WISE Program
Doctoral Program for World-leading Innovative & Smart Education
Amid the enduring Coronavirus pandemic and progressing global warming, a wandering hope for attaining sustainability is seen within the global community. To sustain and grow Japan’s hope for the future amid this turbulence, expectation is placed on the nation being able to create new key industries including the revamping of its industrial structure. (That is, for Japan to achieve its “Society 5.0” vision.) To this end, university graduate schools in Japan are expected to be a wellspring for generating new knowledge genres and technologies while performing as an incubator of talented people attuned to the social values attending these innovations.

However, when looking at the situation currently enveloping graduate schools in Japan, we witness a variety of problems in both the quantitative and qualitative aspects of Japan’s educational environment, one being a shrinking population of young people and another being a phenomenon of excellent young people shying away from entering PhD programs.

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. Taking a lead in generating and applying new knowledge, the WISE Program has as its aim the fostering of excellent doctoral students, who will be the high-level “knowledge professionals” who can 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 create doctoral programs that amplify their unique institutional characteristics and strengths and to make 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. Through follow-up activities and interim evaluations, which started in FY 2021, the WISE Program Committee supports each selected graduate school program while working to foster the next generation of excellent professionals who will shoulder Japan’s future.

The executives of the selected universities 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.

We expect that each program will foster high-level knowledge professionals who personify the WISE objective while overcoming unanticipated difficulties in confronting an increasing spread of the new coronavirus. We also strongly expect that the results attained through the WISE program will be 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 professionals who can pilot forward various doctoral programs, which over a 5-year period endow their students with a melding of top world-class educational and research environments. In creating the new key industries of the future while staying abreast 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 need to create new key industries while being an incubator of talented people attracted 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 reform 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.

Q&A

Q: How can I enter the WISE Program?
A: To enter the 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. Website links and contact information are contained in the “List of Programs.” For information on coming to Japan to study, please use the following link: Study in Japan Comprehensive Guide: http://www.studyinjapan.go.jp/en/index.html JASSO: https://www.jasso.go.jp/en/index.html

Q: If I belong to a university that has become a WISE cooperating institution, may I join the program?
A: You cannot join the program just because you belong to a WISE cooperating institution. 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 curriculum. As to 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 research department? 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.
### List of Programs

#### Applications and Selections

<table>
<thead>
<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>
<td>29</td>
<td>9</td>
</tr>
<tr>
<td>FY 2020</td>
<td>27</td>
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#### List of Programs Selected in FY2018

<table>
<thead>
<tr>
<th>No.</th>
<th>Names of programs</th>
<th>Names of universities</th>
<th>Names of Coordinator</th>
<th>WISE cooperating institutions</th>
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</thead>
</table>
| 1801 | WISE Program for \textit{Dna Health Frontier} Graduate School of Excellence | Hokkaido University | HOBUSHI Masahiro | Osaka University, University of Tsukuba, Nagaoka University of Technology, Kyushu University, Osaka University, University of Tsukuba, Chiba University, Tohoku University, University of Tokyo, University of Tsukuba, Hokkaido University, Naganuma University of Technology, Kanto Gakuen University, Shionogi & Co., Ltd., Fuji Paints, Ltd., Toyo Seikan Group Industries, Ltd., TDK Corporation, Nippon Dental Co., Ltd., Takasago Pharmaceutical Co., Ltd., Mitsubishi & Metals Corporation, KANEKA CORPORATION, Kao Corporation, KYOCERA ENEOS Corporation, FUJIFILM Corporation, Hamamatsu Photonics K.K., Astellas Pharma Inc., Olympus Corporation, CANON MEDICAL SYSTEMS CORPORATION, INOHE Corporation, SANYO CORPORATION, 

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<tbody>
<tr>
<td>1802</td>
<td>Advanced Graduate Program for Future Medicine and Health Care</td>
<td>Tokyo University</td>
<td>NAKAMA Sukeo</td>
<td>Miyagi Prefectural Government / South Miyagi Medical Center / Katz General Hospital / National Institutes of Health / National University of Singapore / University of Sydney / Tropical Medicine, Philippines / Peking University / Norwegian University of Science and Technology / ONO PHARMACEUTICAL CO., LTD / GC Corporation / J. MORTA CORP. / Toyota Dental Corporation / Canon Medical Systems Corporation / Philips Japan, Ltd. / SHINAGAWA Cooperation / DNPON HEALTHCARE, Co., Ltd. / JITT DOCOMO, Inc. / Asahi Kasei Co., Ltd. / Ag Republican Co., Ltd. / TOPDUN CORPORATION / Asahina Corporation / Technical Research Institute / INACTA, Inc. / Astellas Inc. / Olympus Corporation / Chugai Inc. / Nittoku Dainippon Pharma Co., Ltd.</td>
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<tr>
<td>1803</td>
<td>WISE Program for AI Electronics</td>
<td>Tokyo University</td>
<td>KAMENKO Toshio</td>
<td>MEC Corporation / TOSHIBA CORPORATION / CANON MEDICAL SYSTEMS CORPORATION / Hitachi Solutions East Japan, Ltd. / Hitachi Astemo, Ltd. / ISM Corporation / ASIN Software Co., Ltd. / KDDI Research Inc. / Mitsubishi Electric Corporation / SHIONO DENKO K.K. / ALPS ALPINE CO., LTD. / TDK Corporation / KPT Technologies Ltd.</td>
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<tr>
<td>1804</td>
<td>Ph. D. Program in Humanities</td>
<td>University of Tsukuba</td>
<td>KAMAGASAKA Masahito</td>
<td>University of California, Irvine / University of Berkeley / National Taiwan University / University of Edinburgh / National Science / Advanced Industrial Science and Technology / Toyota Motor (Hitachi) / Shimada / CERBERUS / Asahina Pharma</td>
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<tbody>
<tr>
<td>1807</td>
<td>Creating sustainable societies through (knowledge) information multi-talented human resource development</td>
<td>Tokyo Institute of Technology</td>
<td>KAMAGASAKA Takanori</td>
<td>MAMI / ASIT / Keio University / McGill University / Max Plank Institute / Imperial College London / Cornell University / Sichuan University / Tokyo University / Beijing Normal University / Chishangkong University / Indian Institute of Technology Madras / ASC Inc. / ASAH KASEI CORPORATION / ENSO Corporation / FUJIFILM Corporation / Hamamatsu Photonics K.K. / Kobe University / JIST, Ltd. / JVE Film Corporation / Aichi Medical University / KAMAKURA CORPORATION / Asia Corporation / KOCHI Corporation / Istituto Italiano di Tecnologia / Japan Foundation / Mitsubishi Chemical Corporation / MITSUBISHI GAS CHEMICAL COMPANY, INC. / MITUS MINEAGA Corporation / LTD.</td>
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<tr>
<td>1809</td>
<td>Graduates Program of Transformative Chem-Bio Research</td>
<td>Nagoya University</td>
<td>YAMAGUCHI Shigehito</td>
<td>Institute for Molecular Science, National Institute of Science / National Institute of Basic Biology, National Institute of Nature Science / The Graduate University for Advanced Studies / Institute of Physical and Chemical Research / Kansai Co. / Kinco Mekon, Inc. / ISIS-DR consortia</td>
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<tr>
<td>1811</td>
<td>Innovation of Advanced Photonics and Electronic Devices</td>
<td>Kyoto University</td>
<td>KIMOTO Takanobu</td>
<td>University of Cambridge / Humboldt University of Berlin / ETH Zurich / Drexel University of Technology / Nanyang University / National Institute for Materials Science / National Institute for Quantum and Radiological Science and Technology / Central Research Institute of Electric Power Industry / National Institute of Advanced Industrial Science and Technology / NTT Corporation / Mitsubishi Electric Corporation / Sharp Corporation / Sumitomo Electric Industries, Ltd.</td>
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<tr>
<td>1813</td>
<td>The Frontier Development Program for Genome Editing</td>
<td>Hiroshima University</td>
<td>YAMAMOTO Takashi</td>
<td>Center for iPS Cell Research and Application, Kyoto University / Graduate School of Technology, Industrial and Social Sciences, Tokushima University / Department of Molecular and Cell Biology, Harvard University / Technical Research Center, Mita Motor Corporation</td>
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<tr>
<td>1814</td>
<td>Global Health Elite Programme for Building a Healthier World</td>
<td>Nagasaki University</td>
<td>ARAYOSHI Hoya</td>
<td>London School of Hygiene and Tropical Medicine / Hokkaido University Research Center for Zoonosis Control / National Research Center for Protozoal 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 Health Sciences / Institute of Biomedical, Health and Nutrition</td>
</tr>
<tr>
<td>1815</td>
<td>Graduates Program for Power Energy Professionals</td>
<td>Waseda University</td>
<td>HISHI Yoshiburo</td>
<td>Hokkaido University / Tohoku University / University of Fukui / University of Yamanashi / Tokyo Metropolitan University / Yokohama National University / National Institute of Technology / Osaka University / Kyushu University / Chubu University / Aoyama University / University of the Ryukyus / The University of Tokyo / University of Chicago / University of Washington / Tsinghua University / Chulalongkorn University / Technical University of Munich / ENEOS Corporation / Tokyo Gas Co., Ltd. / Central Research Institute of Electric Power Industry / National Institute of Advanced Industrial Science and Technology / Power Academy</td>
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**List of Programs Selected in FY2019**

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<th>WISE cooperating institutions</th>
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<tbody>
<tr>
<td>1901</td>
<td>WISE program for Sustainability in the Dynamic Earth</td>
<td>Tohoku University</td>
<td>NAKAMURA Michiko</td>
<td>Stanford University / Harvard University / University of London / University of Tokyo / University of Coimbra / University of Hawaii at Manoa / JICA / Tohoku Maruri &amp; Nichido Fire Insurance Co., Ltd. / Nippon Keishi Co., Ltd. / Pert-In Ocean Construction Co., Ltd. / NTT DATA, Inc.</td>
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<tr>
<td>1902</td>
<td>Applied Humanities Program for Cultivating Global Leaders</td>
<td>Chiba University</td>
<td>YONEAKI Chiyo</td>
<td>Okayama University / Nagasaki University / Kumamoto University / The Graduate University for Advanced Studies / Tokyo University / Waseda University / Institute for Oriental and Classical Studies, National University Research Higher School of Economic Studies / National Museum of Japanese History / Aso Environmental Foundation / ASEN CO., LTD. / JTB Tourism Research &amp; Consulting Co. / China Bank</td>
<td>46</td>
</tr>
<tr>
<td>1904</td>
<td>Frontier Physics and Mathematics Program to Drive Transformation</td>
<td>The University of Tokyo</td>
<td>MURAKAHI Hisashi</td>
<td>Nippon Steel Corp. / NTT Corp. / Maxon LLC. / Eco-Popularization / California Institute of Technology / UC Berkeley / Korea Institute for Advanced Study / National Taiwan University / ETH Zurich / Tsinghua University / Seoul National University / National Institutes for Quantum and Radiological Science and Technology / National Institutes for Quantum and Radiological Science and Technology / National Institutes for Quantum and Radiological Science and Technology / National Institutes for Quantum and Radiological Science and Technology</td>
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<tr>
<td>1905</td>
<td>World-leading Innovative Graduate Study: Advanced Business Law Program</td>
<td>The University of Tokyo</td>
<td>TAKAHASHI Ichiro</td>
<td>Harvard Law School / Peking University / Seoul National University / National Taiwan University / University of Strasbourg / Hitachi, Ltd. / FUJIFILM Corp. / SoftBank Corp. / Yahoo Japan Corp. / Nippon Life Insurance Co. / Intellectual Property Department, Tokyo University / Sony Corporation / Hitachi Industrial Equipment Systems Co., Ltd. / Tokyo University / NICT Wireless Networks Research Center / AIST Information Technology / RIKEN Center for Advanced Intelligence Project / National Institute of Radiological Sciences / National Institute for Radiological Sciences</td>
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<tr>
<td>1906</td>
<td>Engineering Education Program for Super Smart Society based on Advanced Quantum Science</td>
<td>Tokyo Institute of Technology</td>
<td>SAKABUCHI Katsuyuki</td>
<td>National Agriculturol and Food Research Organization / National Institutes for Quantum and Radiological Science and Technology / National Center for Advanced Intelligence Project / Japan Agency for Marine Earth Science and Technology / NICT Wireless Networks Research Center / AST Information Technology and Human Factors / JSTERT / NEC Corporation / NTT Corporation / Hitachi Electric Corporation / Hitachi Ltd. / NTT Corporation / AIST Information Technology and Human Factors / NICT Wireless Networks Research Center / AIST Information Technology and Human Factors / NICT Wireless Networks Research Center / AIST Information Technology and Human Factors / NICT Wireless Networks Research Center / AIST Information Technology and Human Factors / NICT Wireless Networks Research Center / AIST Information Technology and Human Factors / NICT Wireless Networks Research Center</td>
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## List of Programs

### List of Programs Selected in FY2020

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<th>WISE cooperating institutions</th>
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<tr>
<td>2001</td>
<td>Multi-Scope Energy WISE Professionals</td>
<td>Tokyo Institute of Technology</td>
<td>HARA Manabu</td>
<td>RIKEN Corporation / AIST</td>
<td>66</td>
</tr>
<tr>
<td>2002</td>
<td>Graduate Program for Lifesyle Revolution based on Transdisciplinary Mobility Innovation</td>
<td>Nagoya University</td>
<td>KABAGUCHI Nobuo</td>
<td>Gifu University / University of Michigan / Virginia Institute of Technology</td>
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<tr>
<td>2003</td>
<td>Distinguished Doctoral Program of Pathology</td>
<td>Kure University</td>
<td>HARA Hiroshi</td>
<td>John Hopkins University / The Institute of Statistical Mathematics / Toyota Motor Corporation / Toyota Technical Development Corporation / Friesen Nakaoka Corporation</td>
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<tr>
<td>2004</td>
<td>Graduate Program of Mathematics for Innovation</td>
<td>Kyushu University</td>
<td>SAIKEN Osamu</td>
<td>The Institute of Statistical Mathematics / KYOCERA Corporation / Hitachi Co., Ltd.</td>
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<tbody>
<tr>
<td>1907</td>
<td>Development of WISE (World-leading Innovative &amp; Smart Education) Program to foster AI (Artificial Intelligence) Professors for Marine Industries</td>
<td>Tokyo University of Marine Science and Technology</td>
<td>SHISHIRU Rumi</td>
<td>National Institute of Maritime, Port and Aviation Technology / Japan Agency for Marine-Earth Science and Technology</td>
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<td>1908</td>
<td>WISE Program for Nano-precision Medicine, Science and Technology</td>
<td>Kanazawa University</td>
<td>HAMAMATSUB. Rikun</td>
<td>Imperial College London / University of British Columbia / NIKKEI Soliton Co., Ltd. / Fiber R&amp;D Japan K.K. / Riken Co., Ltd. / TABULUM Make Pore Chemical Corporation / Olympus Corporation / Daihai Corporation / Hamamatsu Photonics K.K. / Shiibuya Corporation</td>
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<tr>
<td>1909</td>
<td>Converging of Informatics and Biomedical Sciences On Global Alliances</td>
<td>Nagoya University</td>
<td>KATSUNUMB. Masahiro</td>
<td>Gifu University / National Institute for Physiological Sciences / Aichi Cancer Center / National Center for Geriatrics and Gerontology / Aichi Developmental Disability Center</td>
<td>Tokyo Institute of Technology / National Institute of Biomedical Research and Innovation / Kobe / Tohoku Koulai Medical Research Institute</td>
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<td>1910</td>
<td>Graduate Program for Medical Innovation</td>
<td>Kyoto University</td>
<td>WATANABE Dai</td>
<td>University of California, San Diego / University of Tokyo / National Taiwan University / The PRC Institute of Molecular Genetics / National Cancer Center Research Institute / National Cancer Center Research Institute / National Cancer Center Research Institute / National Cancer Center Research Institute / National Cancer Center Research Institute / National Cancer Center Research Institute</td>
<td>62</td>
</tr>
<tr>
<td>1911</td>
<td>Multidisciplinary PhD Program for Pioneering Quantum Beam Application</td>
<td>Osaka University</td>
<td>NAKANO Takahito</td>
<td>High Energy Accelerator Research Organization / Institute of Materials Structure Science / High Energy Acceleration Research Organization / Institute of Nuclear Physics / RIKEN / Institute of Biological Research and Innovation / Institute of Biological Research and Innovation</td>
<td>64</td>
</tr>
<tr>
<td>2001</td>
<td>Multidisciplinary Program for Advanced Quantum Scies in Science and Technology</td>
<td>Kyushu University</td>
<td>SAIKEN Osamu</td>
<td>The Institute of Statistical Mathematics / RIKEN: Center for Advanced Intelligence Project / Theoretical and Mathematical Sciences Program</td>
<td>72</td>
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</table>
The Human Resources Network fostered by PhDs is a supreme property of world society.

To ensure “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 life sciences for contributing One Health. Additionally, PhDs will gain a variety of experiences of international collaborative research with reliable counterparts, cooperative activity with international organization such as WHO, OIE, 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 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 R&D fields, 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 help 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 arm of One Health, we hope to accelerate the creation of One Health, a social benefit that should be shared by human society.

The human resources that we aim to foster is superior PhDs who will be able to contribute to the achievement of “One Health” to pass soundness and integrity of living environments to the next generations.

Foster professionals in the field of One Health for addressing public health issues at the human-animal interface.

In this program, multisectoral activities with universities, private companies and international organizations are involved. It ensures practical and quality education for the program participants. Although we have experienced time under the pandemic, it let us reacknowledge the importance of One Health approach where people from various fields work together. Gaining advanced knowledge on One Health, participants are expected to contribute to solving One Health issues as true experts. We are also promoting the WISE program as good practice in Hokkaido University for further innovation in graduate school education.

Fuso Pharmaceutical Industries Ltd.

Corporate Planning Office / International Business Development Office, Fuso Pharmaceutical Industries Ltd.

011-706-5252

Based on my experience there for human resource development 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 R&D fields, 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 help 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 arm of One Health, we hope to accelerate the creation of One Health, a social benefit that should be shared by human society.

The concept of One Health was introduced to me during my academic studies. The fully funded internship offered by WISE Program provided a great opportunity for me to expand my knowledge and skills detecting zoonotic pathogmers in rodents and other animals including humans. I opened a new area of study for me to continue in future career. Also, getting known to the leading researchers and the WISE program enabled me to have the opportunities to collaborate with our local One Health leaders and to develop knowledge in the field of zoonotic diseases standing on the ground of One Health.

HOKO Kiyohiro
Professor of animal science

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011-706-5252

Based on my experience there for human resource development 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 R&D fields, 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 help 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 arm of One Health, we hope to accelerate the creation of One Health, a social benefit that should be shared by human society.

The concept of One Health was introduced to me during my academic studies. The fully funded internship offered by WISE Program provided a great opportunity for me to expand my knowledge and skills detecting zoonotic pathogmers in rodents and other animals including humans. I opened a new area of study for me to continue in future career. Also, getting known to the leading researchers and the WISE program enabled me to have the opportunities to collaborate with our local One Health leaders and to develop knowledge in the field of zoonotic diseases standing on the ground of One Health.
The COVID-19 crisis demands a “New Normal,” which our university is addressing by advancing education, research, and social synergy as we “strive for creativity and innovation” while leading social progress from a global outlook. Now, as in the past, our university implements diverse degree programs as part of a positive cycle of education, research, and social synergy aimed at developing highly specialized human resources.

For four years the Advanced Graduate Program for Future Medicine and Health Care has steadily fostered human resources to drive futuristic medical care (which promotes health, prevention, and treatment through data, technology, and social infrastructure), making this degree program central to our graduate school innovations.

**Overcoming the Pandemic**

We thought that futuristic medicine should be a medicine that can quickly solve the problems of society by making maximum use of data and technology, and we are fostering human resources who can contribute to it through this program. The Tohoku region is the most advanced in a super-aging society by making full use of data and technology, contributing to it through this program. The Tohoku region is the most advanced in a super-aging society by making full use of data and technology, contributing to it through this program. The Tohoku region is the most advanced in a super-aging society by making full use of data and technology, contributing to it through this program.

Students visit university hospitals, regional hospitals, and biobanks for backcasting training to see first-hand what is going on in the field, to embody social needs, and to cultivate the ability to find solutions.

**Fostering leaders of social progress in anticipation of the New Normal**

Producing leaders who will drive futuristic medical care through data / technology

Students visit university hospitals, regional hospitals, and biobanks for backcasting training to see first-hand what is going on in the field, to embody social needs, and to cultivate the ability to find solutions.

For students from different fields of sciences participate in the training together from each student’s perspective, leading to foster the ability to share knowledge and skills and to interact with multiple professions based on deep mutual understanding, while at the same time to develop the ability to discover issues that are currently required, and to proceed to the solution of those issues.

Another feature of our program is that we create many opportunities to interact with people who are innovating in modern society. We ask people who are active on the front lines of medical and welfare care, and train them to identify issues in the field. Students

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 in society.

**Message from WISE**

Tohoku University

**FY 2018**

**WISE Program**

**Programs selected in FY 2018**

**Program Coordinator**

**[Program Coordinator]** NAKAMURA Keiko (Professor, Graduate School of Medicine, Tohoku University)

**[Fields of diplomas]** Doctor of Philosophy (Medical Sciences) / Disability Sciences) / (Nursing) / (Health Sciences) / Dental Sciences) / (Pharmacy) / (Pharmaceutical Sciences) / Soft Sciences) / (Information Sciences) / (Economics) / (Management) / (Sutter) / (Education) / (Biomedical Engineering)

**[Doctor of Philosophy]** Doctor of Philosophy

Name of the program to be noted: Advanced Graduate Program for Future Medicine and Health Care

**[URL]** https://www.fmhc.tohoku.ac.jp/
**WISE Program for AI Electronics**

**Program Coordinator** | KANEKO Toshiro (Professor, Division of Electric Engineering, Graduate School of Engineering, Tohoku University)
Field of diploma | Doctor of Philosophy (Engineering) (Information Sciences) / (Biomedical Engineering) / (Science) / (Lettuce) / (Economics) / (Management)
Doctor of Philosophy: Professor

**Program of the program to be noted:** WISE Program for AI Electronics

**URL** | [https://www.aie.tohoku.ac.jp/english/](https://www.aie.tohoku.ac.jp/english/)

**Message from the President**

**President,** **Tohoku University**

**Fostering outstanding social leaders in anticipation of the New Normal**

Producing leaders with executive abilities and big-picture thinking to create ultra-smart communities

The COVID-19 crisis demands a “New Normal,” which our university is addressing by advancing education, research, and social synergy as we “strive for creativity and innovation” while leading social progress. Now, as in the past, our university implements diverse degree programs as part of a positive cycle of education, research, and social synergy aimed at developing highly specialized human resources.

For four years the WISE Program for AI Electronics has provided students with the executive abilities and big-picture thinking needed to create ultra-smart communities. Incorporating interdisciplinary techniques, it fosters exceptional doctoral students capable of “continuous innovation,” making this degree program central to our graduate school innovations.

**Education with industry-academia and 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 student’s abilities to take a broad view to penetrate real and cyber space, and a multidimensional connection in Society 5.0. The industry-academic collaborative education is for students to develop practical skills to resolve social issues cooperating with industries and society.

The five-year integrated education is divided into 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 professional course, 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.

**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 and in computer architecture for designing processors that make low-power consumption and high-performance computation possible.

The WISE program for AI Electronics aims to develop 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-low devices.

**An environment that creates human resources to take on challenges**

When I started my career, Japanese companies had sales offices all over the world, where everyone could play an active role. A society where IT and AI are heavily used will come in near future. I strongly sympathize with this program, in which industry, academia and government work together to develop human resources who will take on bold challenges in an ultra-smart society.

As a company, believe that it is urgent to create an environment that accepts such human resources.

**Message from WISE Cooperating Institution**

**NAKAYAMA Tsuyoshi**

Manager, AI BUSINESS DIVISION, Property Solutions, TDK Corp.

**A place for practical learning**

The most attractive in the program is that we can learn about artificial intelligence, which is currently used in society, from practical and academic perspectives in various research fields in collaboration with partner companies. My motivation for joining the program is the study of PBL courses, where we consider the issues provided by the companies, to propose solutions, and verify them.

Practical experience that cannot be experienced in the laboratory will be a valuable asset for future academic research and activities.

**Office and section in charge** | AI Electronics Education and Research Center

**Inquiries** | 022-795-5667

**Program selected in 2018** | Tohoku University
Creating a new paradigm — Developing outstanding talents who can challenge “ZERO to ONE” —

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 like 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”.

**Anticipated Ph.D. talents**

To create a new paradigm by integrating different disciplines of biomedical and physical sciences/engineering/informatics, we need to develop leaders who can talk with each other using the languages of both fields, understand both deeply, and integrate them in order to make it a reality. For example, da Vinci, a surgical support robot, was developed from the idea of a surgeon engineer with an engineering background, and the robot suit HAL was inspired and implemented in the real world by an engineer who had studied human physiology. Optogenetics, a leading candidate for the Nobel Prize, that manipulates neuronal activity with light was founded by a psychiatrist who was well versed in optical technologies and genetic engineering. However, the educational system to develop such talents did not exist in our country.

This graduate program sheds light on the fundamental principles of physiology and pathology of the human, defines “Humanics” as a discipline that generates new science and technology to achieve a healthy and comfortable life of human beings in the society, and is designed to nurture the Humanities talents. The Humanities talents should be doctoral-level professionals with knowledge and skills in the fields of both biomedical sciences and physical sciences/engineering/informatics, and have the expertise to combine these bi-disciplinary knowledge and skills. They should also have flexible, multifaceted creativity which can be applied to the unpredictable future, based on the expertise. Through the development of expertise and 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 human life, “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.

**Message from the President**

**NAGATA Kyosuke President of the University of Tsukuba**

Creating the “Humanics” by integrating biomedical sciences and physical sciences/engineering/informatics, and cultivating outstanding talents who can overcome intractable challenges in life and health

**Humans to humanics**

Humans are the living and active subjects of knowledge and life, and they have their own government-issued Researcher Number. In contrast, humanics is an institute designated by MEXT whose researchers all have their own learning goals. CPx allows students to self-reflect and set their own learning goals. 12 different skill sets that can be selected according to the future image of students. CPx allows students to self-reflect and set their own learning goals.

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

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

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

Program Coordinator: KIHAKAWA Masahide (Professor, Graduate School of Medicine, The University of Tokyo)
Fields of discipline: Doctor of Medical Science, Doctor of Engineering, Doctor of Philosophy

Name of the program to be noted: The World-leading Innovative Graduate Study Program for Life Science and Technology

URL: http://square.umin.ac.jp/wings-lf/index_en.html

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 (WINGS-LST) is now in its fourth year of operation, with the goal of developing “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 the 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 have high 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 will address the resolution of global challenges faced by human society.

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

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Using new technologies, while we also develop novel and advanced research methods based on scientific principles and theories of life. Innovative areas in academic disciplines and technologies do not arise spontaneously. We believe that they are created by enhancing expertise, broadening 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 ability: 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 life sciences) using state-of-art technologies, and the technologies (related to clinical practice and engineering) that contribute to human health based on the elucidated principles and theories.

Life science has made tremendous progress and has been able to elucidate new phenomena thanks to many technical developments, such as recombinant DNA technologies based on biochemistry or microscopy based on physics. In parallel, new principles have revealed the target molecules for drug discovery, and new treatment techniques have been created. In other words, in order to elucidate life phenomena and create technologies, an ecosystem where both are performed at a highest level as two halves of a whole is necessary. Therefore, this program aims to promote knowledge professionals who can integrate both basic and mechanistic elucidation, as well as contribution to the development of academic disciplines and industries that contribute to human health.

Message from the President

FUJII Teruo
President, The University of Tokyo

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.

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Programs selected in FY 2018 – The University of Tokyo

WINGS Journal Club – with young first authors of cutting-edge papers as advisers and role models –

WINGS Journal Club is a research training seminar where students study about cutting-edge papers in various research fields related to life science and technology. Program students present and discuss a cutting-edge paper in front of a young first author of the paper, sometimes a graduate of the Program, who will serve as adviser. It may be a bit intimidating to present a five‐year combined educational program

Create a field for practical training of interdisciplinary research

Collaboration with interdisciplinary projects

• Supporting program of international collaborations to improve the competitiveness of the Program students

Participation and support by private enterprise

• Participation in the Program by private enterprise

Education and thesis defense

• Education and thesis defense at the discipline of expertise

Proposal of new viewpoints and methods to the society

Excellence in the field of expertise: education and research at affiliated hospitals

Create a field for practical training of interdisciplinary research

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• Supporting program of international collaborations to improve the competitiveness of the Program students

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• Participation in the Program by private enterprise

Education and thesis defense

• Education and thesis defense at the discipline of expertise

Proposal of new viewpoints and methods to the society

Excellence in the field of expertise: education and research at affiliated hospitals

Programs selected in FY 2018 – The University of Tokyo
Developing dynamic doctoral degree holders with practical abilities who can expand values for the future to pioneer a ‘Super-Smart Society’

Our university’s goal is to foster human resources who will lead the knowledge-based society of the future via scientific inquiry and knowledge based on public service, sociality, internationality and ethics as well as to educate students to become people who care for others on a large scale. This program plans to enable students to acquire abilities for practical action while designing the future for vision generation and sharing each other’s perspective. By respecting the individuality of others and developing their own originality, we expect them to discover their own talents and connect them to social implementation. Then, they can play an active role as powerful and dynamic doctoral students who will pioneer a ‘Super-Smart Society’ where cyberspace and real-world space merge.

Driving Super Smart Society by New Industry and Diversity

In this program, based on agriculture and engineering, we will produce high-level human resources with doctoral degrees to implement the Society 5.0 “Super Smart Society” in 5th Basic Plan for New Science and Technologies to solve social problems. We feature “Creation of New Industries” and “Diversity” which are essential for the creation of excellent innovation. As for “Creation of New Industries”, we apply the cutting-edge technologies such as Artificial Intelligence (AI), machine learning, advanced measurement and IoT, robot, smart mobility (automated driving), and energy control to agriculture. We cultivate human resources with doctoral degree who will create and drive the safe, secure, and sustainable new industries regarding agriculture. We cultivate human resources with doctoral degrees.

The vision of human resources cultivated by the WISE Program is; (1) Challenging creating new industries through agri-engineering collaboration and thereby leveraging cutting-edge technologies to solve the social challenges relating to agriculture, (2) Strengthening the understanding of diversity (gender, nationality, social experiences, etc.) which is essential for innovative human resources, and (3) Excellent leadership with a big-picture perspective, originality, appreciation of diversity, international competitiveness, and high-level specialization.

Inquiries

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The Charm of Integration of Agriculture and Engineering: Enjoy “NOKODAI CRAFT BEER”!

TUAT WISE students made the NOKODAI CRAFT BEER by combining the knowhow of agriculture and engineering. It started from “Outline of Global Leadership”, a course in which students learn how to define social issues, understand the real situation, and develop a business plan as a solution receiving the advice from mentors from industry. After this, a doctoral student developed the “TUAT Beer Project” using the funding system of the program. As a result, his team succeeded to create the original craft beer by applying ultrasonic opening technology to strawberries produced at university’s farm. This project became a good practice of supporting students’ creative challenges, expanding networks with alumni and local people, and also promoting the WISE Program and university.

Good Practice

Message from WISE Cooperating Institution

Human resources development by field-based industry-academia partnership

Our company 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 vision 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 know-how which our company has cultivated to the education.

Inquiries

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Challenge to various collaboration and integration

Towards my goal of returning research results to society, I participated in this program that allows me to experience international-industry-academia collaboration based on integrating agriculture and engineering. Through the collaborative works with others beyond different backgrounds, I gained practical learning on extracting social issues, intellectual property and commercialization. Utilizing the bird-eye view that I obtained, I continue the research that leads to the society in line with the SS4D.
University-wide efforts to empower students to become multitalented individuals in materials science and informatics

As part of education reform, the University has created a system to provide joint education by removing the disciplinary walls among the six graduate schools, Institute of Innovative Research, and Institute for Liberal Arts. This program empowers students to become “multitalented individuals” who can capitalize on original ideas for social innovation in the converged fields of materials science and informatics. In addition to encompassing the entire University, the program provides specialized doctoral education in collaboration with private corporations, the National Research and Development Agency, and top-notch overseas universities. Under the leadership of the President, we established a University-wide integrated education curriculum that utilizes the strength of the University in materials science and informatics research, and values our ties to society to transform students into excellent “multitalented individuals”.

Fostering individuals who can create new industries

The program empowers students to become “multitalented individuals” who utilize informatics to conceptualize new ideas through multifaceted 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, Japan’s Monotsuki 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 are becoming possible. The era utilizing information technology has arrived, allowing market-specific optimization and production management of devices and processes as well as the creation of social services from consumer trends. However, traditional materials research is conducted at a specific level such as the molecular or device and process level. A broader perspective that encompasses the eventual social services has yet to be fostered. Consequently, graduate-level education must aim to converge materials science and informatics through a broad perspective from molecules to social services. Students develop the following abilities: 1) creativity to realize multifaceted ideas across the fields of materials science and informatics, 2) a broad perspective to identify social issues accurately by sifting through a vast amount of information, 3) initiative to take action to solve challenges by spiraling outward and expanding from the atomic or molecular level to social innovation towards attaining a sustainable society, and 4) global leadership ability to introduce new services to the world.

By working in a team of exceptional students from diverse backgrounds to tackle various challenges, students learn different viewpoints and foster new ideas for social innovation. As a joint effort of all six graduate schools in charge of the program, the Institute of Innovative Research, and the Institute for Liberal Arts, the program education is provided in cooperation with private corporations, the National Research and Development Agency, and top-notch overseas universities.

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 information technology and shifted into areas with higher 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 innovation are woefully lacking. The characteristics and excellence of the program are to produce “multitalented individuals” who are unrestrained “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 connections of materials to social services, but they are also passionate about creating new industries.

Good Practice

Tokyo Tech’s original “Practice Schools” in Materials Informatics

Students propose solutions to companies’ most pressing problems by utilizing material and information science

We implement “practice schools” at companies — as first-year doctoral program courses— at which faculty members and students work together for 6 weeks to access information throughout the company in large volumes and solve its most pressing problems. This will be accomplished by applying students’ knowledge and experience obtained during their studies at TAC-MI, which is a prerequisite to join. Practice schools in FY 2020 were conducted in cooperation with 2 companies, Asahi Kasei and TDK, both companies presented clear issues relating to their products, and expected results such as direction for improvement and sales. This work differs from students’ usual doctoral research activities. However, even in the limited time frame of 6 weeks, they made remarkable achievements by effectively utilizing informatics and simulation techniques.

Developing innovative abilities through interdisciplinary learning

In order to become a scientist who can create innovative ideas, it is essential to learn new perspectives. That is why I participated in TAC-MI. Through learning informatics, which is a different field for me, I feel that not only my practical knowledge of the interdisciplinary field, but also my ability to think flexibly and to accept different fields have improved. In this program, there are well-established opportunities for lectures and practice so that students can work hard with feelings of social demands.

[Office and section in charge] WISE Program Group, Promotion Office for Education Programs

[Inquiries] 03-5734-3793

WISE Program Doctoral Program for World-leading Innovative & Smart Education
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.

Development of human resources for root technologies able to contributing to the realization of SDGs

Our University was appointed as a World Hub University for the Sustainable Development Goals (SDGs) Goal 9 (“Build 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 top experts in materials science and power engineering, as well as unique practical professionals of the highest level in universities, research institutes, members of industry, and government agencies in Japan and abroad.

Characteristics of the teaching curriculum in global pro-active education, vision for human resources to be cultivated, and the professional career paths of graduates

Good Practice

Level 1
Level 2
Level 3
Level 4
Level 5

Establishing an environment for realizing 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 method (dual system) in which advanced European industry members and academia collaborate, 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 repetitive training, which serves 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 CDIO, students are learning new 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.

Program selected in 2018 by Nagoya University of Technology
Programs selected in 2018 – Nagoya University

Graduate Program of Transformative Chem-Bio Research

Program Coordinator: YAMAGUCHI Shigeru (Professor, Institute of Transformative Bio-Molecules, Nagoya University)

Fields of disciplines: College of Science and College of Life Science

Name of the program to be noted: Graduate Program of Transformative Chem-Bio Research

URL: https://www.ibm.nagoya-u.ac.jp/grtr/en

A university’s role is to promote excellent research and cultivate talented individuals with multifaceted abilities. As part of its Leading Graduate School Programs, Nagoya University has created the Graduate Program of Transformative Chem-Bio Research (GTR) to address the top-notch research findings of Institute of Transformative Bio-Molecules (ITB-M), as part of WPI (World Premier International Research Center Initiative), and cultivation of talent in the Integrative Graduate Education and Research Program in Green Natural Sciences. The world is changing rapidly and dramatically as science and technology advance. This program provides interdisciplinary and international environments that will generate novel ideas and perspectives in science. We promote this project wholeheartedly, with the goal of training doctoral students with the capacity to promote original sciences, command a global perspective, and create networks. We believe that this project will cultivate future world leaders.

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 production, the development of materials leading to industrial and technological innovations, and life science research that contributes to the promotion of human health. According to the UN, it is crucial that a broad range of knowledge be acquired to break through only acquired by active involvement in interdisciplinary research. The Graduate 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 launch 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/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 the most important of the three is the program for developing research power to break through.

The Institute of Transformative Bio-Molecules (ITB-M), 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 graduates 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 interdisciplinary 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 ITB-M in the realization of the mixed lab concept.

Message from the President

METSU SHAKI President, Nagoya University

A Proposal for Interdisciplinary Research

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.

Message from the WISE Cooperating Institution

Message from the Student’s Voice

Message from the MITK cooperation Committee

Message from the GTR Student Support Office

Institute of Transformative Bio-Molecules (ITB-M), the parent organization of Graduate Program of Transformative Chem-Bio Research (GTR), and Iwate Center for Sustainable Ressource Science (CRSS) have been holding joint workshops every year since 2015, pursuing a broad range of joint research and promoting personal exchanges. Through our consolidated efforts with GTR, CRSS intends to contribute to the training of excellent researchers who are capable of solving global environmental and resource-related issues.

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

Student’s voice

I joined GTR to gain the ability to develop my own research. A fascinating aspect of GTR is that I can broaden my research from various perspectives through discussions with people in different fields, especially when I have identified a new and interesting aspect of my research. In addition to my research experiences, I also had valuable opportunities such as volunteering for the ORIR camp in the U.S. and conducting several student-initiative events. I have learned a lot since GTR started.

[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

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

Three powers fostered by GTR: basic knowledge across chemistry and life science, comprehensive research power to advance, and research power to break through any acquired by active involvement in interdisciplinary research.
Fostering diverse doctoral human resources who connect science and technology to innovation

Making effective use of scientific discoveries in society is extremely difficult and takes time. It is also difficult to achieve on your own. To overcome these challenges, the DII (Deployer-Innovator-Investigator) program fosters leaders in the field of electronics from three types of perspectives: human resources who create challenges in this field to promote research, human resources who translate research results into specific products, and human resources who create social value and start businesses. To this end, we have developed a system of collaboration with industry, national research institutes, overseas research institutes, and universities and also launched the Doctoral Education Consortium. We will make every effort to promote the project with the hope that it will produce outstanding human resources needed by the world.

Accelerating product innovation from 30 years to 10 years

In this program, on the basis of his experience that it took 30 years from the start of research and development on gallium nitride crystals to the practical use of blue LEDs, Prof. Hiroshi Amako (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 for 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 nurture excellent human resources according to the vision of the future imagined by each student while setting improvement of abilities in one’s field of expertise and acquisition of experience and the ability to work collaboratively in teams with different types of human resources. This program accepts students with a keen interest in manufacturing and products. More specifically, in addition to students with the basic academic skills necessary to acquire high-level expertise and comprehensive capabilities, as well as the motivation to explore the frontiers of engineering and create new value, the following four items are added as qualifications for participating in the program: (1) a higher level of basic academic capabilities; (2) strong motivation and enthusiasm to explore and practice leading-edge edge engineering and disseminate it in society; (3) the ability to discuss, disseminate information, and practice in the international arena; and (4) the initiative to take proactive and independent actions.

Close guidance by industry-government-academic collaboration

In this program, researchers and engineers from companies, national research institutes and other institutions serve as mentors and provide students with direct guidance over a long period of time. All students participate in the short-term overseas internship immediately after the start of the program. In the second half of the second year, each student selects courses from among those aimed at each Deployer, Innovator, and Investigator type and works to acquire necessary skills. In the DII basic subjects, the environment for e-Learning will be enhanced to study anytime and anywhere. English-language education and transferable skills training will also be provided to improve international communication skills. In the Workshop for Human Society Problem Challenge, leading figures in a variety of industries are invited to give lectures to allow students to learn about the various challenges related to the creation of future electronics as well as ideas and technologies to solve them.

In the DII Collaborative Project, students study in host organizations for six months. Deployer course students visit multiple organizations, such as venture companies, to establish a variety of human resources who explore challenges and develop their international perspectives, foresight, and planning abilities. The Innovator course offers a long-term internship at a company where students learn about the key points for completing product development and aim to launch collaborative research. Investigator course students take up long-term residence and conduct collaborative research at overseas institutes. They deepen their studies, develop the foundation for international collaborative research, and write international co-authored papers.

The DII Collaborative Project in the fourth year is the program’s most ingenious initiative and aims to enable students to experience DII collaboration and understand the importance of cooperation. Teams of different types of students are formed based on the abilities, knowledge and experience they obtained through their internships, and they work together to solve challenges for future electronics in the real world.

Good Practice

Message from the President

MATSUO Seiichi
President, Nagoya University

In our university, the number of students originates from universities has been increasing along with the government policy which promotes the start-up company. I believe that the motto of fostering an entrepreneurial spirit through the further development of specialized fields and the cooperation of different types of people is one of the strategies of graduate school education. As I interact with the participating graduate students, I realize that their challenge spirit is growing day by day, and I look forward to the results of this program.

Inquiries
052-747-6985
Innovation of Advanced Photonic and Electronic Devices

Program Coordinator: KIMOTO Tsunenobu (Professor Graduate School of Engineering, Kyoto University) Fields of disciplines: Doctor (Engineering), Doctor (Science), Doctor (Informatics)

Name of the program to be noted: Innovation of Advanced Photonic and Electronic Devices Doctoral Program

URL: http://www.e-takeout.co.jp/program/kyoto-u.ac.jp/en/

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 university life.

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 comprehension 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 and 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.

After the lecture, they have a round-table conference to further interact with each other.

Message from WISE Cooperating Institution

OSHIHARA Takehiko

Graduate School of Engineering, Kyushu University

Contributing to human resource development of the WISE Program “Innovation of Advanced Photonics and Electronic Devices” with External Vision

I am aware that the development of professionals of knowledge is steadily conducted by the multidisciplinary education and research beyond the framework of research fields, institutions and countries. As a researcher belonging to a collaborative institution that conducts research and development from basics to applications in the fields such as quantum beams, nuclear fusion, materials science. I believe, when I continue my research, it will provide the students with opportunities to gain various experiences, giving a broad outlook.

New ideas come up through interaction with researchers in various fields

I decided to join this program attracted to crosscutting education, which is one of the features of this program. I’ve been engaging in fundamental research on semiconductor material and device. Even though my research interests mainly include basic material properties, I feel it is essential to always think about how my research will make practical devices or systems better. I believe this program is a valuable opportunity to get acquired such a wide perspective toward academic discipline not limited to my research field.
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

Osaka University aims to be a world-leading university that contributes to social transformation. Our unique program fosters students' practical research skills to achieve internationally superior research results in the fields of medicine, dentistry, pharmacy, and life sciences as well as entrepreneurship (social implementation) skills to effectively translate their research results for the benefit of the society at large and to make innovations. Currently, 11 third year students, 24 second year students, and 32 first year students are enrolled in the program. The courses offered will help them become PhD graduates who will contribute to the prosperity of our society, by such means as improving the quality of life (QOL) and eradicating the threat of various diseases. Osaka University aims to achieve true innovation through this program.

Professionals with research & entrepreneurial skills

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 the society. At Osaka University, we have been developing doctorally qualified human resources with practical research skills to produce internationally superior research results and oversee 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 this society.

Students develop their practical research skills through discourse with our outstanding researchers regarding the techniques to overcome scientific challenges. Moreover, these discussions regarding the challenges they face in student-centered research, which is an education system unique to our graduate school, strengthens their practical research skills. In addition, students develop an ability to examine their research by interacting with researchers working in fields different from their own, making them aware not only of advanced scientific expertise but also of the 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 results, students will develop a mindset 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 originality 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 their own research for its implementation to society and in problem-solving plans. In addition, students defend their doctoral thesis at the graduate school of their affiliation.

Academia-industry-government network

To foster “experts in knowledge” who translate research results for application in the society based on their ability to investigate biomedical science, we must work with other graduate schools and introduce education that is linked to society, in addition to offering the conventional specialized education provided in graduate schools. Therefore, this 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 aims to provide 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, and Dental Hospital, we encourage students to develop “practical research research,” which is the ability to consider biomedical science and perform basic research. Furthermore, Osaka Prefecture, MND, National Institute of Health, Innovation, and Nutrition, and domestic and overseas large pharmaceutical companies participate in our education activities, providing students with various opportunities to develop their “entrepreneurial skills.”

Familiarization with sites participating in societal implementation of biomedical science

Students visit 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 urgent needs, and learning about open innovation and the corporate research environment in general, students will discuss the results with corporate researchers, fostering connections between industry and academia. In AY2021, students visited the National Institute of Health Sciences on the left, which is at the cutting edge of regulatory science, to gain insights into current research and development and to learn how they link research directly contributes to improving people’s living conditions.

Message from the President

Prof. NISHIO Shojiro

Osaka University

November 3, 2021

I decided to join this program because I believe that not only research skills but also the skills and mindsets to return research findings to society are crucial for future researchers. The program provides an environment in which we can improve our ability to incorporate research results to society. Moreover, the wide network of faculty members in industry, medicine, and academia, and their interactions between students, have offered me valuable opportunities to broaden my horizons.
The Frontier Development Program for Genome Editing

Welcome to Hiroshima University: ‘The Frontier Development Program for Genome Editing’ on the theme of ‘Developing a Future Society with Genome Editing’

Now, ‘genome editing’ is drawing attention worldwide as it is thought to bring a revolution to life science. The Novel Prize in Chemistry 2020 was awarded to two female scientists, who have developed a new method for genome editing through which scientists can rewrite the genetic code of life at will.

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 core researchers who run The Japanese Society for Genome Editing. Moreover, Program on the Consortium of Innovation for Bio-Digital Transformation (BiDX), 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 Japanese 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 Courses/ 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 (BiDX), COI-NEXT.

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

The program aims to foster scientists and developers who play a role in creating new genome editing industries (industrial technology) Basic technology developers, Drug discovery/therapeutic scientists, Entrepreneurs of related ventures)

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 participants, from high school students, universities, companies, and other organizations. Past seminars included a variety of themes, such as “Genome-Editing Technology for Understanding and Curing Disease” and “How Can Genome-Edited Organisms be Released from the Genetically Modified State?” Some examples of favorable comments from participants are as follows: “I obtained a lot of interesting information,” “I was able to understand how genome editing in the first and second year.”

Program is selected in FY 2018 Hiroshima University

Program is selected in FY 2018 Hiroshima University
Promoting human health and peace, and pursuing research that contributes to the improvement of global health through the study of science

We believe that being selected as part of the WISE Programme offers students an important opportunity to assist Nagasaki University (NU) 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 NU 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 fostering 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 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 caused 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 contribute to solving these global issues, Nagasaki University (NU) has launched a degree programme, NU WISE Programme. This programme is an affiliation with internationally renowned institutions in global health, the London School of Hygiene and Tropical Medicine (LSHTM), UK. Having the NU School of Tropical Medicine and Global Health at its core, NU WISE Programme aims to foster leaders in global health with a mission to “train 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 (NIEM), 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.

Furthere more, our mission is also focused on further developing our collaboration with external organizations such as Hekkaido 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; Symes Corporation. Whilst strengthening relationships with our partner organizations, we aim to develop our programme so it functions as a hub in the field of global health.

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 courses 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 so students can set practical objectives and receive the most effective research guidance from their experienced supervisory team.

Establish “Highly Practical Professional Training Program” to foster professionals who can tackle pandemic and contribute to the 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 webinar on a cruise ship at the Nagasaki Port. These experiences have encouraged students to work on new research topics to enhance their knowledge in the field. Taking advantage of the experience we gained through living with new diseases in this unprecedented times, we will be establishing a Doctor of Public Health Programme (DPh) in October 2022 with an aim to strengthen our programme for fostering professionals with high-level leadership and management skills in public health, who can tackle global issues regardless of the academic discipline and contribute to policymaking by adapting scientific evidences, decision-making, and implementation of the policy.

Good Practice

Inquiries

Addressing global health challenges through high-quality research, education and innovation

We are proud to have a long-standing partnership with Nagasaki University. Our partnership has flourished over the years through our joint PhD scheme as well as a programme of academic cooperation, staff exchange and research collaboration. We value our collaboration with Nagasaki University through the WISE Programme. Now more than ever, our doctoral students have a fundamental role in improving our knowledge and understanding of global health issues, and building the capacity and evidence base for actions to improve global health.

Bridging between Japan and the United Kingdom through COVID-19 research

My PhD focuses on understanding the impact of social contact and behavioral patterns on the transmission of SARS-CoV-2 in Japan and the United Kingdom using epidemiological and mathematical modeling techniques. As a result, I have participated in a number of research projects and programs aimed at addressing global health challenges through high-quality research, education, and innovation. These programs have helped me to develop my research skills and knowledge while contributing to the advancement of global health research.

Find out more about the Global Health Elite Programme for Building a Healthier World at the following link: http://www.wise.nagasaki-u.ac.jp/eng-en
Waseda University

Program Selected in FY 2018 — Waseda University

Graduate Program for Power Energy Professionals

Good Practice

Message from the President

Waseda University is promoting cutting edge research and innovative education based on its outstanding research outcome. In this program, Waseda plays a key role in collaboration with 12 partner universities, 54 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 the 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 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 its management; electric vehicles; storage batteries; and IoT. As a result, the energy supply sector has begun a shift to international standardization. Many technological innovations have been achieved, such as renewable energy and systems for its management; electric vehicles; storage batteries; and IoT. As a result, the energy supply sector has begun a shift to international standardization. To innovate global energy and society, particularly: 1) we offer a five-year program to give students a comprehensive education on the electricity industry; and research experience to ensure that they acquire six pillars of deep expertise: bird’s-eye view perception; strong fusion, joint research; industrial creation; and international collaboration, all essential for new era intellectual professionals.

Cross-disciplinary education and standardization education

This program sees the energy value chain from the future as ranging from the cleanest 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; panoramic elective courses including lecture courses on leadership development lectures and basic AI/OT, multi-layered education and research guidance; and seminars on new industry creation—all in collaboration with a comprehensive group of research organizations. Furthermore, in collaboration with Japan’s power and energy system standardization measures, the EMS Shinjuku R&D Center, established at Waseda University as a paragon of neutrality and fairness, has been partially opened to provide unparalleled international standardization education. We ensure high quality of education with various types of examinatins, including selective examination (SE); qualification examination (QE); final examination (FE1) for evaluation of advanced research expertise; and final examination (FE2) to verify acquisition of 45 credits or more and publication of one or more papers co-authored in collaboration with institutions at international academic societies and the like. The PEP program will continue to foster “PEP people”, Ph.D. holders who will energize society.

Fostering doctoral resources to innovate power energy

Students compete to design the best communication control for demand response using actual equipment from the International Standardization Education Center, and recognize the challenge of “standardization of technology”.

University as a paragon of neutrality and fairness, has been partially 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); final examination (FE1) for evaluation of advanced research expertise; and final examination (FE2) to verify acquisition of 45 credits or more and publication of one or more papers co-authored in collaboration with institutions at international academic societies and the like. The PEP program will continue to foster “PEP people”, Ph.D. holders who will energize society.

PEP students can learn the essence of new business creation through 3 steps based on the wisdom of humanities and social science faculties at Waseda University customize the essence of the knowledge and skills to teach human and practical skills for creating new industries in the new age of energy, such as power and energy-related systems; scenario analysis; technologies, and business models. PEP program takes a three-deep approach to nurture students’ knowledge and skills: 1) lectures: “Social Science of Energy Innovation” to acquire basic knowledge; 2) group work: “Practical Business Creation” and 3) serving as a judge of the annual “Business Idea Contest” to gain new insight from a different perspective.

Good Practice

The chance to collaborate with the leading minds of tomorrow

PEP Program Office: Inquiries 03-5286-3238

Student’s Voice

PEP students can learn the essence of new business creation through 3 steps based on the wisdom of humanities and social science faculties at Waseda University customize the essence of the knowledge and skills to teach human and practical skills for creating new industries in the new age of energy, such as power and energy-related systems; scenario analysis; technologies, and business models. PEP program takes a three-deep approach to nurture students’ knowledge and skills: 1) lectures: “Social Science of Energy Innovation” to acquire basic knowledge; 2) group work: “Practical Business Creation” and 3) serving as a judge of the annual “Business Idea Contest” to gain new insight from a different perspective.

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.

Cross-disciplinary education and standardization education

This program sees the energy value chain from the future as ranging from the cleanest 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; panoramic elective courses including lecture courses on leadership development lectures and basic AI/OT, multi-layered education and research guidance; and seminars on new industry creation—all in collaboration with a comprehensive group of research organizations. Furthermore, in collaboration with Japan’s power and energy system standardization measures, the EMS Shinjuku R&D Center, established at Waseda University as a paragon of neutrality and fairness, has been partially 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); final examination (FE1) for evaluation of advanced research expertise; and final examination (FE2) to verify acquisition of 45 credits or more and publication of one or more papers co-authored in collaboration with institutions at international academic societies and the like. The PEP program will continue to foster “PEP people”, Ph.D. holders who will energize society.

PEP students can learn the essence of new business creation through 3 steps based on the wisdom of humanities and social science faculties at Waseda University customize the essence of the knowledge and skills to teach human and practical skills for creating new industries in the new age of energy, such as power and energy-related systems; scenario analysis; technologies, and business models. PEP program takes a three-deep approach to nurture students’ knowledge and skills: 1) lectures: “Social Science of Energy Innovation” to acquire basic knowledge; 2) group work: “Practical Business Creation” and 3) serving as a judge of the annual “Business Idea Contest” to gain new insight from a different perspective.

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Fostering leaders of social progress in anticipation of the New Normal
Producing leaders equipped with the latest executive skills, capable of handling a wide range of risks

The COVID-19 crisis demands a "New Normal," which our university is addressing by advancing education, research, and social synergy as we "strive for creativity and innovation" while leading social progress. Now, as in the past, our university implements diverse degree programs as part of a positive cycle of education, research, and social synergy aimed at developing highly specialized human resources.

The WISE Program for Sustainability in the Dynamic Earth covers the fields of environmental studies, earth science, and disaster science. For three years it has produced knowledge professionals who are equipped with the latest executive skills and capable of handling a wide range of risks, making this degree program central to our graduate school innovations.

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 has led to 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 understanding of issues related to Earth system processes, and disaster science. For three years it has produced knowledge professionals who are equipped with the latest executive skills and capable of handling a wide range of risks, making this degree program central to our graduate school innovations.

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 at 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.

Tohoku university has made a significant contribution to formulating this framework and will further contribute to achieving this goal through education. The Tohoku region is characterized by globally rare large-scale disasters and massive natural risks; thus, researchers visit this region from all over the world. By taking advantage of our location, this program aims to create digital teaching materials and disseminate them internationally via the Internet.

Monthly meeting: a student-designed homeroom as an opportunity to learn from peers and improve abilities required in the program

This program holds a monthly meeting in which all program students participate. Students from various scientific, cultural, and regional backgrounds work together to plan each meeting based on the philosophy and policies of the program. The goal of this education is to help students acquire the necessary knowledge and skills to adopt a global mindset and think critically outside their own academic fields. This meeting is not only a platform for students to share their experiences and insights but also an opportunity for them to learn from each other and foster a sense of community. Through this meeting, students are encouraged to develop leadership skills, critical thinking, and the ability to work effectively in diverse teams.

Message from the President

President, Tohoku University

Offices and section in charge: WISE Program for Sustainability in the Dynamic Earth Office (022-795-5591)
Asia-Eurasia × Digital Humanities: Challenge of Humanities

The humanities is the study of thoughts, words, behavior, and ways and history of society that link religious elements. This 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. 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 mining is needed. The program investigates 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 humanities in understanding the social movement of Asia-Eurasia.

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 learn two realms: micro perspective and technology to move into the fields 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 coordinate with Chiba University, Okayama University, Nagasaki University, Kumamoto University, The Graduate University for Advanced Studies, SOKENDAI. This programme aims to promote a variety of domestic and international collaborations to create new value, with a diverse partnerships with universities in Japan and overseas.

Message from WISE

Director and Secretary General of WISE Cooperating Institution

Thinking of the World from Asia

AERONCO., LTD. has been working on visual management to exist and prosper together with the local region, combining 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 Takushuku University’s graduate program accepts the challenge of such an initiative by industry-academic collaboration.

We create opportunities for students to present their research and engage in academic exchange in diverse partnerships with universities in Japan and overseas.

This programmes aims to promote a variety of academic and international collaborations to create new value, with a bird’s-eye view to the Asia-Eurasia region. Although face-to-face exchanges had to be limited due to the Coronavirus pandemic, active online exchanges were conducted not only with domestic partner institutions but also with partner institutions in Russia and China. In particular, we co-hosted the online academic symposium “Academic Discussion Forum for Outstanding Graduates Students of Japan and China” with Zhejiang Gongshang University, together with Chiba University, Okayama University, Kumamoto University, Nagasaki University, and the Graduate University for Advanced Studies, SOKENDAI.

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 in the same franchise. In addition, my research also analyzed how this motif was praised by the filmmakers, and how the gender issue that studio have affect what they depict on screen.

I decided to enroll in this program because I wanted to enhance transcultural transcript of my research.
Good Practice

TF

GOOD PROGRAM
WISE Program

iMeC WISE program emphasizes student’s initiative

As the world is getting diversified, there are full of problems to be solved. These problems are too complex to solve at once, and there might not be any absolute one answer. Here, what we can do is to think of as many solutions as possible. Based on advanced science, how would you answer? I’m expecting that this program will produce PhDs who can come up with unique answers for the bright future.

Message from WISE Cooperating Institution

As President of Chiba University, I have become a member of this program, because I wanted to implement novel cancer drugs that I have been studying since my undergraduate years. This program strongly encourages students to take the initiative. We make appointments with prominent leaders in various fields and invite them to give lectures. I believe that such experiences will help us to successfully develop new therapies in the future.

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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 that integrates development of human resources 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 develop human resources with flexible thinking ability, challenging spirit, and resilience through education in collaboration with the world’s top research institutes and familiar with multiple specialized fields. In the future, they will create new medical knowledge and medical innovation. We hope that this program’s graduates will become world-leading human resources 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 departments 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 Therapies International Program (iMeC-WISE) for global education containing 37 visiting professors from 21 foreign institutions, and the Chiba Innovative Therapeutics Industry Consortium (iCTICO) for industry-government-academia collaborative education consisting of 26 companies, and three government institutions are also engaged in this program.

The latest technologies including cancer immunotherapies and artificial intelligence are dramatically advancing medical care. Continuous advancing medical care and realize a sustainable healthy society. The School of Medical and Pharmaceutical Sciences takes a lead role in Super-Aging Society

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Nurturing of World-leading Medical Innovators

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Forefront Physics and Mathematics Program to Drive Transformation  

**Message from the President**

FUJII Teruo  
President, The University of Tokyo

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

The Forefront Physics and Mathematics Program to Drive Transformation (FoPM) aims to set a new standard for graduate-level education in the University of Tokyo and beyond. To achieve academic excellence, I believe that it is essential for diverse groups of people to come together to discuss, to learn, and to identify and share challenges and solutions. In this context, FoPM provides a diverse and inclusive place for curious and talented graduate students to come together and engage in open and transparent dialogue with globally minded scientists at various stages along a wide variety of career paths. This focus on diversity and dialogue, in addition to the acquisition of strong research skills, will foster graduates with both specialized knowledge in their chosen field and the skills required to transcend boundaries and lead the future of science and society.

Advancing social innovation through basic science

Mathematics provides the quantitative basis of all social science and helps describe the world around us. FoPM builds on UTokyo'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 Neurorobotics (iRCN), which have contributed greatly to the globalisation 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, require 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 different backgrounds progresses 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 outstanding 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 Presentation” and “AI and Quantum Computing” courses, students acquire valuable skills for their future careers, regardless of the field 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 reforms

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**Message from WISE Cooperating Institution**

OAKA KOITI  
NTT Fellow

## Anticipating original ideas from basic science specialists

At NTT we build new technological platforms by connecting information and people, and undertake research in cryptography, theory and blockchain. There is an urgent need for a new theory of communication that can withstand the evolution of quantum computing, and the strategic development of such research requires a team of researchers with different specializations. We anticipate that FoPM will train professionals with a broad perspective and the ability to come up with original ideas.

## Maximizing our ability and possibilities to be a “scientist”

I applied for the FoPM program because I want to gain the skills necessary to work as a “scientist” beyond the boundaries of my specialized field. In the coursework, we learned a wide range of topics, not only in 4i and quantum computing but also social issues such as diversity. In addition, through the interaction and research talks with course students in the monthly 4PM seminar, we encountered the various ways of thinking in other fields and learn how to explain the importance of our research to people in other fields.

## Diversity and dialogue

Diversity and Ethics Training: A seminar by an expert in diversity education. In this seminar students learn the importance of respectful interaction and collaboration with people of different genders and backgrounds, and how this can give them a new perspective on their research. IPRM Seminar: A place for free interaction between FoPM students. After a lecture by an invited speaker, students give short presentations to explain their research to students working in different specialist fields, then discuss and evaluate each other’s work. In the second half of the seminar, students are divided randomly into small groups to continue the conversation and break down barriers between research groups.

## Coursework through which students develop skills for their future careers and our future society

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**Connecting people and research beyond traditional boundaries**

**Message From WISE Cooperating Institution**

OKAMOTO Tatsuaki  
NTT Fellow

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Coping with various business challenges

The Fourth Industrial Revolution represented by AI, IoT and big data, and innovations such as biotechnology, 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, knowledge of the sciences is necessary. Meanwhile, to institute solutions to these business problems, knowledge of social sciences is required. Thus, it is necessary to collaborate across disciplinary borders of the sciences 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 of interdisciplinary fusions, 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 clearly 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 subsequent innovation. Even though the determination is difficult, this problem can be legally reviewed. It could be understood with a conventional issue of granting pharmaceutical patent to chemical substances, which requires to consider whether chemical substance has comparable pharmacological 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 pharmacological 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 enlighten students with values such as freedom, equality, and justice that 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 business law.
Train "super-skilled PhD holders to lead a Super Smart Society" through university-wide interdisciplinary education

The University promotes pioneering 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 captivating 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-professional super-skilled PhD holders, who can lead industry, government, and academia in the forthcoming Super Smart Society.

Leaders of the forthcoming Super Smart Society in (open innovation), therefore, the SSS Promotion Consortium was established in 2018, which consists of national institutes, private corporations and local governments. As an open innovation platform, several SSS research & education fields were created in the University and are utilized in both education and research. Figure 2 overviews the Education Program for a Super Smart Society between the University’s engineering education program (open research) and the participating organizations of the Consortium (blue), the SSS Promotion Consortium (green) acts as a bridge to realize open education (blue arrows) to cultivate a broad perspective and open innovation (red arrows) to develop problem solving ability. By providing global leadership education in collaboration with overseas partner institutions, training global leaders with specialized knowledge and high ambition is another feature of the program.

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 provide education with P1 faculty members collaboratively across six schools, Institute of Innovative Research, and 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 Science. This is an exceptional education program that fosters specialization and originality across these fields.

Furthermore, in the field of SSS, it is necessary to train talent through social collaborative education (open education) and interdisciplinary research.

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 partner research activities for their super smart society innovation research project with the goal of realizing a super smart society. Interdisciplinary collaboration opportunities are increasing in research fields. One such example is combining technology of highly-sensitive quantum sensors with a study of protecting coral reefs inside reefed coral ecosystems by applying electric current to the structure.

The Good Practice

I believe broad knowledge and intelligence will be powerful weapons in the future Super Smart Society.

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 “Monozukuri manufacturing” but also to create innovative industries and services utilizing ICT and AI.

I support this program in the hope that it fosters “knowledge professionals” who can recognize new needs, set goals, find solutions, and lead the smart society of the future.
Tokyo University of Marine Science and Technology

Development of WISE (World-leading Innovative & Smart Education) Program to foster AI (Artificial Intelligence) Professionals for Marine Industries

(Program Coordinator) SHOJI Ruri (Executive Director, Professor, Department of Maritime Systems Engineering, Tokyo University of Marine Science and Technology)

(Fields of diplomas) Doctor of Philosophy or Doctor of Engineering Degree

(Name of the program to be noted: WISE program for the Development of Artificial Intelligence Professionals in the Marine Industries. URL: https://www.g2.kaiyukai.org/garmarine-ai/eng/)

Message from WISE Program Coordinator

The WISE Program is an educational program in the field of marine AI. It is designed to foster professionals who can apply artificial intelligence (AI) to marine-related fields. Through the program, students will gain knowledge and skills in AI, as well as practical experience through projects and internships.

The program is targeted at students who have completed their bachelor's degree and are interested in pursuing a career in marine AI. The curriculum includes courses in AI theory, data science, and marine applications.

In addition to the academic curriculum, the program offers opportunities for students to engage in research and development projects, as well as internships with partner organizations. This hands-on experience will provide students with practical skills and knowledge that are highly valued in the marine industry.

For more information, please visit the WISE Program website or contact the program coordinator directly.

Message from the President

Establishing a multi-disciplinary education system

TUMSAT's WISE Program offers a unique educational environment that integrates AI with marine science and technology. The program is designed to prepare students for careers in the marine industry, where AI is increasingly being applied to solve complex problems.

The curriculum includes courses in AI fundamentals, machine learning, and data science, as well as courses in marine and environmental sciences. Students will have the opportunity to work with industry partners and research institutions to gain practical experience and develop their skills.

The program is particularly aimed at students who are interested in careers in marine technology, such as those who have studied marine engineering, marine science, or related fields. The program offers a unique opportunity for students to combine their knowledge of marine sciences with their expertise in AI.

Inquiries

Programs selected in FY 2019: Tokyo University of Marine Science and Technology

YEAR

Programs selected in FY 2019

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WISE Programs Doctoral Program for World-leading Innovative & Smart Education

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WISE Program Doctoral Program for World-leading Innovative & Smart Education
Kanazawa University

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

(Program Coordinator) 　KANAZAWA Rikimaran (Professor, Nano Life Science Institute, Kanazawa University)
(Field of diploma) 　Doctor of Philosophy in Science, Doctor of Philosophy in Engineering, Doctor of Philosophy in Medicine, Doctor of Philosophy in Pharmacy, Doctor of Philosophy in Pharmaceutical Sciences, Doctor of Philosophy in Health Sciences, Doctor of Philosophy in Nanoscience or Doctor of Philosophy in Nanotechnology

Name of the program to be noted: WISE Program for Nano-Precision Medicine, Science and Technology

(URL) 　https://wisen-w3.kanazawa-u.ac.jp/en/

The program trains technologically competent nano-precision medicine professionals and medically competent nano-precision science and technology professionals who will create innovative methods of prevention, diagnosis, and treatment through the understanding and control of pathology at the nano level.

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 they enter 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.

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 consist of mathematical data science and innovation management that are necessary to the realization of Society 5.0 and nanotechnology and nanomaterials 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. Furthermore, students advance to the four specialist courses. Pre-Medical, 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 graduate students, current students and graduates, and academic staff and graduates.

Personnel who can develop for solutions to health issues

Cutting-edge techniques such as genetic analysis from the United States in 2015 have proposed a precision medicine that aims to deliver optimal patient-tailored treatment. While this has grasped the world’s attention, many diseases are still not sufficiently controlled. We believe a major factor contributing to this is that the dynamics and structures of substances that cause disease within living organisms remain an uncharted territory at the nano level.

Therefore, this program focuses on five challenges to human society, namely, cancer, lifestyle diseases, neurological disorders, diseases from particulates, and diseases from nano materials, and draws fully on the research environment and results of the World Premier International Research Center Initiative (WPI) of the Nano Life Science Institute at world-leading research institutions. In doing so, the program enables students to study nano-precision medicine, science, and technology through the question of how their own specialist fields, nano science, and nano technology are applied to and used in medicine, science, and technology.

We educate PhD-qualified individuals who can bring about the innovation required to build a health infrastructure for humanity by applying these skills and knowledge. In other words, our program trains technologically competent nano-precision medicine professionals and medically competent nano-precision science and technology.

Creating innovation that continues from pre- to post-program

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Message from the President

Fostering innovative individuals to pioneer new domains and revitalize Japan’s global competitiveness

Kanazawa University is promoting graduate education reform for the development of human resources who lead academia and industry as a major objective. It is this Program that is being pursued with the aim of developing human resources with special implementation capabilities based on multidisciplinary and transdisciplinary knowledge imagination, making use of the world-class research environment of the WPI Center, Nano Life Science Institute.

Graduate students are strengthening their abilities to create new value with an awareness of issues and with the highest motivation while being inspired by the participating companies and researchers, and I am confident of their growth. While maximizing their expertise, they grow into human resources with doctorate degree who boldly challenge and open up unexplored fields by drawing out a wide range of potential through interdisciplinary activities, and thus I expect that they will become the driving force for the revival of international competitiveness.

Program selected in FY 2019 – Kanazawa University

[Image 71x541 to 130x612]

[Image 275x322 to 359x324]

[Image 847x527 to 1117x707]
Novel medical system to create a high-quality aging society

As a result of rapid developments of electronic medical devices and biomedical/life sciences, mass vaccination has made many infectious diseases infrequent. However, other life-threatening diseases are also emerging, and their causes are not yet known. The aging population poses social issues in developed countries. The problems make it urgent to create environments that are required for elderly people to maintain high quality of life and social lives. To implement these environments, it is necessary to develop a novel medical field in which diseases are predicted and prevented before people get ill. In this program, it is planned to develop cutting-edge researches of individual prevention and to nurture scientists who carry out the researches.

From personalized prevention to social implementation

Currently, increases in cancer, dementia, and other diseases associated with a population aging have become a global problem, and this includes developing countries. The situation is particularly serious in Japan, which between a super-aged society and a rapidly declining birthrate is facing a critical situation with 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 the molecules to human society and allow understanding of the pathogenesis of undiagnosed diseases and develop preventive methods. In order to achieve this goal, informatics and biomedical sciences must work in tandem. However, due to high specialization in both medical sciences and informatics the rapid pace of technological development, there is an overwhelming lack of people capable of conducting such integrated research and applying the results of that research to society. Many of challenges we face in medicine today are no longer limited to national borders as is evident from our struggles against global scale infectious diseases. Development on a global scale is essential to collect and analyze big data and implement the findings to society. Thus, global awareness and diversity are vital to developing human resources. The CIBoG program, therefore, aims to foster the development of researchers, administrators, and developers to gain new insights into informatics and biomedical sciences who can build a collaborative research system for big data analysis, 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, Multidisciplinary Biomedical Sciences, and International and Diversity Education. During the five-year program (four years for medical doctors), students enrolled in the CIBoG program acquire proficiencies in the three fields that constitute the main pillars, through both basic science study and clinical practice. Graduates gain the ability to develop integrated medical and informatics research that utilizes mathematical informatics. In CIBoG, the Graduate School of Medicine and the Graduate School of Informatics will not only work together to support graduate student education and research, but also to strengthen digital medicine 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 ID Cellular Dynamics (CICD), a center for integrated medicine and informatics analysis, has been established at the Tohoku University. Through close collaboration between the wet and dry laboratories, CICD 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.

Flow of education

CIBoG Retreat (NAGOYA Global Retreat) Researchers from Nagoya and surrounding areas can gather to present their research and build meaningful relationships with other researchers. More than 150 graduate students and young researchers from Nagoya University and neighboring institutions will participate in the CIBoG Retreat, where they will present their research and have a meaningful interaction with each other. The NAGOYA Global Retreat started in 2008, and was renamed the CIBoG Retreat in 2019, and has been held 14 times since then until 2021. All the events are conducted in English, and graduate students and young researchers can train themselves to give presentations and answer questions in English. The organizing committee, consisting of many researchers from neighboring institutions, manages the event while gradually updating the content.
Graduate Program for Medical Innovation

(As of November 2021)

Programs selected in FY 2019

WISE Program Doctoral Program for World-leading Innovative & Smart Education

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 both 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 pathogenesis.
2. To discover diverse next-generation drugs and medical care and develop experts who can conduct research that integrates medicine and information.
3. To spread the next-generation advanced education for next-generation medical care and develop experts who have medical management ability and can plan and implement policies to solve problems related to medical and social issues.
4. To spread the next-generation advanced education for next-generation medical care and develop experts who can conduct research that integrates medicine and information.

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 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.

Education Goals of the Graduate Program for Medical Innovation

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

1. To create innovative and excellent researchers who elucidate complicated phenomena and pathogenesis.
2. To discover diverse next-generation drugs and medical care and develop experts who can conduct research that integrates medicine and information.
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4. To spread the next-generation advanced education for next-generation medical care and develop experts who can conduct research that integrates medicine and information.

Program Features

The Graduate Program for Medical Innovation is the world’s highest level of research and has produced internationally-recognized researchers including Nobel laureates. Curricula that take advantage of this research-based strength of the university have been established by the Graduate School of Medicine, Graduate School of Pharmaceutical Sciences, Center for IPS Cell Research and Application (CiRA), and Institute for the Advanced Study of Human Biology (ASHBi), operating under the World Premier International Research Initiative (WPI).

(Features)

1. The program aims to acquire systematic medical knowledge as well as advanced and creative research capabilities 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.
2. To meet the diverse needs of students, a diverse group of course students will be assigned to run the program, and young mentor faculty members will provide detailed guidance and support.
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.

Programs selected in FY 2019

Kyoto University has been pursuing the world’s highest level of research and has produced internationally-recognized researchers including Nobel laureates. Curricula that take advantage of this research-based strength of the university have been established by the Graduate School of Medicine, Graduate School of Pharmaceutical Sciences, Center for IPS Cell Research and Application (CiRA), and Institute for the Advanced Study of Human Biology (ASHBi), operating under the World Premier International Research Initiative (WPI).

Thirteen lectures help students equip themselves with problem-solving techniques that boost their self-confidence and enable them to explore new areas in each stage of their life.

Education Promotion Office, Graduate School of Medicine, Kyoto University

[Office in charge] Education Promotion Office, Graduate School of Medicine, Kyoto University

[Inquiries] 075-753-9334

The Graduate Program for Medical Innovation fosters world-class experts!

Current and future healthcare fields need world-class experts who are able to think critically, and have a broad vision, flexible mindset, and creativity. The Graduate Program for Medical Innovation provides students with opportunities for collaboration with overseas research institutes and private enterprises to foster future world-class experts. The University of California, San Diego also has a collaborative research facility that is expected to play a key role in fostering excellent human resources.

Be an innovator! The program helps me explore knowledge in new fields

Wise candidates of medicine may be one of the requirements to be a medical innovator. I think, however, the most important thing is to have a passion to venture into a new world. This program supports individual students in acquiring the knowledge and skills required for research, as well as in exploring new things through a unique lecture and collaborative research project. I am inspired by the program to try new research activities.
Cultivating individuals capable of tackling various social issues through the fusion of knowledge

Osaka University has envisioned “the creation of a society that fosters a sense of purpose in life through co-creation with society” as the key concept of the OU Master Plan 2027, a mid- to long-term management plan for FY2022 and beyond. Through such co-creation, we aim to cultivate individuals capable of tackling various social issues. This program combines quantum beam application with fundamental research in science, medicine, and information sciences to create new value. Examples include targeted alpha therapy to promote longevity and strategies for soft errors, which contribute to a safe and secure super-smart society. PBA has been scaled up significantly due to the addition of the Graduate School of Medicine, Division of Health Sciences, and new partner institutions and corporations. This expansion translates to higher expectations to produce “true opinion leaders,” who will create a society where everyone can enjoy a comfortable and happy life.

Pioneering quantum beam application to solve social issues

Confronted with the reality of rapid aging and a low birthrate, our country must address these issues to extend the healthy life expectancy and realize a super-smart society with a clear vision of Society 5.0. Academy, including universities, are expected to address this issue and create new value through interdisciplinary cooperation. In this context, quantum beams created by accelerators are being applied in innovative ways to solve problems of modern society. Radioactive isotopes (Ris), which support nuclear medicine, have been essential in cancer research. Ris played a critical role in the rapid evolution of gamma imaging technology and targeted alpha-particle therapy. In addition, cosmic rays contribute to soft errors, which are expected to thrive as global leaders and “knowledge professionals” within all sectors (industry, academia, and government). They will possess the following 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 knowledge 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

To educate individuals who possess these attributes, the program offers a curriculum focusing on interdisciplinary and international joint research. In particular, overseas training is mandatory. Training locations include Canada’s Particle Accelerator Centre TRIUMF (Canada) and The University of British Columbia (Canada), which shares property boundaries with TRIUMF, University of Queensland (Australia), which has the Center for Advanced Imaging, and Heidelberg University (Germany), which has close collaborative relationships with Osaka University in a variety of fields related to nuclear medicine.

Cultivating individuals capable of tackling various social issues through the fusion of knowledge

This 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.

Message from the President

We offer a curriculum to acquire a high degree of expertise, an ability to understand from a broad perspective, and global communication skills.

Pioneering quantum beam Application

Multidisciplinary PhD Program for Pioneering Quantum Beam Application

Targeted Alpha Therapy that contributes to realization of a society of health and longevity

Soft Error

Countermeasures to support a safe and super-smart society

New Applications that may solve other social issues

Characteristics: quantum beam and expertise to create new value to solve social issues.

Message from WISE Cooperating Institution

Good Practice

Investments 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 “SEEDS” which is offered to high school students. Doctoral candidates in PBA participate as TAs and mentors. Approximately half of the participants in “Mebae Tekijuku” and “SEEDS” are female students. We expect that nurturing exceptional young talent will continue to cultivate future leaders and improve gender balance in scientific fields.

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<td>Research Center for Electron Physics</td>
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<td>National Institutes for Quantum and Radiological Science</td>
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Anticipate polymath who expedite new value creation with accelerators

Japan has been leading the world with numerous advanced accelerator facilities. Many organizations that own such facilities are participating in the program. Although accelerators hold great promise to solve social issues, their potential is not fully utilized at present. We anticipate cultivating exceptional individuals who can lead the world by creating new value with accelerators.

Message from WISe Cooperating Institution

Student's voice

Great internship experience

The program started when I nearly finished the 1st year of my PhD. With my supervisor's encouragement and a feeling that my study on the medical application of nuclear physics is well-aligned with the program perspective, I decided to take the last chance for students in DI grade to apply for the program. The overseas internship that I just finished was an amazing experience. I got a chance to visit a new country, and a feeling that my study on the medical application value with accelerators.

Programs selected in FY 2019 — Osaka University

Pioneering quantum beam application to solve social issues

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New Applications that may solve other social issues

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Multi-Scope Energy WISE Professionals

Tokyo Tech pushes strategic promotion of three outstanding graduate school programs

Tokyo Tech implemented institution-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 (DNJ) 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 forth institute-wide efforts to promote the funding program for outstanding graduate schools since its start in AY 2018. We have made one proposal every year in the aforementioned priority fields, all of which have been adopted.

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 suitable for the future of energy, we must transition to a culture of sustainability and carbon neutrality by making the most of big data. At analysis data and science, and digitization, Tokyo Tech defines its sought-after “ambient energy” that coexists with industries.

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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 (DNJ) 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 forth institute-wide efforts to promote the funding program for outstanding graduate schools since its start in AY 2018. We have made one proposal every year in the aforementioned priority fields, all of which have been adopted.
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 and have created major changes since the Industrial Revolution. On the one hand, due to global issues such as pandemics, resource depletion, and climate variability, the complexity of social issues such as declining birthrate and aging population, and diversification of values such as diversity and inclusion, the conventional technology-led approach to “realizing a rich lifestyle” is becoming difficult. In order to lead a “lifestyle revolution” wherein people can freely choose various ways of life, it is necessary to have specialized human resources who can collaborate with different fields. Through this program, students with diverse specializations will work hard toward the goal of mobility innovation. I sincerely expect the nurturing of human resources who will lead social change through research results, and I will do my utmost to promote the program.

Transdisciplinary talents leading lifestyle revolutions

In recent years, technological innovation also known as “mobility revolution” has progressed since the Industrial Revolution that minimizes 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. To drive lifestyle revolution, transdisciplinary human resources are required to team up with experts from different fields (multidisciplinary) such as humanities, social sciences, engineering, informatics, and environmental science, to understand and respect each other’s specialties, to create diverse values (value creator) for lifestyle, and to translate those values to society by building the “technology and methodology.” In this program, in addition to “Industry-Academia Co-Creation Education”, in which the university collaborates with private companies, 6 graduate schools and 7 centers to “Industry-Academia Co-Creation Education”, and have collaborated on a diverse group of students and companies from different fields. This initiative brings together students from different graduate schools under the theme “TMI Practice Base” consisting of “Boot Camp” that fosters transdisciplinary collaboration through close team-type 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 creator” 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.

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 “transdisciplinarity” are required.

Aiming to analyze diverse and dynamically changing lifestyles by actively participating in joint industry-government-academia social implementation

With the increasing complexity of social issues in recent years, local governments are required to provide appropriate administrative services to all stakeholders. Therefore, in collaboration with JTA, an international organization for promoting smart cities, and Moton City in Arch Prefecture, we are participating in social experiment to analyze dynamically changing lifestyles, such as park demand forecasting and urban sensing using garbage collection vehicles. Furthermore, in anticipation of diverse lifestyles in the future, we are working on social implementation in collaboration with local government, aiming not only to analyze the collected data but also to return it through administrative services that are intrinsically valuable to residents.

To be a Leading Talent for the Once-in-a-Century Mobility Innovation

I applied for this program because I felt that in order to lead the mobility revolution and create better lifestyles, it is essential to collaborate across disciplines and work together with industry, academia, and government. In this program, there are many opportunities to discuss mobility innovation from multiple perspectives, such as group activities with students from other graduate schools, dialogues by professionals from different fields, and mentoring programs with people from collaborating companies, and I am inspired every day.
Distinguished Doctoral Program of Platforms

Program selected in FY 2020, Kyoto University

Message from the President

MINATO Nagahiro
President, Kyoto 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 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.

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 disasters, the platforms play an increasingly important role in our society. The platforms use information and communication technologies to categorize, analyze, and share digital data obtained from various information sources that are non-uniformly spread throughout our society, which are collected and stored in the form of big data. A platform consists of three components: a basic data gathering network composed of various data gathering network; a database that data are collected and stored in the form of big data; and a physical-space-driving network that provides a platform to drive the network.

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

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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

To demonstrate and implement the platforms 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 front-line professionals from industry, government, and academia in Japan and overseas.

Message from WISE Cooperating Institution

KOJIMA Fumihide
Director, Wireless Networks Laboratory, Kyoto University

A program has begun to foster personnel who will contribute to building platforms that can respond quickly to social risks such as infectious diseases and natural disasters. This program will foster personnel who can drive doctoral-level research and development by using a multi-disciplinary, optimized platform to be built. As a collaborating institution, we will spare no effort to support these personnel to enable them to help solve the social risks that will occur around the world in the future.

Students’ Voice

Seiji Nakada
Graduate School of Agriculture, Kyoto University

I decided to participate in this program because I believed that its goal of building new platforms would be a major step toward solving the “ocean noise problem” that I am working on in my research. In this program, we will work to create a platform alongside students, teachers, and companies who are striving to solve various problems. I believe that the cross-industry experience fostered by this experience will serve as a driving force to continue research and solve problems.

Programs selected in FY 2020

Kyoto University
Program of Mathematics for Innovation

In the Doctoral Program, we have three "Co-Creative Internships" i.e., industrial, interdisciplinary, and international ones, as well as "Advanced Mathematical Modeling", in which students train mathematical modeling to researchers in other fields as reverse mentors.

Kyushu University’s Distinctive Initiatives

The main reason for proposing this WISE program at Kyushu University is that we have a proven track record of contributions to society by Mathematics and have a strong determination to take on that responsibility. The University has established an excellent organizational structure for this purpose.

The educational organization consists of three main graduate schools: Mathematics, Information Science and Electrical Engineering, and Economics. In particular, the Graduate School of Mathematics offers long-term internship training, and is one of the two organizations that have earned the highest result in the second-term corporate evaluation by MEXT, Japan. As research organizations, we have the Institute of Science and Industry for Industry and the Pan-Omics Data-Driven Research Innovation Center. The IMI is Japan’s unique joint usage/research center for industrial Mathematics, and is actively engaged in the mission to develop "Mathematics for Industry", a new research area of Mathematics born from dialogues with industry. We will take on the responsibility of the University through this Interdisciplinary degree program, designed by various departments and faculty members.

One of the most distinctive initiatives in this plan is to establish the WISE Doctoral System for Mature Students. (Figure 2) This means that companies hire excellent Master’s graduates, and at the same time, the students are admitted to the doctoral program as mature students, and they return to the company after obtaining their doctoral degrees. This allows us to solve various problems at once, such as financial support, career development, and strengthening industry-academia collaboration. Preparations have already been made at Fujitsu Laboratories Ltd., our partner organization, and will be implemented immediately after the start of the program. We would like to extend this system to other companies, increase the dwindling number of doctoral students in Japan, as well as to contribute to the active exchange of industry-academia human resources.

Mathematical Modeling Professions with Five Forces

In the super-smart society that Japan aims at, Artificial Intelligence technology and data analysis are essential, but they have certain limits. The versatility and rigor of Mathematics have received attention as a way to break the limits and change our future business and life dramatically. "Excellent Doctoral Talents in Mathematics" can make great contributions to this change, and lead the world’s society and industry by drawing out the potential of industrial mathematics.

Nurturing “Excellent Doctoral Talents in Mathematics” who can develop new interdisciplinary fields and create innovation

With the aim to create and develop “new interdisciplinary fields”, Kyushu University has built a framework for a Cross-Disciplinary Integrated Masters-Doctoral Program called the “Da Vinci Program”, and the Graduate Program of Mathematics for Innovation is the first and leading pilot program. In this program, we will nurture “Excellent Doctoral Talents in Mathematics” who can develop new interdisciplinary fields and create innovation by making full use of the “modeling ability” based on excellent “mathematical ability”, and “co-creation ability” that can cross the boundaries of organizations and fields. In addition, through this most important graduate school program in Kyushu University, we will promote and lead graduate school reform in Japan and develop and lead the world’s society and industry by drawing out the potential of industrial mathematics.

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(Only in Japanese)

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Issued March, 2022