciences and overseas research stations in Kenya, Vietnam and the Philippines. With our 75 year history and proven success in educating professionals in the field of infectious disease, we are committed to expanding both our education and research areas.

Furthermore, our mission is also focused on further developing our collaboration with external organizations such as Hokkaido University Research Center for Zoonotic Control, National Research Center for Protozoan Diseases, Obihiro University of Agriculture and Veterinary Medicine; School of International Health, Graduate School of Medicine, the University of Tokyo, National Center for Global Health and Medicine; JICA, National Institute of Infectious Diseases; Sysmex Corporation; Shionogi & Co., Ltd. While strengthening relationships with our partner organizations, we aim to develop our programme so it functions as a hub in the field of global health in Japan.

Top-level education and research programme in global health

The Nagasaki University WISE Programme consists of a five-year doctoral programme. Up to the second year of the Master’s degree programme, the lectures are focused on the coursework and are taught by faculty staff including practitioners whose specialized areas are cross-disciplinary and innovative. In particular, the Epidemiology and Statistics modules are taught using LSHTM teaching materials by LSHTM faculty staff invited to teach in Nagasaki. Furthermore, advanced modules have been established for the NU WISE Programme in order to meet course requirements and facilitate quality research.

From the third year onwards, students will focus on their research work. Each student is assigned a supervisory team. By assigning faculty members specializing in different areas of research, the programme aims to maintain a diversity students can set practical objectives and receive the most effective research guidance from their experienced supervisory team.

Train global health elite programme for building a healthier world

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Top-level education and research programme in global health

The Nagasaki University WISE Programme consists of a five-year doctoral programme. Up to the second year of the Master’s degree programme, the lectures are focused on the coursework and are taught by faculty staff including practitioners whose specialized areas are cross-disciplinary and innovative. In particular, the Epidemiology and Statistics modules are taught using LSHTM teaching materials by LSHTM faculty staff invited to teach in Nagasaki. Furthermore, advanced modules have been established for the NU WISE Programme in order to meet course requirements and facilitate quality research.

From the third year onwards, students will focus on their research work. Each student is assigned a supervisory team. By assigning faculty members specializing in different areas of research, the programme aims to maintain a diversity students can set practical objectives and receive the most effective research guidance from their experienced supervisory team.
Waseda University

Graduate Program for Power Energy Professionals

Program Coordinator
HAYASHI Yasuhiro (Professor, Faculty of Science and Engineering, Waseda University)

Fields of diploma
Doctor of Engineering, Doctor of Science, Doctor of Informatics Science, Doctor of Philosophy

Name of the program to be noted: Graduates will receive certificates of program completion, awarded jointly by all 13 universities.

URL: https://www.waseda.jp/pep/en/

Waseda is leading an advanced graduate program in collaboration with 12 partner universities, producing Ph.D. holders who will make a positive impact on global carbon neutrality.

Waseda University is promoting cutting edge research and innovative education based on its out-standing research outcome. In this program, Waseda plays a key role in collaboration with 12 partner universities, 58 leading corporations, and 9 international research institutions to develop international standards in interdisciplinary graduate programs. Also, even in the post with COVID-19 society, we will continue to develop new educational methods, making the most of new digital technology for our students. Consequently, Waseda University will commit itself to paving the way for a carbon-neutral future and promote the development of highly skilled professionals holding Ph.D. who will contribute to human society.

Fostering doctoral resources to innovate power and energy

The world has seen emerging global trends such as the shift to digital and AI, and a focus on global environmental protection for the realization of a sustainable society. In response, the industry sector related to electric power and energy infrastructure is entering a period of structural transformation. Many technological innovations have been achieved, such as renewable energy and systems for their management; electric vehicles; storage batteries; and IoT. As a result, the energy supply sector has begun a shift to small-scale distributed work. Now there is an urgent need for unconventional transformation and reconstruction of energy networks.

This program provides an inter-university platform for collaborative education and research among 13 national, public, and private universities to enable the creation of new industries that will contribute to Japan’s future vision of achieving “Society 5.0” and 2050 carbon neutrality. The program promotes more practical education and research than usual, in collaboration with domestic and overseas companies and research institutes spanning numerous energy fields.

Waseda University

Cross-disciplinary education and standardization education

This program sees the energy value chain of the future as ranging from the finest component, the electric charge, to huge power networks. With that vision, we have prepared a comprehensive curriculum that includes: the materials field, which produces highly functional distributed power resources; the power engineering field, for optimal integration, control and operation of resources; and the humanities and social sciences, to design an optimal society. Ten credits are required in seven courses, including: Power Resource Optimization, a multidisciplinary course in power engineering and energy materials; Social Science for Energy Innovation, lectures on the implementation of innovative energy infrastructure systems, intended to hone the students’ skills and vision for business development; and Seminar on Business Creation. The program also develops the students’ capacity through: specialized elective courses that leverage the unique expertise of each university; pan-university elective courses including lecture courses on leadership development lectures and basic AI/MT; multi-layered education and research guidance; and seminars on new industry creation—all in collaboration with a comprehensive group of research organizations. Furthermore, in coordination with Japan’s power and energy system standardization measures, the EMS Shinkujo R&D Center, established at Waseda University as a paradigm of neutrality and fairness, has been partly opened to provide unparalleled international standardization education.

We ensure high quality of education with various types of examinations, including selective examination (SE); qualification examination (QE); and final examination 1 (FE1) for evaluation of advanced research expertise; and final examination 2 (FE2) to verify acquisition of 45 credits or more and publication of one or more papers co-authored in collaboration with institutions at international universities in the same field.

The program will continue to foster “PEP-people”, Ph.D. holders who will energize society.

Good Practice

Waseda University and other 12 partner universities, in collaboration with 58 leading corporations and 9 international research institutions, have created Waseda’s Graduate School Platform for 13 University Collaboration: A Human Resource Development Scheme that will contribute significantly to the creation of new electric power and energy industries.

PEP students can learn the essence of new business creation through 3 steps based on the wisdom of humanities and social sci. faculty to integrate energy, humanities, and science.

PD students can learn the essence of new business creation through 3 steps based on the wisdom of humanities and social sci. faculty to integrate energy, humanities, and science.

Programs implemented in FY 2018

Waseda University
Fostering leaders to respond to various risks with practical skills based on advanced knowledge, developing HR to lead the transformation of future society.

In addition to the conventional discipline-based degrees offered by its graduate schools, Tohoku University aims to build a graduate school that is appropriate for a world-class research university by enhancing various "degree programs" that transcend the boundaries of disciplines, national borders, and organizations such as industry and academia, and by developing a world-class research environment and financial support, centered on the Advanced Graduate School. In this context, the WISE Program plays a major role in the "creation of new value" through co-creation with industry and other sectors.

Now in its fourth year of operation, this program is making progress in fostering human resources to become knowledge professionals with practical skills based on advanced knowledge as an educational program in the fields of "environment and earth science" and "disaster science" based on co-creation with society.

Study the Earth, Discover the future

Located in an orogenic belt, Japan is prone to natural disasters such as earthquakes, volcanic eruptions, and torrential rain, which are high demand from society for quality scientific research. With continued advances in our knowledge of Earth's structure, the field of Earth system science has evolved into a precise understanding of the mechanism of dynamic phenomena, which is seamlessly linked to disaster science. In addition, modern society faces new large-scale risks such as space environment disasters caused by fluctuations in the planetary space magnetic field.

Earth scientists in Japan have specialized in research into subduction zone phenomena such as earthquakes and volcanic eruptions. Now, those fundamental studies have progressed to the stage where they can directly lead to essential improvements in our disaster prevention capabilities. Moreover, many disasters are caused by both natural environmental factors and a combination of information, social, and economic factors. To build a society that can respond to diverse and complex risks, we need to further elucidate the mechanisms governing natural phenomena and improve corresponding prediction techniques. We must also urgently develop skilled scientists who have the practical ability to understand humans and society and communicate scientific research results to society. This program aims to produce knowledge professionals who can seamlessly acquire and convey advanced knowledge for improving our understanding of issues related to Earth system science.

Study among diversity, on the job, from around the world

In this program, we will achieve these educational objectives through hands-on training by an integrated academic team with the participation of a wide range of departments. This style of training exploits the fact that students learn more from each other than from lectures.

As a second educational policy, we will invite private companies and organizations to build a "Study Sustainability Study Consortium." One of the consortium's purposes is to develop skilled scientists that are adept at working in the field through project-based learning. Students will learn the basics of risk management, which forms the basis of all industries.

The third policy of this program is to provide international joint education with director-class faculty members from overseas affiliated organizations. In collaboration with faculty members who have experience of United Nations organizations and the Japan International Cooperation Agency (JICA), we plan to collaborate with international organizations to conduct research education and achieve international contributions. Through the three educational policies unique to this graduate degree program: "study among diversity, on the job, from around the world," we will develop "snow crystal-type human resources" with multiregional abilities. We aim to supply their human resources to a wide range of sectors, including industry, government, and academia.

In 2015, the United Nations adopted the "Sendai Framework for Disaster Risk Reduction," a framework for countries around the world to implement disaster prevention and mitigation.


As an initiative to "Learn from the World," six program students and three supervising faculty members visited the United Nations Headquarters, United Nations Development Programmes, and Permanent Mission of Japan to the United Nations in New York, as well as the World Bank in Washington, D.C. In addition, the students had the opportunity to meet with United Nations staff and officials daily and meet with high-ranking officials, including industry, government, and academia. As an initiative to "Learn from the World," six program students and three supervising faculty members visited the United Nations Headquarters, United Nations Development Programmes, and Permanent Mission of Japan to the United Nations in New York, as well as the World Bank in Washington, D.C. In addition, the students had the opportunity to meet with United Nations staff and officials daily and meet with high-ranking officials, including industry, government, and academia.
Chiba University
Applied Humanities Program for Cultivating Global Leaders

Year of selection
FY 2019

Program selected in FY 2019: Chiba University

Message from the President

Message from WISE Cooperation Institute

Program selected in FY 2019: Chiba University

Asia-Eurasia × Digital Humanities: Challenge of Humanities

Humanities is the study of thoughts, words, behavior, ways and theory of society that link people together. It is a seemingly roundabout way of gaining a fundamental understanding of people. What we see in front of us is a complex world in which people of increasing diverse backgrounds move and come into contact with one another, which causes friction. Because we are in such a modern world, there is a need for a new study of humanities to move into the folds of diverse cultural backgrounds and sensitivity and ever-changing social dynamics to be able to identify guidelines for the resolution of issues.

The first focus of the program is Asia-Eurasia. This area covering East, Southeast Asia, Russia in Northern Eurasia and the Islam world is not only deeply related to Japan’s future direction, but it is an experimental site (developed areas facing challenges) where diverse issues of future society arise in a pluralistic world where multi-ethnic, multi-lingual, multi-cultural and multi-religious elements are mixed. It is the region where the strength to deal with an ever-changing world is tested. The program aims to cultivate the capacity to closely analyze the pluralistic world of Asia-Eurasia on multiple levels. The second focus is on Digital Humanities.

Fostering top management personnel who will lead the diversity society by utilizing humanities

Based on the philosophy of “Always Aim Higher”, Chiba University promotes outstanding education and research that integrates humanities and science, intending to develop next-generation human resources who can play an active role as leaders in the global society. At the same time, we continue to take on constant challenges, such as reforming the structure based on our vision.

This program will cultivate flexible cultural imagination and a bird’s-eye view of literacy through exploration activities for various issues in Asia-Eurasia, a pluralistic world, based on a distinctive educational and research base in the humanities field our university and affiliated universities. In the future, the trained human resources will lead a diversified society in collaboration with industry. We hope that this program’s graduates will serve as a bridge between the humanities and the community.

Excellent Educational Program Through a Cooperative Network

As stated above, the program aims to cultivate individuals to lead in the future diverse environment by comprehensively learning two realms: micro perspective and technology to move into the folds of culture and sensitivity; and macro perspective and technology to see from the perspective of data science (Digital Humanities). This program to cultivate such individuals has structured a broad network in and outside of Japan. In Japan, we cooperate with Chiba University, Okayama University, Nagasaki University, Kumamoto University, The Graduate University for Advanced Studies, National Museum of Japanese History, AEON CO., LTD., TBJ Tourism Research & Consulting Co., Chiba Bank, and Keiyo Bank. In addition, we have a network with institutions of higher education in China and Russia. Participating universities have accumulated innovative achievements in intercommunication in order to analyze the direction of a changing society, technology to visualize environmental changes and social space with GIS (Geographic Information System) or data science analysis, and to understand the trends of social movement by making almost use of social research statistics and text mining (statistical analysis of text) is necessary. It is also an important focus of the program to localize data science in the application of analysis in Humanities to understand the social movement of Asia-Eurasia.

This program is a collaborative effort among five universities, each of which has graduate students affiliated with the program. So far, student exchange among the partner universities has been mainly online, but we convened face-to-face workshops and research presentations this year. In this workshop at the national Museum of Japanese History (Rikukawa), each team of several students, shuffled by university and field of study, acquired digital information from Rikukawa’s diverse collection of digital objects and images according to the theme, created them, and compiled a virtual visual exhibit.

Excellent educational program implemented within a sub-area network

Excellent educational program implemented within a sub-area network

Cross-institutional Collaboration and Digital Humanities

This program is a collaborative effort among five universities, each of which has graduate students affiliated with the program. So far, student exchange among the partner universities has been mainly online, but we convened face-to-face workshops and research presentations this year. In this workshop at the national Museum of Japanese History (Rikukawa), each team of several students, shuffled by university and field of study, acquired digital information from Rikukawa’s diverse collection of digital objects and images according to the theme, created them, and compiled a virtual visual exhibit.

Good Practice

Thinking of the World from Asia

AEON CO., LTD. has been working on glocal management vis-à-vis and together with the local region containing Asia, in order to develop business in the Asian market. It is necessary to learn about the lives of customers in the region, realize an environment of society for diversity, and pursue global values. We think that Takuetsu University’s graduate program accepts the challenge of such an initiative by industry-academia collaboration.

Programs selected in FY 2019: Chiba University

Applied Humanities Program for Cultivating Global Leaders

WISE Program for Transdisciplinary Research

Student's voice

I am studying representation in children’s film from the perspective of racialized gender. My focus is how representation of women are shifted in the past ten years from the perspective of racialized gender. I am focusing on how the motif was pruned by the filmmakers, and how the representation of women are shifted in the past ten years from the perspective of racialized gender. My focus is how representation of women are shifted in the past ten years from the perspective of racialized gender. I am focusing on how the motif was pruned by the filmmakers, and how the representation of women are shifted in the past ten years from the perspective of racialized gender.

I decided to enroll in this program because I wanted to enhance transdisciplinary field of my research.
Fostering creators of new "medical knowledge" and innovators of world-leading innovative medicine

Based on the philosophy of "Always Aim Higher", Chiba University promotes outstanding education and research for Japan, which is a super-aging country, to lead the world as a future model to achieve a sustainable healthcare society.

The Graduate School of Medical and Pharmaceutical Sciences takes a lead role in innovation of Medically CHIBA Doctoral WISE Program (iMeC-WISE), based on its more than 100-year history. iMeC-WISE aims to create a new graduate education system in cooperation with world-class academic and research institutions, including RIKEN and the University of California San Diego (UC San Diego), many companies, and the Center for Artificial Intelligence Research in Therapeutics to develop modern medicine and medical care and realize a sustainable healthy society.

Sustainable Education System to Create Medical Innovation

Talented graduate students with different backgrounds will major in at least two out of the six specialized fields, which are organized beyond degree programs and institutions: Therapeutics, Medical Engineering, Biomedicine, Drug Discovery, Sustainable Health Sciences and Medical Informatics. The students are required to cultivate basic skills and knowledge on Medical Sciences studying in nine areas of the two-year Master's Program. Then they accomplish at least two projects in different fields, equivalent to double majors, in Frontier Medicine and Pharmacy of the four-year Doctoral Program. Each student is guided by professors from three fields and takes the curriculum to nurture multidimensional skills necessary for the creation of interdisciplinary innovation: rotation training, self-planned overseas training, self-directed retreat and others. The International Double Degree Course, in which students can earn Ph.D. degrees from both Chiba University and a foreign university such as UC San Diego is provided. The Chiba Innovative Therapeutics International Program (iCIP) for global education containing 37 visiting professors of 21 foreign institutions, and the Chiba Innovative Therapeutics Industry Consortium (CITICO) for industry-government academics collaborative education consisting of 26 companies, and three government institutions are also engaged in this program. Ten students for the Master's Program and five students for the Doctoral Program enter iMeC-WISE every year. Qualifying examinations (QEs) are conducted at three stages to assure the quality of the academic degree: QE1 in the 2nd year of the Master's Program, QE2 at the end of the 2nd year of the Doctoral Program, and QE3 at the end of the Program. Each dissertation committee includes at least one foreign professor to ensure that the decision is based on international standards. iMeC-WISE provides students with financial support and the career development office as well as subsequent post-graduate employment positions to maximize each student's potential and build the foundation for career success.

“Advanced General Education” to nurture a global perspective

Innovative Medicine CHIBA Doctoral WISE Program provides “Advanced General Education”, in which many eminent leaders in various fields deliver lectures so that students can develop critical thinking, analytical skills, problem-solving abilities and a moral compass from various angles. iMeC-WISE students determine and invite 15 leaders every year. Prof. Tasuku Hachisuka, Nobel Laureate in Physics 2015, talked in 2022. Students cultivate basic skills and knowledge on Medical Sciences in the Master’s Program and then either the Double Major Course or the International Double Degree Course.

Chiba University
The Forefront Physics and Mathematics Program to Drive Transformation (FoPM) builds on the University of Tokyo’s two World Premier International (WPI) Research Centers, the Kavli Institute for the Physics and Mathematics of the Universe (Kavli IPMU) and the International Research Center for NeurIntelligence (IRiC). FoPM, which have contributed greatly to the globalization and reform of research systems at UTokyo and beyond. The program offers a curriculum in which students come into contact, engage in dialogue, and work closely with a diverse range of people and research fields. We make use of the expertise of our external partner institutions, requiring all students to experience academic life outside of Japan, and have introduced a lab rotation system in which students spend time in a second research group within UTokyo. These activities provide our students with a global perspective and enable them to understand the wider scientific context of their research. Moreover, to ensure that research involving those from different backgrounds proceeds smoothly, we offer a new seminar given by an expert in diversity education and regular seminars in which students mix casually with those from other research groups.

Within this diverse and inclusive environment, we provide courses designed to foster an international level of specialist knowledge, as well as those in which students develop an awareness of how they could use this knowledge to solve complex global challenges. Through our “Academic Writing and Presentations” and “AI and Quantum Computing” courses, students acquire valuable skills for their future careers, regardless of the path they choose to take after graduation. We aim to further open students’ eyes to the wealth of possibilities available to them outside of Japan and outside of academia with the program’s International Career Seminar. By providing a place where students can refine their specialist skills, develop an awareness of the impact of their research, and grasp the multitude of career options available to them, FoPM aims to maximize students’ potential through diversity and dialogue in today’s uncertain world.

Connecting science and society through educational reform

FoPM is a program run by a joint initiative of the University of Tokyo, Peking University, École Polytechnique, California Institute of Technology, ENS de Lyon, and HSE University. It is built in cooperation with a diverse set of prestigious institutions, including the Paul Scherrer Institute in Switzerland, Kavli Institute for the Physics and Mathematics of the Universe (Kavli IPMU), and the International Center for NeuIntelligence (IRiC). The program is designed to provide students with a global perspective on research and development, enabling them to engage in diverse research fields and gain insights into the latest developments in their respective fields. The program aims to develop students’ skills in academic writing and presentation, as well as in interdisciplinary collaboration, preparing them for a wide range of future career opportunities.

Creating the future through dialogue: Maximizing the potential of basic science specialists

The Forefront Physics and Mathematics Program to Drive Transformation (FoPM) provides a unique opportunity for students to engage in interdisciplinary research and gain insights into diverse research fields. The program aims to develop students’ skills in academic writing and presentation, as well as in interdisciplinary collaboration, preparing them for a wide range of future career opportunities.

Advancing social innovation through basic science

Mathematics provides the quantitative basis of all academic disciplines and physics underpins the fundamental laws of all of the natural sciences. It thus follows that physicists, mathematicians, and other specialists in the natural sciences play an essential role in the current shift to a knowledge-based society. Basic science specialists do not simply contribute to academic research in their respective fields; their work can also have a great impact on society. For example, the discovery of the DNA double helix, the invention of blue LEDs, and even the development of the Internet would not have been possible without their contributions. Physics and mathematics will also be instrumental in creating the academic knowledge essential for the technological innovations needed to meet the global challenges facing our society today. With this in mind, the “Forefront Physics and Mathematics Program to Drive Transformation” (FoPM) uses education in state-of-the-art physics and mathematics to cultivate logical, flexible, and non-biased thinking. The program aims to foster specialists in the basic sciences who can exert a wide influence on science, technology, and social innovation. By challenging outdated customs and long-held beliefs within the education system, we also aim to take advantage of Japan’s fundamental strengths and develop a new generation of citizens who are well-informed and have a strong sense of social responsibility.

Message from the President

[Image: President of The University of Tokyo]

[Image: Forefront Physics and Mathematics Program to Drive Transformation Logo]

[Image: Coursework through which students develop skills for their future careers and our future society]

[Image: Good Practice]

Inquiries

Program selected in FY 2019 — The University of Tokyo
Coping with various business challenges

The Fourth Industrial Revolution represented by AI, IoT and big data, and innovations such as biotechnologies, have raised various new problems and concerns of business. Conventional education, which has been divided into different academic disciplines, fails to address these issues. First, to understand the essence of innovation, the knowledge of the sciences is necessary, meanwhile, to institutionally solve these business problems, knowledge of social sciences is required. Thus, it is necessary to collaborate across disciplinary aspects of the scientific and social sciences. Second, since the academic fields of law, economics, and politics each have their own limitations in addressing these issues exclusively and separately, there is also a necessity for integration of study fields within social sciences.

Even with the need for interdisciplinary fusion, problems occurring in the actual society are intricately intertwined; it is almost impossible to develop and propose perfect solutions to these complex problems from scratch. For example, in considering whether to grant patent protection on the discovery about the function of new gene segment, it is difficult to determine which approach is better: to grant the patent in order to promote innovation by rewarding the scientific finding, or not to grant the patent because this discovery is basic research so as to encourage the development of scientific innovation itself. Even though the determination is difficult, this problem can be legally recognized. It could be understood with a conventional issue of granting pharmaceutical patent to chemical substance, which requires to consider whether chemical substance has comparable pharmaceutical effects. Taking the problem mentioned above as a question concerning the existence of effects, if the function of the new gene segment can be evaluated as having pharmaceutical effects, patent can be granted as a tentative solution to the problem. Meanwhile, law can justify it on an equal basis with other existing patented inventions, verify whether there are ethical issues from the perspective of justice.

Producing the elites

This program provides the Basic Seminar for master’s students and the Progress Seminar for doctoral students as compulsory subjects in order to reflect the aforementioned interdisciplinary fusion with a focus on law in the educational program. Aiming at fostering interdisciplinary synergy effects, the program assembles students and professors specializing in natural science, economics, politics and law. This program will guide students to learn specific research methods of law where trial-and-error could be used as a possible approach, and enlightens students with values such as freedom, equality, and justice that are inherent in law.

We expect that students who have completed this program will flourish as elite practitioners, researchers, and policy planners to lead industry, government, and academia in the fields of basic law.

Interdisciplinary and integrative education led by legal studies in the field of advanced business law

In compulsory courses, the Basic Seminar and the Progress Seminar for Advanced Business Law, we invite lecturers from graduate schools and collaborative institutions outside of the Graduate School of Law and Politics; to cultivate students’ knowledge for interdisciplinary studies. Besides, instead of teaching the linear-and-thinking approach, we try to enlighten students to take a progressive trial-and-error approach by using inclusive models based on the concept of law, to incorporate inherent values of law—freedom, equity and justice—into the approach and therefore convince the public. In additional, students will have the opportunity of attending and gathering for this program. By sharing and discussing the concepts of their master’s or doctoral theses, we are exploring and engaging in the interdisciplinary studies.

Training interdisciplinary visionaries who shape policy concern various business fields

The World-leading Innovative Graduate Study: Advanced Business Law Program (WINGS-ABLP) contains an ambitious curriculum promoting interdisciplinary education by fusing topics from the sciences, humanities, and liberal arts in order to produce human resources who can propose solutions to various problems businesses face in the age of technology. These problems raise innovations in artificial intelligence, the Internet of Things, and biotechnologies progress. Before becoming an official part of the ABLP, the program that formed its basis was already equipping students to flourish as visionaries in various fields, such as academic, industrial, official, and legal circles. We expect that students who have completed the ABLP will shape policy in various fields in order to age of great change.

Programs selected in FY 2019 — The University of Tokyo
Train "knowledge professionals" to lead a Super Smart Society through university-wide interdisciplinary education

The University promotes interdisciplinary education reform, which includes establishing a university-wide interdisciplinary education program and offers a consistent liberal arts education from the undergraduate to the doctoral program (interdisciplinary education of arts and science). In FY 2017, the University was selected as a Designated National University Corporation and has made strides in producing brilliant and cultivating individuals with a doctoral degree by responding to social demand. With human resource and financial assistance from the Consortium partners and the university-wide support system, the program offers interdisciplinary education between cyber/physical space technologies with quantum science, which is an area that Tokyo Institute of Technology is leading the world. By offering such education, the University trains knowledge professionals, who can lead industry, government and academia in the forthcoming Super Smart Society.

Features of WISE Program for Super Smart Society

The program is the core of the University's SSS Promotion Project, and the main feature is to promote education with 71 faculty members collaboratively across six graduate schools and the Institute for Liberal Arts. Thus, interdisciplinary education is realized across the following fields:

- physical space technology in the School of Engineering,
- cyber space technology in the School of Computing, and
- quantum science in the School of Materials and Chemical Technology

Figure 2: WISE Program for Super Smart Society

Interdisciplinary research team building to bring about super smart society -- Research in academia to meet social needs from industry

The interdisciplinary matching workshop of the Tokyo Tech Academy for Super Smart Society aims to link the needs of member organizations of the Super Smart Society Promotion Consortium with technology and talent from Tokyo Tech faculty and students to form interdisciplinary research teams. With help from team advisors, students will perform research activities for the Super Smart Society.

Figure 1: Image of program graduates

Interdisciplinary education program matching between academic and practical worlds

In order to enhance the global competitiveness of Japanese industry through the realization of "Society 5.0" which the government advocates as a super smart society, it is necessary not only to harness the strengths of "Japanese manufacturing" but also to create innovative industries and services utilizing ICT and AI. I support this program in the hopes that it fosters "knowledge professionals" who can recognize new needs, set goals, find solutions, and lead the smart society of the future.

Message from WISE Cooperative Institution

Expectation for "knowledge professionals" towards realizing Society 5.0

In order to enhance the global competitiveness of Japanese industry through the realization of "Society 5.0" which the government advocates as a super smart society, it is necessary not only to harness the strengths of "Japanese manufacturing" but also to create innovative industries and services utilizing ICT and AI. I support this program in the hopes that it fosters "knowledge professionals" who can recognize new needs, set goals, find solutions, and lead the smart society of the future.

Message from WISE Program Group, Promotion Office for Education Programs, Student Services Department

Program selected in FY 2019 — Super Institute of Technology

Good Practice

I was attracted by the wide range of state-of-the-art fields not only mechanical, electrical and information technologies but also quantum science and AI, which are necessary to realize a Super Smart Society. Furthermore, through practicums, it is possible to experience cutting-edge technology such as autonomous driving, which is expected to be ubiquitous in a Super Smart Society. I applied for the program because I believe knowledge and intelligence will be powerful weapons in the future Super Smart Society.
Marine AI Student Study Sessions Plus: The event is open to researchers and developers from related industries and research institutions. Internships at Marine AI Consortium partner institutes: Students are sent into the field to work on projects aimed at solving real-world problems. Social Implementation: TUMSAT fosters the development of social implementation of AI professionals for marine industries. WISE Program Doctoral Program for World-leading Innovative & Smart Education: WISE Program is now in its fourth year. Members of first batch of students admitted in April 2020 have finally advanced to the doctoral course, and are gaining a wealth of valuable experiences and developing significantly in a new learning environment that includes working people returning to education. Education and research system to sustain excellence: TUMSAT has established an education and research system that spans wide-ranging fields such as marine, maritime, and fisheries. Students can learn about (1) the development of autonomous navigation vessels desired by the marine industry, (2) ocean observations using artificial satellites and Argo float data, (3) analysis of genomic information of aquatic organisms, (4) management of marine resources, and (5) establishment of next-generation smart fisheries. On November 1, 2019, we established the Marine AI Development and Evaluation Center (MADEC) to fully utilize state-of-the-art nautical training vessels such as Shinyu-Maru, which is a strength of TUMSAT, the Field Science Center, and advanced navigation systems. In fiscal year 2020, we established a marine AI consortium with partner institutes to advance the WISE Program via industry-government-academia collaboration and conducted the second AI training and qualification examination for students and participants from partner institutes. In such a distinguished education and research system, WISE Program students are aimed to be advanced technical experts who can propose sophisticated solutions to complex challenges such as issues on board automation, development of navigation officers, self-propelled vessels capable of automatic target finding and landing, labor savings in fishing and aquaculture using robots, and realization of high-production smart fisheries using automated and optimized water quality management and weather forecasts and ocean information systems. Development of AI professionals for marine industries: It is important to enhance Japan’s presence in global marine industries as the marine-related working population decreases in modern society by producing individuals who can create diverse values and novel systems that contribute to the realization of “Society 5.0 (ultra-smart society).” TUMSAT fosters the development of Artificial Intelligence (AI) Professionals and innovators. We train highly skilled experts who are not only versed in big data (BD) analysis and machine learning (ML) but also can access AI performance. Based on expertise and field experiences gained at TUMSAT, they will play the social implementation of AI and marine-related policies. The WISE Program is established as a 5-year integrated graduate school course at TUMSAT. The master’s program provides lectures on BD analysis and ML to develop students’ technical literacy, while practical skills beyond the courses are gained at MADEC. At the end of the master’s program, students’ basic ability to conduct doctoral dissertation research is assessed (Qualifying Exam). Through these efforts, we strive to develop specialists who can implement their knowledge and expertise at graduate school. The doctoral program provides two introductory courses on AI and society. Since AI is expected to be highly reliable, the Course on Advanced Reliability Assessments focuses on performance evaluation methods for AI. The Course on Social Implementation Impacts Assessment discusses the impact of AI on society. In addition, the doctoral program cultures students’ capabilities necessary to lead the social implementation of AI by providing opportunities to participate in real business projects at partner institutes (in-residence projects) and internship. Through these efforts, TUMSAT aims to contribute to the realization of “Society 5.0 (ultra-smart society).” We train experts who transform society by leading the marine industry. Currently, marine vessels are operated by the knowledge and skills of experienced crews. Machine learning and big data technologies are expected to complement inexperienced crews and to help solve issues, including marine accidents and industry-wide labor shortages. TUMSAT’s WISE Program is appealing to me because it provides opportunities to interact with partner institutes and to participate in real business activities. Additionally, it helps broaden my views and skills to conduct practical research.
Kanazawa University

WISE Program for Nano-Precision Medicine, Science, and Technology

[Program Coordinator] HAIKAWA Rinkin (Professor, Nano Life Science Institute, Kanazawa University)

Message from the President

Kanazawa University is promoting graduate school education reforms with a focus on fostering scientists who will lead academia and industry. Based on the world-leading research capabilities of the WPI - Nano Life Science Institute, the WISE Program for Nano-Precision Medicine, Science, and Technology is to train doctoral scientists who will create innovative preventive, diagnostic, and therapeutic methods based on nano-level understanding and control. Kanazawa University nurtures doctoral students to acquire interdisciplinary knowledge beyond the borders of their own specialty. Kanazawa University expects that the students supported by the Program will explore the challenges that humans face today and in the future and contribute to overcoming them.

Creating innovation that continues from pre- to post-program

This program is a trans-disciplinary degree program covering the four graduate schools. With the aim of creating innovative individuals, the program builds and develops a trans-disciplinary education in science, technology, and medicine with a focus on nano-precision medicine and nano-precision science and technology. Before entering the university, we host pre-program lectures and seminars for applicants joining the program. The pre-program is operated in a residential training format and includes participation from students at other graduate schools, senior students, and representatives from our corporate partners as well as the academics responsible for the program. While on the residential pre-program, participants acquire a taste of the potential for trans-disciplinary fusion by sharing their visions for the future of the program and getting to know one another.

After entering the university, all students study the core subjects on the program's foundation course. These courses of mathematical data science and innovation management that are necessary to the realization of Society 5.0 and nanotechnology and nano materials science, which serve as a basis for the program's transdisciplinary research. While on the foundation course, we cultivate a comprehensive perspective and creativity as students engage in a broad study of real-world cases in transdisciplinary and applied research. Thereafter, students advance to the four specialist courses of Nano Pre-Empirical Medicine, Nano Neurology, Nano Environmental Science, and Nano Diagnostic Development and study how nano science is applied to the field of their specialist course. The specialist course program is student-led, whereby students conduct a transdisciplinary research project under the supervision of an academic staff member.

Our program graduates are conferred with a doctor's degree and can also acquire a qualification that enables them to perform research and development using the university's cutting-edge nano measurement technology. Through this, we aim to connect the program to corporate employment destinations, forge a personnel network, and create all types of transdisciplinary innovation, such as between fellow graduates, current students, and graduates, and academic staff and graduates.

Good practice

Pre-program for prospective students to learn about the program's vision and expose themselves to the expansive possibilities of inter-field research and development

In the pre-program lectures and seminars designed for prospective students, students of different fields of study will form a group, discuss solutions to health-related problems with instructors, and give a presentation. In addition, the president and representatives of collaborating companies will conduct a lecture on the qualities required for collaborators with the professional skills that are currently in demand. Prospective students will also experience themselves to the technologies of different fields by operating cutting-edge, nano-precision analysis equipment or by using VR learning materials to experience professional healthcare situations. Through this experience, they will learn about the infinite possibilities of the field research and development.

Message from WISE Cooperating Institution

We provide strong support to the development of innovative individuals!

Kanazawa University’s WISE program, which aims to support corporate executives who will lead innovations and entrepreneurs who will implement a new knowledge society, has begun its fourth year. Our company, Daisel, is actively taking part in this program by sending interns and accepting interns. With the strong bond of industry-academia collaboration, we will support the development of talents who will contribute to society through their achievements.

Inquiries

076 - 264 - 5959

[Office and section in charge] WISE Promotion Office, Educational and Student Affairs Department

[Inquiries] 076 - 264 - 5959
Convolution of the creation of new fields and the production of human resources for the safety and well-being of society as a whole

The increases in diseases such as cancer and dementia associated with the aging of society has become a worldwide social problem, including in developing countries. This is particularly serious in Japan, where the super-aged population and declining birth rate are pronounced, and the country is facing a critical situation of ballooning medical and nursing care costs and a shrinking working population. The key to solving these issues is to shift from personalized medicine to personalized prevention, and to realize the safety and well-being of society as a whole. It is necessary to analyze life science big data at multiple levels, from molecules to human society, and to create a new field that integrates understanding of pathological conditions and development of preventive methods for unmet diseases. The CIBoG program is making every effort to promote its goals, which are to promote research that integrates informatics and biomedical science, implement disease prevention methods in society, and produce human resources who can optimize social well-being.

From personalized prevention to social implementation

Currently, increases in cancer, dementia, and other diseases associated with a super-aged society have become a problem, and this includes developing countries. The situation is particularly serious in Japan, which is experiencing a super-aged society and a declining birth rate. It is crucial to focus on societal situations with critical situations of ballooning medical and nursing care costs and a shrinking working population. The key to resolving these issues is to shift from personalized medicine to personalized prevention. To achieve this, life science big data must be analyzed at multiple levels from molecules to human society and allow understanding of pathological conditions and development of preventive methods for unmet diseases. The CIBoG program is making every effort to promote its goals, which are to promote research that integrates informatics and biomedical science, implement disease prevention methods in society, and produce human resources who can optimize social well-being.

The CIBoG program aims to develop a new field of biomedical sciences that is an implementation of individual prevention on the global society. To achieve this, life science big data must be collected and analyzed at multiple levels from molecules to human society, and produce human resources who can optimize social well-being.

implement the findings to society. Thus, global awareness and diversity are vital to developing human resources. The CIBoG program, therefore, aims to foster researchers, administrators, and entrepreneurs with deep insight into informatics and biomedical sciences who can collaborate on disease prevention research, create personalized prevention systems, and promote their social implementation. To develop globally competitive interdisciplinary research

CIBoG is based on 3 basic educational policies or pillars: Digital Biomedical Sciences, Multilayered Biomedical Sciences, and International and Diversity Education. During the five-year program (four years for medical doctors), students enrolled in the CIBoG program acquire proficiency in the three fields that constitute the main pillars, through both basic science study and clinical practice. Graduates gain the ability to integrate developed medical and informatics research projects at a global level by applying what they learn in the CIBoG program. Digital Biomedical Sciences is a form of medical research that utilizes mathematical informatics. In CIBoG, the Graduate School of Medicine and the Graduate School of Informatics will work together to support graduate student education and research, with the goal of strengthening digital medical education through the reorganization of the Department of Health Sciences and participation of the Institute of Statistical Mathematics, sure to prove a driving force behind this new graduate education program. In addition, the Center for Cellular Dynamics (CCCD), a center for integrated medicine and informatics research, has been established at the Tsukui Campus. Through close collaboration between the wet and dry laboratories, CCCD will promote joint research among medical informatics research that integrates various related fields such as medicine, molecular biology, and mathematical sciences, with a focus on immunology, and promote spatio-temporal understanding of complex biological phenomena on a cell-by-cell basis.

The CIBoG program recruits students in informatics and biomedical science, and supports them with financial aids to foster global leaders who can create and promote new fields of integrated informatics and biomedical science.

Program supported in FY2019

In this fiscal year, the CIBoG program has received support from 14 universities, 5 public research institutes, and 12 companies, and has been active in various research projects. It is currently conducting research on various aspects of biomedical sciences, including the development of new diagnostic tools and the use of big data in clinical practice. The program is working towards the goal of creating a new field of biomedical sciences that is an implementation of individual prevention on the global society.

E-mail: info@cirog.med.nagoya-u.ac.jp

Message from WISE Program Director

KIMURA Kazue

Student’s voice

Aiming to be a researcher who can create new value in the medical field

Through my experience in clinical medicine of the undergraduate level, I felt that it would be necessary to analyze an amount of medical information in the future. So, I participated in this program in order to acquire the skills and knowledge necessary for it. In CIBoG, we can play an active role as a researcher who creates new technologies and values in society.

KAMIGUCHI Hidenori

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Education for Next-Generation Medical Innovators

In order for medical and healthcare innovation in Japan to be accelerated and disseminated worldwide, a system for training outstanding personnel capable of undertaking cutting-edge research and development, needs to be established strategically. Based on this idea, the Graduate Program for Medical Innovation aims to train MD (medical doctor) students and non-MD students to be medical innovators with a global mindset. This will be achieved through collaboration between accomplished medical, pharmaceutical, and health science researchers at Kyoto University.

[Education Goals]
1. To create innovative and excellent researchers who elucidate complicated phenomena and pathologies
2. To discover diverse next-generation drugs and nurture researchers and developers who engage in translating new technologies into next-generation medical care
3. To collect and analyze sizable data from different modalities and develop scientists who can conduct research that integrates medicine and informatics
4. To spread the next-generation advanced medical care and develop experts who have medical management ability and can plan and implement policies to solve problems related to according to their diverse backgrounds and interests. It also aims to cultivate a comprehensive perspective of the social implementation of next-generation medical treatment by interacting with leading experts in industry, government, and academia in Japan and overseas.

[Program Features]
1. The program will build an advanced education and research system through an academic-industrial-government-academia collaboration that covers everything from basic research to social implementation of the results.
2. To meet the diverse needs of students, a diverse group of faculty members will be assigned to run the program, and young mentor faculty members will provide dedicated guidance for career policy makers.
3. In collaboration with related departments that have world-class research achievements and long-established expertise in industry-government-academia collaboration, the program will establish a research system that works together with domestic and international research institutions as well as industry and government.

Inquiries
MINATO Dai
President, Kyoto University
WATANABE Dai (Professor, Graduate School of Medicine, Kyoto University)
(WISE Cooperative Institution)
The image contains a page from a document that appears to be related to a Doctoral Program for Pioneering Quantum Beam Application at Osaka University. The text is in Japanese and discusses the program, its objectives, and its impact on solving social issues. Here is a translation and summary of the key points:

**Title:** Multidisciplinary PhD Program for Pioneering Quantum Beam Application

**Objective:**
Cultivating individuals capable of tackling various societal issues through the fusion of knowledge

**Program Overview:**
Osaka University has envisioned creating a university dedicated to creating a society where each member can enjoy a comfortable and happy life. The program aims to "continuously develop human resources to lead the creation of next-generation quantum beam application technologies" by targeting students mainly in the fields of science, medicine, and information technology in cooperation with domestic and foreign universities, institutions, and companies.

**Curriculum and Attributes:**
- Ability to consider risks in terms of human sustainability
- Significant academic and technical knowledge in a specialized field
- Ability to consider phenomena on various scales and academic fields
- Experience and know-how of advanced experiments and calculations in different fields
- Ability to evaluate risks and benefits of the implementation of advanced technologies
- Ability to develop and capitalize on human networks by taking a leadership role in international activities

**Message from the President:**
"We hope that this program will produce opinion leaders who are globally active in creating a society where everyone can enjoy a comfortable and happy life."

**Cooperating Institutions:**
- Hiroshima University
- Osaka University
- Tohoku University / J-PARC Center / Kyoto Institute of Technology
- The University of Tokyo/RIKEN/TRIUMF / The University of British Columbia (Canada)

**Innovations for the Future:**
- Sparkling middle and high school students’ interest in science is crucial to further cultivate talent in this program. Therefore, Osaka University works in collaboration with "Mebae Tekijuku" (JST Junior Doctor Training After-School Program), which is offered to elementary, middle, and high school students, and "SEED" which is offered to high school students. Doctoral candidates in PQA participate as "Advisor and mentor." Approximately half of the participants in "Mebae Tekijuku" and "SEED" are female students. We expect that nurturing exceptional young talent will continue to cultivate future leaders and improve gender balance in scientific fields.

**Student's Voice:**
"I joined the program because its perspective on beam application matched my research interest, which is developing a new type of particle accelerator. In practice, the double-mirror system allows me to discuss my research with professors from different academic disciplines, who gave me precious advice in my master thesis and helped me to make further progress. I am also looking forward to participating in the domestic and overseas internships. This program provides me with many experiences and helps me to build my career as a researcher."
Outstanding researchers (As of November 2022)

Multi-scope Energy WISE Professionals shape the future of energy

Supplying sustainable energy while curbing activities that contribute to climate change is an urgent mission for the global community. To build a society feasible for the future energy, we must transition to a culture of sustainability and carbon neutrality by making the most of big data science. Along with analysis and data science, and digitization, Tokyo Tech defines its sought-after "ambient energy society" as one in which the environment and economy coexist without people having to worry about energy sources and protecting the environment. We aim to achieve such a society through cooperation and collaboration with industries.

The newly established Tokyo Tech Academy of Energy and Informatics program helps students develop into Multi-scope Energy WISE Professionals who, with a solid basic understanding of energy science, are capable of applying big data science to the research and development of devices, systems, and scenarios, designing the future of energy, and taking leadership in bringing about transformations. Students are evaluated and awarded diplomas based on their readiness for expected roles in 1) bringing social innovation through new ventures, 2) planning and promoting new businesses in companies, and 3) driving the creation of a future society. Such outstanding professionals, trained through the program's collaborations with companies, are expected to demonstrate excellence across the scopes of multi-disciplinary energy science (profundity expertise), big data science (expertise and skills), and social design for the future (expertise and quality as member of society).

Liaison with InfoSyEnergy Research and Education Consortium

Prior to the establishment of the Academy of Energy and Informatics program, Tokyo Tech launched the InfoSyEnergy Energy Research and Education Consortium in November 2019 as an industry liaison hub for research and education. "InfoSyEnergy" was coined from "Informatics", "Synergy", and "Energy." The consortium functions as a framework to support feasibility and continuity of the program in its mission to train Multi-scope Energy WISE Professionals.

Joint research projects between industry and academia have typically been between one lab and one company. But through this program, we aim to build a platform where performing and implementing a number of collaborations of various scales and levels are possible. A major feature of this program is the close cooperation with the consortium. Consortium member organizations select representatives to work with Tokyo Tech faculty and representatives to promote the program. By inviting renowned researchers from overseas institutions – including the world's top 14 universities – as well as business mentors from member companies to report on research outcomes and conduct discussions, the consortium aims to strengthen the feasibility of the program's concept, enhance graduate education, and improve continuity of the program with additional financing from corporate members. The program will also provide doctoral students with research opportunities and financial support through joint research projects with companies, so that the students can become financially independent and concentrate on their studies.

In addition, the program will launch courses – through which students are expected to acquire or enhance knowledge in social sciences – in new business creation, energy policy planning, and energy economics with the full support of Hitotsubashi University. Multi-scope Energy WISE Professionals, as they complete these studies and projects, will contribute to bringing about the desired shift to a society of sustainable energy free from restrictions on the use of energy such as cost and carbon emissions.

Cross-border Student Exchange Event Connecting Asia, the U.S., and Europe online: First International Energy & Informatics Forum to Design a "Future Energy Society"

This international forum, held over a year, aims to help students develop their design thinking skills by integrating academic knowledge they have gained from their multidisciplinary education and exploring, creating, and shaping the boundaries between energy and informatics. For the first time, students of the Academy of Energy and Informatics program across Tokyo Tech, domestic universities and international partner organizations, universities and their students gathered online for lectures by overseas partners, workshops and presentations by students, and technical tours at energy-related facilities. There were 40 sessions in 5 days, during which 102 people participated.

Multi-scope Energy WISE Professionals

Program Coordinator

URL

Program Coordinator

[Image 71x541 to 131x612]

Message from the President, Tokyo Institute of Technology

Tokyo Tech: Asia’s leading university for the 21st century.

School of Engineering
School of Materials and Chemical Technology
School of Science
School of Environment and Society
School of Advanced Science and Engineering
School of Liberal Arts

Multi-scope

INFOGRAPHIC

Operation and program in FY 2021

Tokyo Tech implemented Institute-wide, ambitious reforms in education, research, and governance in 2016, reorganizing its system into the current six schools, Institute of Innovative Research, and Institute for Liberal Arts. Having also identified three strategic fields and three priority fields that are applicable and relevant to all departments, we were selected as a Designated National University (DNU) in March 2018. The three new priority fields – “Next-Generation Element Strategy,” “Integrated Energy Science,” and “Digital Society Devices and Systems” – are the fields in which we will take future initiatives in leading Japan. Under my leadership as president of Tokyo Tech, we have also put institute-wide efforts to promote the funding program for outstanding graduate schools since its start in FY 2018. We have made one proposal every year in the aforementioned priority fields, all of which have been adopted.

Multi-scope Energy WISE Professionals

Tokyo Tech Academy of Energy and Informatics
Tokyo Institute of Technology

Tokyo Tech pushes strategic promotion of three outstanding graduate school programs

Tokyo Tech

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Outstanding researchers (As of November 2022)

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Fostering human resources for social change who will lead lifestyle revolution

Recent technological innovations in information and mobility have minimized the cost of traveling in time and space. However, as social issues become more complex and value standards diversify, technology-led "realization of rich lifestyles" is becoming difficult. In order to lead a "lifestyle revolution" where people can freely choose various ways of life, it is necessary to have specialized human resources who can collaborate in diverse fields. Through this program, students will develop five abilities that include teamwork and diverse values.

Transdisciplinary mobility innovation will bring about major changes in society. In order to create truly rich lifestyles and values, not only technology but also deep understanding of people and society, and "transdisciplinary" are required.

In this program, the knowledge and practice necessary for conducting transdisciplinary Mobility Innovation (TMI) through transdisciplinary collaboration are structured as a 3-layer transdisciplinary curriculum. The most basic "TMI Knowledge Base" can be selected according to the backgrounds of the students, and consists of: “Course Works” in which basic knowledge necessary for transdisciplinary collaboration is learned through courses in specialized fields and courses in multidisciplinary fields. "Transdisciplinary Faculty Discussion Lecture" to learn different viewpoints from lecturers in different fields, and "Mobility Innovation Common Lectures" to learn basic knowledge about mobility. The "TMI Practice Base" consists of: "Boot Camp" that fosters transdisciplinary collaboration through close teamwork collaboration in a training camp format, "On-site Research Training (ORT)" in which site surveys are conducted on sites such as local governments, "Testbed Design and Development (TDD)" in which students collaborate with corporate mentors to design and develop a "testbed" as a basis of demonstration experiments, and "Venture Catapult" through which students plan and practice the establishment of a venture by forming a team among students. In "TMI Lifestyle Revolution Doctoral Research", in addition to a student's own specialized field, students conduct doctoral dissertation research focusing on "value creation" and "methodology" in lifestyle revolution based on transdisciplinary collaboration such as industry-academia co-creation research. In particular, in the "Industry-Academia Co-Creation Education" promoted by the university, "intellectual professional" ability will be cultivated through joint research with private companies.

TMI students participated Smart City Expo World Congress in Barcelona - introducing TMI Testbed projects

TMI faculties and students participated in the Smart City Expo World Congress, the world’s largest smart city exhibition held in Barcelona in November 2022, and introduced our educational and research activities. These student groups exhibited and had discussions with many visitors about the various TMI testbeds, as well as the initiatives that utilize these testbeds (safety truck sensor systems, smart warehouses, and human flow utilization). We also studied the efforts of other exhibitors and obtained many hints for future urban design.

Message from the President

SUGIMURA Naosuke
President, Nagoya University

Programs selected in FY 2020 - Nagoya University
Through the WISE Program, Kyoto University seeks to cultivate advanced “knowledge professionals” who will play key roles in industry, academia, and government.

In 2021, Kyoto University established the Graduate School Education Support Office to enhance its liberal arts and general education courses, and centrally manage its diverse graduate degree programs. The new office promotes collaboration and cooperation among graduate schools in diverse aspects of education and research.

It will ensure that the university continues to provide unique high-quality programs under the government’s Doctoral Program for World-leading Innovative & Smart Education (WISE Program). WISE programs are provided in close cooperation with leading companies and world-class research institutions in Japan and leading universities around the world with the aim of cultivating advanced “knowledge professionals” and promoting the reform of the university’s graduate schools.

In this program, we will develop the ability to build the basic infrastructure of platforms using actual big data from agriculture, medical care, disaster prevention, among others. Then, according to the students’ backgrounds and orientations, we will develop an educational system that helps them acquire the knowledge of Platform Studies, encompassing multiple major subjects and advanced, original research capabilities across the following six competencies.

- (1) Outstanding core expertise in the area of the primary major
- (2) Expertise to deepen understanding in the areas of sub majors
- (3) Integrating humanities and sciences, including subjects such as law, ethics, and distribution that are required to build a platform

Features of distinguished doctoral program

- (4) Building platforms on one’s own initiative
- (5) Progressing and managing a project and operating and expanding the results globally
- (6) Sustaining development through standardization and social implementation

The six competencies to be developed, and program features

Lectures, exercises, and seminars by in-house and external experts in the key technologies, user realities, and approaches to implementation needed for platform building built in this program, we will create an environment in which students can access a wealth of actual data and have opportunities to interact with frontline professionals from industry, government, and academia in Japan and overseas.

Wise, an all-in-one program for “platformers” to lead from Japan

It has been four years since the launch of a program designed to better personnel who will contribute to building platforms that can respond quickly to social risks such as infectious diseases and natural disasters. This program involves creating a multi-disciplinary, optimal platform and using it to cultivate personnel who can drive doctoral-level research and development. As a collaborative activity, we will spare no effort to support these personnel to enable them to help solve social risks globally in the future.

Message from WISE Coordinating Institution

WISE, an all-in-one program for “platformers” to lead from Japan

Programs selected in FY 2020

Kyoto University

Distinguished Doctoral Program of Platforms

Message from the President

President, Kyoto University

MINATO Nagahiro

Platform Studies: A new academic field to advance society

To reduce the social risks involved in various fields such as agriculture, medical care, and natural disaster prevention, the “platforms” play an increasingly important role in our society. The platforms use information and communication technologies to cater to a diverse range of data obtained from various information sources that are uniformly spread throughout our society, which are collected and stored in the form of big data. A platform consists of three components: a basic information collecting network composed of various sensors, information terminals, and information communication networks; a database that stores sensor information and interprets the output while reducing costs by understanding and interpreting the data’s meaning in each specific field properly and by optimizing the data. To achieve this, informatics must be combined with knowledge of other disciplines such as agriculture, medical care, and disaster prevention. The emergence of cloud computing and communication networks developed in other countries challenges Japan. It is not sufficient for engineers to be only involved in platform development. They also need to consider the business as well as the standardization from an international perspective. Indeed, such platform developments with a broader world perspective require the knowledge of laws, ethics, public policy, distribution, and other human studies. We believe this kind of comprehensive expertise helps engineers implement new collective decision-making mechanisms on platforms supplied by Japan’s unique outlook on social ethics and fairness. In this program, we name this new interdisciplinary academic field “Platform Studies” and we propose to develop the required skills with our five-year doctoral program.

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To demonstrate and implement the platforms
Mathematical Modeling Talents with Five Forces

In the present era of digital transformation, new demand arises that mathematicians and data science professionals are not only good at theory but also have strong practical skills to analyze data and solve the social issues. To address this trend, the WISE Doctoral Program at Kyushu University has established a Graduate Program of Mathematics for Innovation to train students and researchers who can apply mathematics, data science, and AI skills to their own research fields of specialization and “Train doctoral talents who can lead the way in solving the social issues by developing integrative, cross-disciplinary degree programs.”

The GPMI Support Office is established with the support of eight universities, 3 public research institutes, and 5 companies, 1 local public body for the purpose of promoting the research activity of students, researchers, and professors who are engaged in the GPMI Program. The WISE Doctoral System for Mature Students solves multiple problems at once, such as financial support, career development, etc.

Figure 21 WISE Doctoral System for Mature Students solves multiple problems at once, such as financial support, career development, etc.

Therefore, we envisioned “the Graduate Program of Mathematics for Innovation”. The five skills that this program aims to cultivate are shown in the Mathematics Five Force Tree (Figure 1). Having excellent mathematical and statistical skills is the basis and represents the soil, and by utilizing the mathematical modeling power and the power to co-create across organizations and fields, it fortifies the lush inlets to create innovation and blossoms flowers in each field, in turn cultivating “Mathematics for Innovation Professionals”. In the Master’s Program, students join the labs of faculty members of other fields as “Basic Mathematical Modeling”. In the Doctoral Program, we have three “Co-Creative Internships”, i.e., industrial, interdisciplinary, and international ones, as well as “Advanced Mathematical Modeling in Japan”, in which students teach mathematical modeling researchers to researchers in other fields as reverse mentors.

In the present era of digital transformation, expectations for Mathematics for the future and mathematics technology are becoming greater and greater. This program is unique in that it will contribute to the development of human resources who can create innovations by practicing co-creation with society and possessing fundamental mathematical skills. It offers the first initiative of the WISE Doctoral System for Mature Students and we are glad to be a part of it.

“Mathematics for Innovation Café”, Co-creative Activity Organized by Students

Students and young mentors collaborate to take the initiative in planning, organizing, and disseminating the entire program to society, and regularly hold lectures and poster presentations by young researchers, etc., as well as social gatherings on a scale where all participants can see each other. Not only program students but also undergraduate students of the Department of Mathematics and students in other fields participate in the café, where research on the theme of mathematics is introduced in an easy-to-understand manner and opinions from various perspectives are exchanged, which is useful for recruiting activities. The program students themselves also have opportunities to give lectures and presentations, and through implementation and participation in this café, they can improve their mathematical and co-creation skills.
For inquiries about the overall WISE Program
Office for Higher Education Policy
Policy Division, Higher Education Bureau
Ministry of Education, Culture, Sports, Science and Technology (MEXT)
3-2-2 Kasumigaseki, Chiyoda-ku, Tokyo 100-8959, JAPAN
Phone: +81-3-5253-4111 (ext.3357)
https://www.mext.go.jp/a_menu/koutou/kaikaku/taquetudaigakuin/index.htm
(Only in Japanese)

For inquiries about screening and evaluation under the Program
Secretariat of the Program Committee
University Cooperation Program Division, Human Resource Development Program Department, Japan Society for the Promotion of Science (JSPS)
Kojimachi Business Center 6F, 5-3-1 Kojimachi, Chiyoda-ku, Tokyo 102-0083, JAPAN
Phone: +81-3-3263-0979
https://www.jsps.go.jp/j-takuetsu-pro/index.html
(Only in Japanese)