DESCRIPTION OF GRADUATE SCHOOL PROGRAM

*Majors and courses open to the application need to be confirmed through each application guidelines.

*The English translations are provided only for reference purposes to aid in the understanding of the Japanese originals. In the case of a discrepancy between the Japanese original and its English translation, the former shall take precedence.

1. Purpose and Mission

I. Major of Integrated Medicine, Master's Degree Program (2-year course)

The **Medical Science Course** aims to train researchers and educators in medical science fields, and to nurture human resources who possess specialized medical science knowledge and can meet the needs of industrial fields related to medical sciences.

The **Nursing Course** aims to form a world-class research and education hub for nursing science, contributing to the maintenance and promotion of health as a human right through the realization of a highly advanced welfare society. Therefore, it aims to foster nursing researchers and educators, as well as highly specialized medical professionals.

The **Public Health Course** aims to establish a world-class education and research hub for public health, aiming to contribute to the promotion of the health and welfare of people in Japan and around the world. It aims to foster researchers, leaders, and practitioners with a foundational understanding of public health, high expertise, and a strong sense of professional ethics, and in particular, to train cutting-edge interdisciplinary researchers in public health.

Ⅱ. Major of Integrated Medicine, Doctoral Program (3-year course)

The **Medical Science Course** aims to nurture researchers and educators who possess advanced specialized knowledge in general medicine and rich comprehensive knowledge, and who can independently conduct world-class, original research. Its mission is to foster leaders with high ethical standards and an international perspective who will drive interdisciplinary teams to develop and socially implement advanced medical care, playing active roles at the forefront of hospitals, companies, and other institutions.

The **Nursing Course** aims to nurture researchers and educators who possess advanced specialized knowledge and practical skills in nursing, and who can independently conduct world-class, original research that contributes to the field's development. Its mission is to foster leaders with high ethical standards and an international perspective who will collaborate with diverse fields to build the scientific foundation of nursing practice and lead the next generation of nursing research and education.

Ⅲ. Major of Integrated Medicine, Doctoral Program (Medical Course)

The primary objective of this Graduate School is the training of medical researchers. Its purpose is to cultivate the advanced research capabilities necessary to conduct research activities independently or to engage in other highly specialized professional duties, as well as the rich academic knowledge that forms the foundation for these capabilities. Its mission is to contribute to the advancement of medicine and the improvement of social welfare. (This program can be selected, for example, by those who hold a medical license but do not have a master's degree. Those who have completed the 2-year Master's Program of the Major of Integrated Medicine and obtained a Master's degree (Medical Sciences) can also select this program, although they can also choose to proceed to the 3-year Doctoral Program.)

2. COMPLETION REQUIREMENTS AND DEGREES

I Major of Integrated Medicine, Master's Program (2-year course)

In order to complete the master's program, students must be enrolled in the program for two years or longer, take the prescribed courses to acquire 30 credits or more, receive the necessary research supervision, and successfully pass the review of their master's thesis (or research project) and the final examination. Upon completion of this program, the following degrees are granted:

- Medical Science Course: Master's degree (Medical Sciences)
- Nursing Course: Master's degree (Nursing)
- Public Health Course: Master's degree (Public Health)

Ⅱ Major of Integrated Medicine, Doctoral Program (3-year course)

To complete the 3-year Doctoral Program in the Major of Integrated Medicine, students must be enrolled in the program for at least three years, attain 17 or more credits in total from compulsory and elective compulsory subjects, receive the necessary research guidance, complete a doctoral dissertation, and successfully pass the review and final examination. However, for students who have acquired the necessary credits and have been highly evaluated for their exceptionally outstanding research achievements by the Graduate Research Review Committee, an enrollment period of one year or more will be sufficient (for those who have completed a master's program in less than two years of enrollment at the graduate school, a period of three years in total including that enrollment period is required). Those who complete the 3-year Doctoral Program in the Major of Integrated Medicine are granted the following degrees:

Major of Integrated Medicine

- Medical Science Course: Doctoral degree (Medical Sciences)
- Nursing Course: Doctoral degree (Nursing)

Ⅲ　Major of Medical Sciences, Doctoral Program (Medical Course)

To complete the Medical Course at our graduate school, students must be enrolled in the program for at least four years, attain 30 or more credits in total from compulsory and elective compulsory subjects, receive the necessary research guidance, complete a doctoral dissertation, and successfully pass the review and final examination. However, for students who have acquired the necessary credits and have been highly evaluated for their exceptionally outstanding research achievements by the Graduate Research Review Committee, an enrollment period of three years or more will be sufficient. Those who complete the Medical Course in the Major of Medical Sciences are granted the following degree:

Doctoral degree (Medicine)

3. RESEARCH SUPERVISION

All students who are admitted into the graduate program will be given research guidance in accordance with the research themes of the departments the students belong to. Please refer to the Tohoku University Graduate School of Medicine website for the research themes of each department. List of departments: https://www.med.tohoku.ac.jp/laboratory/index

4. ENTRANCE FEE / TUITION EXEMPTIONS

(1) Exemption of Entrance Fee

Students recognized as being in severe financial difficulties due to special circumstances are eligible to apply for exemption from payment of the admission fee (complete or half exemption).

(2) Exemption of Tuition

Students recognized as being in severe financial difficulties for economic reasons, and who have an excellent academic record, are eligible to apply for tuition exemption (complete, two-thirds, or one-third exemption). Please refer to the Tohoku University website for details (https://c.bureau.tohoku.ac.jp/gakusei-shien/menjo/).

Scholarships for International Students

https://www.tohoku.ac.jp/japanese/studentinfo/studentlife/12/studentlife1201/

5. ABOUT THE EXTENDED REGISTRATION SYSTEM

At this graduate school, students who request to systematically take educational courses and complete the program over a certain period exceeding the standard completion period [Note 2] due to circumstances such as having a profession [Note 1] may be permitted to do so upon screening. Students who are approved for this system are referred to as "Extended Registration Students," and the total amount of tuition fees paid by such students will be the same as that of students completing the program within the standard period.

- [Note 1] Eligible persons:
    1. Full-time employees of companies, etc., and those running their own businesses.
    2. Those who need to take care of childbirth, childcare, nursing care, etc.
    3. Medical specialty trainees (Senior residents).
    4. Others deemed appropriate by this graduate school.
- [Note 2] The enrollment period cannot exceed four years. However, students may request to shorten their approved extended enrollment period. Therefore, those considering the extended registration system are advised to consult with their academic supervisor early so that they can start from the time of admission if possible.
- [Note 3] When the period is shortened, the tuition fee will be recalculated. In principle, no special curriculum will be prepared for extended registration students.
- [Note 4] The use of the extended registration system begins in either April or October. Details regarding the extended registration system will be provided in the enrollment procedure documents, and can also be checked on the following website: Admission Q&A for Working Adults (What is the Extended Registration System?) https://www.med.tohoku.ac.jp/wp-content/uploads/2023/11/qa_231122.pdf

6. INTRODUCTION OF THE PROGRAMS

I. Major of Integrated Medicine, Master's Program (2-year course)

Medical Science Course

Course Features

The goals of this course are to raise researchers and educators who can contribute to the development of medicine and healthcare fields in Japan and the international community, and to foster advanced medical professionals who will help realize a healthy, safe, and secure society. To achieve these goals, we strive to nurture human resources possessing a wide range of knowledge related to medicine, practical techniques to pioneer new medical fields through flexible ideas, and a high sense of ethics. The curriculum is specifically designed so that even graduates from non-medical faculties can acquire fundamental knowledge in

various medical fields while utilizing their prior knowledge and skills, and further develop them.

(1) General Program

Program Features

Students can receive guidance from many faculty members within the Graduate School of Medicine. The Graduate School has faculty members in all fields related to medicine and healthcare. Students can learn problem-solving methods from a medical perspective from these faculty members and apply their undergraduate education to the medical field. A key feature is that multiple faculty members advise on thesis research, allowing students to gain a comprehensive, multifaceted view of medicine.

Contents of Education

The curriculum offers a diverse range of lecture courses and is designed so that students can begin lectures and practical training according to their undergraduate education level. Current medical issues are presented through lectures by experts in basic, social, and clinical medicine. Furthermore, students acquire a wide range of skills through rotation and internship training, and smooth progress toward a degree is facilitated through interim reviews of their master's thesis research.

Career Plans after Graduation

- Advancement to the Graduate School of Medicine Doctoral Program (3-year course or Medical Course).
- Employment at medical, pharmaceutical, and food-related companies, medical equipment development companies, government agencies (especially in the healthcare sector), etc.
- Occupations include medical/pharmaceutical researchers, drug development/medical information representatives at pharmaceutical companies, and product development/management personnel at food companies.

(2) International Course of “Public Health Science for Human Security” (English-taught program)

Program Features

After the Cold War ended in the early 1990s, the concept of "Human Security," which focuses on addressing threats to people's safety such as illness, disasters, poverty, and conflict, gained attention as a key concept for building a new international society, replacing the traditional concept of "national security." Particularly in low- and middle-income countries, including those in Asia, people's lives and dignity are still threatened by preventable diseases and injuries due to poverty, disasters, poor environmental hygiene, and malnutrition. In addition, infectious diseases and environmental pollution now threaten

people's lives and safety across borders. These human security challenges facing the international community in the 21st century are caused by highly complex factors, necessitating new leaders who can promote problem-solving efforts from a comprehensive perspective that transcends traditional disciplinary boundaries. The International Course of "Public Health Science for Human Security" in the Major of Integrated Medicine Master's Program aims to develop students' ability to understand and resolve the structural factors threatening people's lives and health by integrating the latest knowledge of medical science and international health with humanities and social science methodologies. It aims to nurture professionals and researchers who can contribute to the realization of human security as policy or community leaders in Japan and the international community. Following the framework of the "International Post-Graduate Program in Human Security (IPHS)," students can take common courses offered in English by the Graduate Schools of Agricultural Science, Environmental Studies, and International Cultural Studies. All required courses for this program are taught in English.

Contents of Education

In addition to courses offered jointly by the four collaborating graduate schools, this program offers courses such as Human Security and Global Health I, Health and Social Resilience to Disasters I, Infectious Diseases and Human Security I, and Medical Research Methodology I. All classes are conducted in English, and the curriculum allows students to earn all required credits solely in English.

Career Plans after Graduation

- Advancement to the Graduate School of Medicine Doctoral Program (3-year course or Medical Course).
- International health and medical administration officials in various countries.
- International organizations (e.g., WHO) and international NGOs.

(3) Quantum Biology and Molecular Imaging Educational Program

Program Features

Molecular imaging examines the behavior of in-vivo biological systems, including genes and proteins, from the outside while the organism is alive. It involves new boundary and interdisciplinary areas of medicine, pharmaceutical sciences, and engineering. Methods such as Positron Emission Tomography (PET), Magnetic Resonance Imaging (MRI), and Optical imaging are utilized. Molecular imaging allows changes in biological systems, which could previously only be judged statically and qualitatively, to be understood dynamically and quantitatively by visualizing them at the molecular level. It is highly anticipated as a technology that enables the extremely early diagnosis of cancer and dementia such as Alzheimer's disease. Recently, the development and clinical application of molecular

therapeutic technologies (theragnostic) integrated with molecular imaging diagnostics have also been advancing. To establish molecular imaging as an extremely early diagnostic method, there are various research challenges, such as developing equipment in the engineering field, molecular probes in the pharmaceutical field, and diagnostic modalities in the medical and dental fields. To develop diagnostic technologies utilizing this latest science, the "Quantum Biology and Molecular Imaging Educational Program" conducts research and education on molecular bio-imaging—a field lacking human resources—by incorporating an interdisciplinary approach from pharmaceutical sciences, engineering, and dentistry, in addition to advanced medicine such as radiology, nuclear medicine, pharmacology, oncology, and psychiatry. There is also a collaborative program with the Institute for Quantum Medical Science, National Institutes for Quantum Science and Technology (QST) (formerly the National Institute of Radiological Sciences).

Contents of Education

As in the General Program, Medical Ethics, Research Planning Seminar, Rotation Training, Internship Training, Interim Review, and Thesis Research are required. In addition, this program makes Introduction to Molecular Imaging compulsory and offers courses from the Molecular Medical Science Program.

Career Plans after Graduation

- Advancement to the Graduate School of Medicine Doctoral Program (3-year course or Medical Course).
- Employment at medical, pharmaceutical, and food-related companies, medical equipment development companies, government agencies (especially in the healthcare sector), etc.
- University hospitals, public hospitals, etc.

(4) Medical Physicists Training Program

Program Features

Radiology is a field that contributes to medical care using advanced radiological medical equipment. Among radiology professionals, medical physicists are involved in the quality assurance and quality control of radiation therapy, as well as the development of radiation therapy equipment and technology, contributing to the safe execution and advancement of radiation therapy. Medical physicists are required to earn credits in medical, physical, and engineering subjects and acquire clinical experience. Targeting graduates of the Department of Radiological Technology (Health Sciences) and science/engineering faculties, this program aims to train medical physicists who, by completing practical training programs

alongside systematic lectures, possess the foundation for research and teaching, and can practice team medicine with other professionals and specialties involved in cancer care.
Contents of Education Graduates from the Department of Health Sciences are required to take science and engineering courses, while graduates from science and engineering departments must take medical and health science courses. The curriculum ensures that graduates from both backgrounds acquire an equivalent level of knowledge upon completion.
Career Plans after Graduation

- Medical physicists at university hospitals, public hospitals, etc.
- University faculty members.
- Advancement to the Graduate School of Medicine Doctoral Program (Medical Course or 3-year course) or other majors.

Nursing Course

Course Features We accept students aiming to become advanced professionals, educators, and researchers. We welcome not only graduates of the Department of Health Sciences but also graduates from other disciplines. Consideration is given to working adult students by offering extended registration systems, evening lectures, and seminars, allowing many working professionals to study here. For those who have graduated from medical junior colleges and have work experience, there is also a system to obtain examination eligibility through a preliminary screening prior to the graduate school entrance exam. The completion requirement is the acquisition of 30 or more credits in total from compulsory subjects (such as thesis research) and elective subjects. Thesis research accounts for 10 credits. Students must select their desired research field and supervising faculty member. Students must also acquire at least 2 credits from common elective subjects, including those specified by each course.

① General Program

Program Features The General Program consists of two domains: Advanced Nursing Practice & Health Development Nursing, and Family Nursing. These are subdivided into 10 specialties: Science of Nursing Practice, Nursing Administration, Gerontological and Home Healthcare Nursing, Public Health Nursing, Adult Health Nursing, Oncology Nursing, Palliative Care Nursing, Child Health Nursing, Psychiatric Nursing, and Women's Health Nursing & Midwifery. The Advanced Nursing Practice & Health Development Nursing domain focuses on research and education regarding the development and assessment of nursing skills, theory construction for health and independence support, nursing education

and administration, nursing ethics, and the health development of individuals, groups, and communities. The Family Nursing domain treats the family unit as the subject of nursing, conducting research and education on support methods aimed at maintaining and improving family functions based on characteristic traits and life events. Please refer to our website for details on each research field. For students who hold a nursing license and aim to become Certified Nurse Specialists, educational curricula are available for Oncology Nursing, Child Health Nursing, and Psychiatric Nursing.

Contents of Education Nursing Research Methodology, Nursing Science, Medical Ethics, Nursing Ethics, Medical and Nursing Policy, Medical Education, Statistics for Nursing Research, Medical Statistics (lectures and practical exercises), etc.

Career Plans after Graduation

- Advancement to the Graduate School of Medicine Doctoral Program (3-year course), other majors, or doctoral programs at other universities.
- University faculty members.
- Public health nurses, midwives, or nurses at university hospitals, public hospitals, etc.
- Local government bodies, etc.

② Public Health Nurse Training Program

Program Features

The Public Health Nurse Training Program trains public health nurses who possess both practical and research skills. Aiming to train public health nurses as advanced professionals, we have established two educational curricula: one for obtaining a public health nurse license, and a recurrent program (for those who already hold a license). Public health nurses responsible for public health nursing practice require specialized knowledge and skills to simultaneously promote individual and social change. They must not only address immediate problems but also elucidate the relationships with socio-cultural determinants of health. Through caring for residents, they need comprehensive qualities and abilities to develop community resources and enhance the problem-solving capacity of the entire community alongside the residents. Please refer to our website for details on the research contents of the Public Health Nursing and Community Care System Nursing fields.

Contents of Education

Public Health Nursing, Community Care System Nursing, Epidemiology, Health Statistics, Public Philosophy, Practical Training (Administration, School, Industry), Problem Research, etc.

Career Plans after Graduation

- Public health nurses at local government bodies (health, medical, and welfare administrative agencies).
- Advancement to the Graduate School of Medicine Doctoral Program (3-year course), etc.

Public Health Course

Course Features Health issues are becoming more diverse and complex, and genomic science is making rapid progress. Meanwhile, there is a shortage of human resources to promote advanced clinical research. Under these circumstances, there is an urgent need to train human resources who possess the skills to understand and solve individual health problems from the perspective of the social environment, combined with a sense of mission to achieve better health for both individuals and society—the foundation of public health. The Public Health Course aims to establish a world-class education and research hub for public health, contributing to the promotion of the health and welfare of people in Japan and around the world. It aims to foster researchers, leaders, and practitioners with a foundational understanding of public health, high expertise, and a strong sense of professional ethics, and particularly to train cutting-edge interdisciplinary researchers in public health. The Public Health Course includes the Department of Social Medicine, which consists of 8 full-time fields and several collaborating fields. Information and Health Medicine consists of 4 full-time fields (Epidemiology, Biostatistics, Medical Informatics, and Medical Genetics) and 2 collaborating fields (Disaster Public Health from the International Research Institute of Disaster Science [IRIDeS], and Personalized Prevention and Epidemiology). Public Health Medicine consists of 4 full-time fields (Health Administration and Policy, Environmental Medicine, Forensic Medicine, and Medical Ethics), with the Department of International Cooperation for Disaster Medicine, Disaster Psychiatry, and Global Health Policy from IRIDeS acting as collaborating fields. This major utilizes the seven programs described below to train targeted human resources. Lectures and seminars integrate fields related to public health, and we pursue advanced expertise in a wide range of fields in coordination with collaborating departments. Furthermore, we provide practical education in disaster-affected areas, university hospitals, and the Tohoku Medical Megabank Organization, and mutually share lectures with the International Post-Graduate Program in Human Security (IPHS). Upon completing the Public Health Course Master's Program, students are awarded an MPH (Master of Public Health) degree, which is necessary to excel in domestic and international health administration and clinical research. Please refer to the major's dedicated website (http://www.sph.med.tohoku.ac.jp/) for further details.

(1) General Program

Program Features

This is the foundational program of this major. Enrollees are assigned to one of the 8 full-time fields or a collaborating field (excluding the Genetic Counseling program). Students take required courses related to the "foundations of public health," such as epidemiology,

medical statistics, and medical ethics, and focus their studies on curricula related to their assigned field.

Contents of Education

Required courses include Introduction to Epidemiology and Research Design, Medical Ethics I, Social Medicine Seminar, Introduction to Medical Statistics, Introduction to Behavioral Medicine, Health Care Administration, and Environmental Medicine. Students will also take multiple elective courses.
They will then compile a master's thesis as their thesis research.

Career Plans after Graduation

- Employment at research and educational institutions (researchers related to the 13 fields of this major), pharmaceutical companies, think tanks, etc.
- Medical administration, international health organizations.
- Advancement to the Graduate School of Medicine Doctoral Program (3-year course or Medical Course).

(2) Course to Train High-Level Clinical Research Administrators Program Features

The need for infrastructure development is increasing not only for clinical trials conducted to obtain approval under the Pharmaceuticals and Medical Devices Act but also for investigator-initiated clinical research conducted under recently enforced ethical guidelines. However, this infrastructure remains insufficient, and training the personnel to support these efforts is an urgent task. Centered on the field of Biostatistics, and in collaboration with the Clinical Research, Innovation and Education Center (CRIETO), TAMRIC, university hospitals, and clinical departments, this program trains professionals who support clinical research, such as Clinical Research Coordinators (CRCs), Data Managers, Research Administrators, Project Managers, regulatory affairs experts, and medical informatics specialists. The program incorporates practical training from an early stage so students can apply what they learn in systematic lectures. The goal is to nurture clinical research supporters and administrators who can communicate with other professionals while leveraging their own expertise. Enrollees generally belong to the Biostatistics field and receive practical education, including training at clinical research promotion centers.

Contents of Education

Required courses include Introduction to Epidemiology and Research Design, Medical Ethics I, Introduction to Medical Statistics, Introduction to Behavioral Medicine, Health Care Administration, and Environmental Medicine. Furthermore, in the required Clinical

Research Practice I, students participate in planned or ongoing clinical research to practice drafting protocols and questionnaires, managing actual data, and analyzing data using statistical packages. Students also take multiple elective courses.

Career Plans after Graduation

- Employment at research and educational institutions (researchers related to the 13 fields of this major), pharmaceutical companies, think tanks, etc.
- Advanced clinical research supporters (Research Administrators, Data Managers, Clinical Research Coordinators, etc.).
- Advancement to the Graduate School of Medicine Doctoral Program (3-year course or Medical Course).
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(3) One-Year Course to Train Physicians and Dentists for Clinical Research

Program Features

This program provides a one-year curriculum aimed at equipping physicians and dentists with the skills to lead clinical research. Enrollees generally belong to the Health Administration and Policy field and draft a clinical research protocol under the guidance of their desired clinical field. Due to the serious shortage of physicians capable of leading clinical research in Japan, we established this one-year master's program specifically for physicians and dentists who have completed their clinical training. The program aims not only to train doctors well-versed in clinical research but also to ensure they are proficient in the systemic management of clinical research (research design, research organization management and communication, data collection and quality control, and social implementation and communication of research results). After completing this program, students are expected to advance to a clinical field in the Major of Medical Sciences Doctoral Program (3-year course or Medical Course) to conduct clinical research.

Contents of Education

Required courses include Introduction to Epidemiology and Research Design, Medical Ethics I, Introduction to Medical Statistics, Introduction to Behavioral Medicine, Health Care Administration, Environmental Medicine, Introduction to Clinical Research, Introduction to Medical Data Analysis, and Clinical Research Protocol Lectures and Practical Training. Furthermore, in the required Clinical Research Practice II, students undergo practical training in clinical research operations at the university hospital's Clinical Research Promotion Center or their desired clinical department. They also take multiple elective courses. Finally, students draft a clinical research protocol to be implemented after advancing to the doctoral program, which serves as their thesis research.

Career Plans after Graduation

- Advancement to the Graduate School of Medicine Doctoral Program (Medical Course), or employment at medical institutions to conduct clinical research.

(4) Course in Public Health and Genetic Counseling

Program Features

This is an educational program to train Certified Genetic Counselors. Enrollees generally belong to the Medical Genetics field. They are required to complete an academic society-certified curriculum related to medical genetics and genetic counseling, while also acquiring broad knowledge of public health. As we enter an era where diagnostics and treatments using genetic testing based on genomic information are applied across all medical care, it is necessary to provide genetic counseling at appropriate times as needed. Furthermore, establishing a genetic counseling system is essential for the next-generation personalized prevention and personalized medicine realized by the genomic cohort studies initiated by the Tohoku Medical Megabank Organization. Against this background, this program was established in April 2013 within the Medical Sciences Master's Program to train Certified Genetic Counselors (a joint certification by the Japan Society of Human Genetics and the Japanese Society for Genetic Counseling) as advanced medical professionals who can collaborate as team members and specialized practitioners in genetic counseling. This is the 10th such professional training course in Japan and the first in the Tohoku region. Education is conducted in accordance with the required curriculum of the Certified Genetic Counselor System Committee in cooperation with various fields of the Graduate School of Medicine, Tohoku University Hospital, the Tohoku Medical Megabank Organization, and other graduate schools. Since academic year 2015, the program has been affiliated with the Public Health major to train professionals capable of working broadly with a societal and public perspective. Upon completion, students are expected to take the certification exam to acquire the Certified Genetic Counselor qualification, and subsequently provide genetic counseling alongside patients and clients at our university, medical institutions throughout the Tohoku region, and the Tohoku Medical Megabank Organization. They can also contribute to society by participating in genomic research projects in collaboration with GMRCs (Genome Medical Research Coordinators) and CRCs, and by serving as experts in communicating genetic information at regional health centers and genetic testing companies in the Tohoku region. As this is a new professional training program, we seek highly motivated individuals with a strong sense of mission.

Contents of Education

Students can take the comprehensive social medicine curriculum prepared in the Public Health major. They will learn genetic counseling from theory to practice through cutting-edge lectures by lecturers involved in the latest genomic research (e.g., basic human

genetics and genomic medicine), as well as rigorous role-playing in Genetic Counseling Seminars and Genetic Counseling Practice. Students will also participate in case conferences and seminars hosted by the Department of Clinical Genetics from an early stage, volunteer at camps for intractable diseases, and join family support groups to learn about genetic disorders from the perspective of daily life.

Career Plans after Graduation

- Employment at medical institutions such as university hospitals, children's hospitals, National Hospital Organization facilities, specialized cancer hospitals, and obstetrics clinics.
- Employment at companies handling genetic testing or pharmaceutical companies.
- Employment at research and educational institutions (researchers related to the 13 fields of this major).
- Advancement to the Graduate School of Medicine Doctoral Program (3-year course or Medical Course).

(5) Leadership Training Course in Medical Ethics and Public Health

Program Features

This program trains leaders engaged in supporting and educating biomedical ethics in clinical practice, public health, and medical research settings. It targets undergraduate graduates seeking master's level mastery of biomedical and public health ethics, healthcare professionals, and working adults directly or indirectly involved in healthcare, public health, and medical research who are expected to support biomedical ethics, conduct research ethics reviews, or take on educational roles in their workplaces in the future. Enrollees belong to the Medical Ethics field and receive broad education covering the philosophical foundations, history, and major issues of biomedical ethics, as well as conducting educational workshops, participating in ethics reviews, and practicing ethics consultations.

Contents of Education

Required courses include Research Ethics Practice (intensive research ethics classes including sitting in on multiple research ethics committees), Clinical Ethics Seminars (practical clinical ethics classes incorporating various elements like case studies and ethics consultations), Introduction to Ethics and Bioethics (learning general introductory ethics and the philosophical foundations of bioethics), Introduction to Descriptive Ethics and Empirical Research (learning empirical research methodologies in biomedical ethics and encountering the latest research papers), Introduction to Public Health Ethics, and Medical Ethics II focusing on medical humanities. Concurrently, students learn the basics of public health and social medicine through required and elective courses.

Career Plans after Graduation

- Advancement to the Graduate School of Medicine Doctoral Program (3-year course or Medical Course).
- Employment at research and educational institutions.
- Committee members of clinical ethics committees, research ethics committees, etc.
- Biomedical ethics educators at medical and research institutions.

(6) Disaster Medicine and Health Care Management Course

Program Features

In various disasters, highly specialized medical care is required across all phases, from the acute to the chronic stage. Targeting individuals with licenses or work experience as nurses, pharmacists, or other medical professionals (e.g., medical administrative officers, hospital staff), this program trains human resources who can not only play an active role as team members in effective medical responses but also respond to disasters scientifically from the perspectives of disaster science and medicine. Upon completion, the goal is for students to be able to plan and propose public health research according to their own expertise, focusing on medical and health responses in the chronic phase or phenomena in the disaster recovery phase.

Contents of Education

In addition to required public health courses, students take Disaster Medicine and Health Care Seminar, Disaster Medicine and Health Care Training, and Introduction to Disaster Sciences as required courses, encompassing classroom lectures and practical training covering general disaster medicine.

Career Plans after Graduation

- Career advancement according to the graduate's specialty (nurse, pharmacist, etc.).
- Advancement to the Graduate School of Medicine Doctoral Program (3-year course or Medical Course), or employment at medical institutions to conduct clinical research.

(7) International Course of “Public Health Science for Human Security” (English-taught program)

Program Features

After the Cold War ended in the early 1990s, the concept of "Human Security," which focuses on addressing threats to people's safety such as illness, disasters, poverty, and conflict, gained attention as a key concept for building a new international society, replacing the traditional concept of "national security." Particularly in low- and middle-income countries, including those in Asia, people's lives and dignity are still threatened by preventable diseases and injuries due to poverty, disasters, poor environmental hygiene, and

malnutrition. In addition, infectious diseases and environmental pollution now threaten people's lives and safety across borders. These human security challenges facing the international community in the 21st century are caused by highly complex factors, necessitating new leaders who can promote problem-solving efforts from a comprehensive perspective that transcends traditional disciplinary boundaries. The International Course of "Public Health Science for Human Security" in the Public Health Course Master's Program aims to develop students' ability to understand and resolve the structural factors threatening people's lives and health by integrating the latest knowledge of medical science and international health with humanities and social science methodologies. It aims to nurture professionals and researchers who can contribute to the realization of human security as policy or community leaders in Japan and the international community. Following the framework of the "International Post-Graduate Program in Human Security (IPHS)," students can take common courses offered in English by the Graduate Schools of Agricultural Science, Environmental Studies, and International Cultural Studies. All required courses for this program are taught in English.

Contents of Education

In addition to courses offered jointly by the four collaborating graduate schools, this program offers courses such as Infectious Diseases and Human Security I, Health and Social Resilience to Disasters I, and Human Security and Global Health I. All classes are conducted in English, and the curriculum allows students to earn all required credits solely in English.

Career Plans after Graduation

- Advancement to the Graduate School of Medicine Doctoral Program (3-year course or Medical Course).
- International health and medical administration officials in various countries.
- International health and medical organizations (e.g., WHO) and international NGOs.

V. Introduction to the Doctoral Program (3-year course)

Medical Science Course

Course Features

This course aims to nurture researchers and educators who possess advanced specialized knowledge in general medicine and rich comprehensive knowledge, and who can independently conduct world-class, original research. To achieve this goal, we have organized an educational curriculum to foster personnel who possess high ethical standards and an international perspective, who will lead interdisciplinary research teams to handle the development and social implementation of advanced medical care, and who can serve as next-generation leaders on the front lines of hospitals, research institutes, and companies.

General Program Features

Students can receive research guidance from a highly advanced and multifaceted perspective from faculty members in diverse fields affiliated with the Graduate School of Medicine. The program not only deeply explores specific specialized fields but also cultivates interdisciplinary thinking capable of integrating peripheral areas related to medicine and healthcare. To foster independent research capabilities and international network-building skills, thesis supervision involves multiple faculty members, which is a key feature allowing students to oversee and develop medicine from multifaceted perspectives.

Contents of Education To form a foundation for independent research activities, we have established a systematic curriculum comprising three categories—foundational courses, comprehensive courses, and specialized courses—aimed at acquiring advanced specialized knowledge and fostering an interdisciplinary perspective. We cultivate the ability to develop next-generation medical care, facilitate social implementation, and engage in international discussions, while nurturing human resources with a strong desire to tackle important challenges. Leveraging each individual's unique traits, we have enhanced multifaceted guidance and exchange systems, such as the "Graduate School Retreat," under an advisory system that enables students to actively promote research from diverse perspectives. In addition, research support facilities such as common equipment rooms are provided, allowing research using state-of-the-art equipment beyond laboratory boundaries.

Nursing Course

Course Features

This course aims to nurture researchers and educators who possess advanced specialized knowledge and practical skills in nursing, and who can independently conduct world-class, original research contributing to its development. To achieve this goal, we have organized an educational curriculum to foster leaders who possess high ethical standards and an international perspective, who collaborate with multiple disciplines to build the scientific foundation for nursing practice, and who will lead next-generation nursing research and education. Another major feature is our consideration for the reality that many working adult students study while employed, providing an environment where it is easy to balance work and research.

General Program Features

Comprising diverse fields based on the domains of Advanced Nursing Practice & Health

Development Nursing and Family Nursing, students can receive research guidance from specialized and multifaceted perspectives. Beyond deep specialized exploration targeting nursing, the program cultivates interdisciplinary thinking capable of integrating peripheral areas of medicine and healthcare. To foster independent research capabilities and international network-building skills, we incorporate a multiple-faculty advisory system for thesis supervision, enabling students to advance next-generation nursing in collaboration with multidisciplinary professionals and acquire the ability to solve challenges from a comprehensive viewpoint.

Contents of Education

To form a foundation for independent research activities, we have established a systematic curriculum comprising three categories—foundational courses, comprehensive courses, and specialized courses—aimed at acquiring advanced specialized knowledge and fostering an interdisciplinary perspective. By combining designated common course subjects with unique specialized subjects, students build a world-class research foundation. To nurture a strong desire to challenge critical nursing issues, we have enhanced multifaceted guidance and exchange systems where students can leverage their individuality to actively promote research. Furthermore, research support facilities such as common equipment rooms are provided, allowing cutting-edge research beyond laboratory boundaries.

VI. Introduction to the Doctoral Program (Medical Course)

(1) General Program

The Major of Medical Sciences trains students to take on the challenge of solving critical issues in the medical field. For cutting-edge medical research, it is important not only to acquire highly specialized knowledge and an understanding of world-class research but also to have a strong desire to tackle important challenges that no one else in the world has resolved. To foster medical professionals with multifaceted perspectives while maximizing each individual's traits and talents, we have established an environment where graduate students can actively promote research by enhancing multifaceted guidance systems, such as the "multiple-faculty advisory system" and the "Graduate School Retreat." Furthermore, with research support facilities such as common equipment rooms provided, students can conduct research using state-of-the-art research equipment beyond laboratory boundaries. On the other hand, since many lectures can be audited from outside the university via the online on-demand system Canvas LMS, it is also possible for working professionals to pursue a degree while continuing their employment.

(2) Quantum Biology and Molecular Imaging Educational Program

Molecular imaging examines the behavior of in-vivo biological systems, including genes and

proteins, from the outside while the organism is alive. It involves new boundary and interdisciplinary areas of medicine, pharmaceutical sciences, and engineering. Methods such as Positron Emission Tomography (PET), Magnetic Resonance Imaging (MRI), and Optical imaging are utilized. Molecular imaging allows changes in biological systems, which could previously only be judged statically and qualitatively, to be understood dynamically and quantitatively by visualizing them at the molecular level. It is highly anticipated as a technology that enables the extremely early diagnosis of cancer and dementia such as Alzheimer's disease. Recently, the development and clinical application of molecular therapeutic technologies (theranostics) integrated with molecular imaging diagnostics have also been advancing. To establish molecular imaging as an extremely early diagnostic method, there are various research challenges, such as developing equipment in the engineering field, molecular probes in the pharmaceutical field, and diagnostic modalities in the medical and dental fields. To develop diagnostic technologies utilizing this latest science, the Major of Medical Sciences Doctoral Program "Quantum Biology and Molecular Imaging Educational Program" conducts research and education on molecular bio-imaging—a field lacking human resources—by incorporating an interdisciplinary approach from pharmaceutical sciences, engineering, and dentistry, in addition to advanced medicine such as radiology, nuclear medicine, pharmacology, oncology, and psychiatry. There is also a collaborative program with the Institute for Quantum Medical Science, National Institutes for Quantum Science and Technology (QST) (formerly the National Institute of Radiological Sciences). [Professor Kei Takase, Department of Diagnostic Radiology; Professor Yasuyuki Taki, Department of Clinical Aging Research; Professor Manabu Tashiro, Department of Cyclotron and Radioisotope Center]

(3) Tumor Specialist Training Program

Cancer is the leading cause of death in Japan, and it is estimated that about one in two people will develop cancer in their lifetime, making it a critical issue for the life and health of the public. By establishing the sub-programs listed below, this program aims to nurture: 1. Personnel who can respond to challenges emerging in cancer care settings; 2. Personnel who promote cancer prevention; and 3. Personnel who can develop new treatment methods. In all sub-programs, students take systematic lecture programs covering general and specific topics in clinical oncology necessary for cancer care, and accumulate practical clinical experience over a certain period in specialized treatments within each field through training programs. Furthermore, in addition to writing clinical oncology-related papers for their thesis research, students will deepen their knowledge of the latest cancer care through the Cancer Professional Joint Seminar of the advanced lecture program. Applicants for the

Tumor Specialist Training Program should select one of the following sub-programs:
① Palliative Medicine Specialist Training Program
② Medical Oncologist (Genomic Medicine, Hereditary Tumors) Program
③ Next-Generation Surgical Oncologist Program
④ Gynecologic Oncologist Program
⑤ Radiation Oncologist Program
⑥ Pediatric Oncologist Program
⑦ Regional Pathologist Training Program

(5) Medical AI Course

Japan is facing an accumulation of medical issues that must be overcome, such as a super-aging society, the uneven distribution of medical personnel, and work-style reforms. To confront these, this program sets the goal of "broadly training human resources who can curate abundant medical challenges unique to regions and design solutions up to AI implementation," and promotes a doctoral human resource development program in collaboration with universities, research institutions, private companies, and local governments nationwide. The curriculum begins with lectures on cutting-edge AI research and development, and students will learn methods to optimally utilize those AI insights for real-world tasks in medical settings. By mutually sharing medical AI-related lectures with other universities, the program aims to foster "cutting-edge AI research and development personnel" possessing the ability to solve "Global × Local medical issues." [Professor Gen Tamiya, Department of AI Frontier and Advanced Medical Science] *Please fully understand the research contents of your "desired field, etc." and make sure to contact the Clinical AI Management Office to declare your intention to take the examination before submitting your application. Inquiries:
https://www.shp.hosp.tohoku.ac.jp/Clinical_AI/#cu_sec

(7) Disaster Medicine and Health Care Research Course

In various disasters, highly specialized medical care is required across all phases, from the acute to the chronic stage. Targeting medical doctors, this program aims to train medical researchers who can not only act as team conductors for effective responses in all phases of various disasters but also scientifically understand disaster prevention, disaster medicine, and disaster recovery from multifaceted perspectives, and conduct research focusing on these areas. [Professor Tadashi Ishii, Department of Comprehensive Medicine]