



入学案内2021

Admission Guide 2021

群馬大学 大学院

医学系研究科生命医科学専攻(修士課程)
Course of Biomedical Sciences (Master's Program)

GUNMA UNIVERSITY
Graduate School of Medicine

Skill

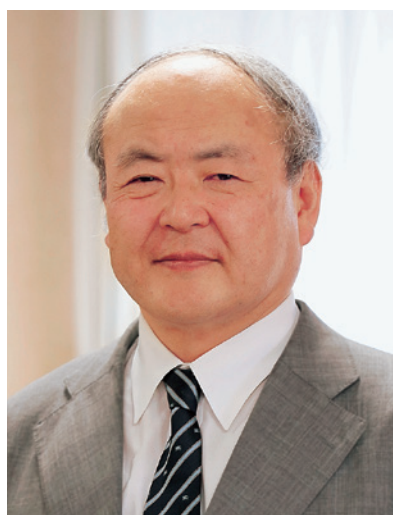
Ethics

Leadership

Biomedical Science

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Dean, Course of
Biomedical Sciences

Yasuki Ishizaki

A Message from the Dean

Course of Biomedical Sciences (Master's Program) was installed in 2007 at Graduate School of Medicine. Due to rapid development of life science, medicine, and information science, a possibility of utilizing the advance in bio-medical fields, in such as a bio-correlative industry, drug design, and advanced medicine, has increased. Therefore, Course of Biomedical Sciences was established in order to grow researcher, educator and high-level medical person, who can exercise leadership in life science, medicine and medical field.

In Course of Biomedical Sciences, the interdisciplinary field of medicine and life science is set as the main object of education and research. Namely, it aims at advancing a life process for analysis from a medical viewpoint, promoting the education and research of the interdisciplinary field in medicine and medical treatment, learning and developing new medicine and medical technology which aimed at improvement of health and the quality of life, raising advanced medical person, etc.

Although the graduates of this Course would be divided into the advanced profession people in each field, such as researcher, educator, medical person, and industrial person, or into those who go on to Course of Medical Sciences (Doctoral Program), playing an active part as a leader in each field will be expected, taking advantage of having learned at Course of Biomedical Sciences.

〈Special Educational Course and Program〉

Medical Physics Course

In Gunma University, heavy-ion cancer therapy was started from 2010 in Heavy-Ion Medical Center uniquely installed in Japan. Medical physicist, who takes charge of the cancer medical treatment using radiation, such as heavy-ion, is very insufficient in Japan. So, Medical Physics Course that aimed at cultivation of medical physicist was installed.



Outline of Biomedical Sciences (Master's Program)

1 Aim of Master's Program for Biomedical Sciences

Recent advances in life sciences and information sciences have opened up abundant prospects for applying the achievements of basic research within bio-related industries and new medical services, including drug discovery and regenerative medicine. At the same time, there is a need to solve many challenges, such as medical ethics and information security that are associated with advanced medical technology, and community healthcare support in our aging society, which are opening up a wide range of potential roles for medical researchers and health professionals. Many doors are being opened to non-medical school graduates and trained researchers, educators, and/or highly skilled workers who can exercise leadership in the life sciences and medical fields. However, there is a looming shortage of researchers/educators able to respond to the needs of society and who can take an active role in Biomedical Sciences, this new interdisciplinary field between life sciences and medicine.

There is also a growing number of non-medicine, non-veterinary, and non-dentistry graduates who are hoping to pursue their interest in life science research or medical fields; however, before these graduates can enter a graduate school of medicine to take a PhD course, they either need to have obtained a Master's Degree or must have more than two years' research experience at a university or research institute. Gunma University Graduate School of Medicine has been shifting its focus of interest to new interdisciplinary fields. For example, in 2003, we re-organized our Medical Sciences Course (Doctoral Program) and our research and educational system into a basic plus clinical integrated style, and established a PhD program in health sciences, now being run by the Graduate School of Health Sciences. The implementation of a day/evening course system for both programs allowed us to offer the course to mature students not from only the medical and health science fields, but also from related fields. However, we were still unable to accept graduates from facilities other than medicine, veterinary, or dentistry directly to our medical sciences course.

In response to increasing demand, and to broaden our intake of graduates from other faculties, we have established a Biomedical Science Course (Master's program) within the Graduate School of Medicine. This program aims to educate non-medical school graduates in the fundamental knowledge and skills needed to engage in the type of independent research that increasingly underpins medical and life sciences, and to foster leadership in medical-related fields on the part of health professional experts.

2 Research conducted in Biomedical Sciences

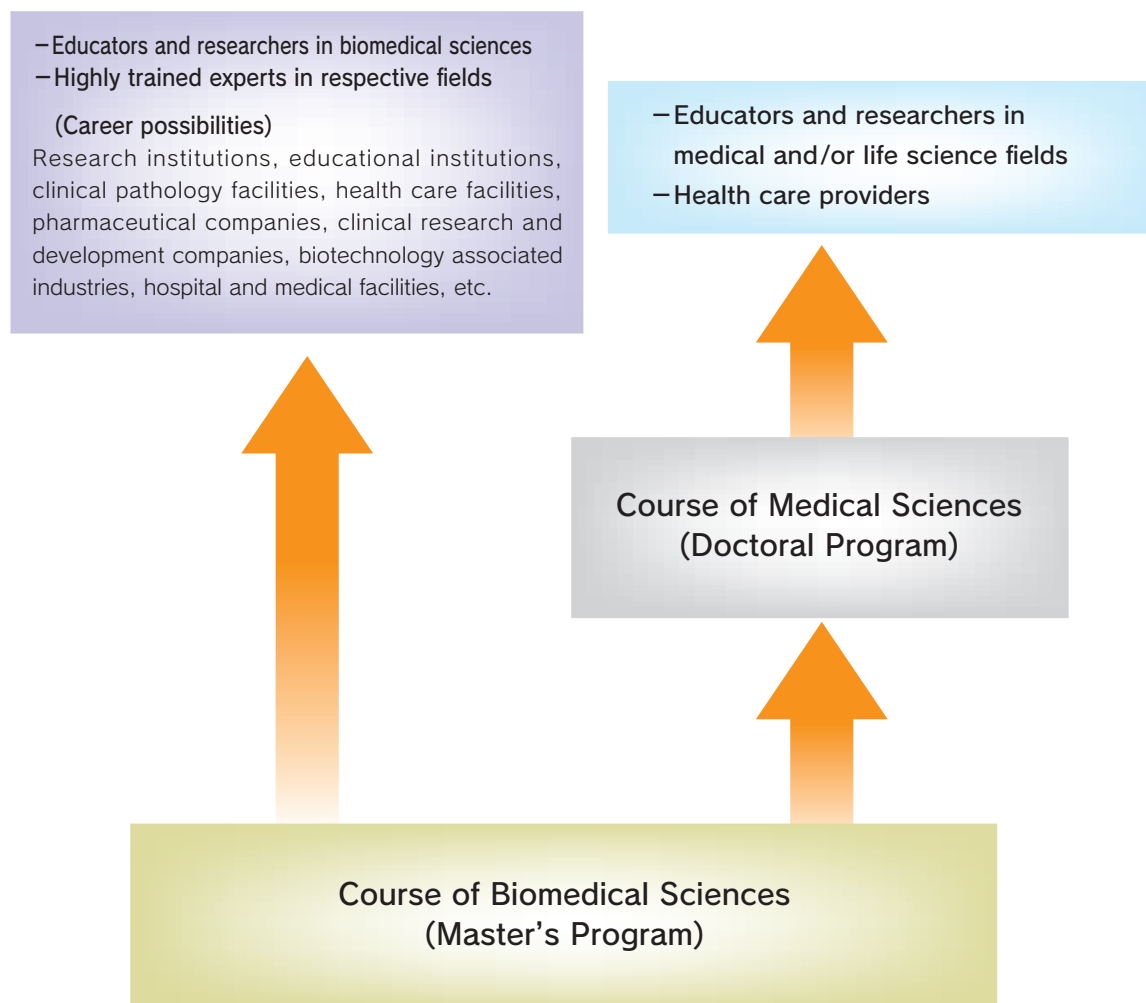
Biomedical Sciences is a general term for the life sciences field, which overlaps medicine, life sciences, and other medical interdisciplinary fields. The Biomedical Sciences Course is designed to draw together life sciences and traditional basic medicine/clinical medicine as educational and research subjects to promote the elucidation of biological processes from a medical perspective and to establish Biomedical Sciences as a discipline that is aimed at the creation of new medical care: not only diagnosis and treatment, but also the promotion of health and improvement of quality of life.

3 Career options after earning Master's Degree

This Master's course will train students in the biomedical sciences. It is hoped they will acquire basic knowledge of medicine, and come to understand the relationship between medicine and life sciences. We hope graduates will become researchers who can propose and conduct original research in biomedical sciences and academic medicine.

Graduates of this Master's Program can expect to become:

1. Educators and/ or researchers in the area of biomedical sciences (eg. life sciences or medical science related fields)
2. Highly trained experts in the fields of medicine, welfare, pharmacology, biology-related industries
3. Those who continue their education in Medical Sciences (Doctoral program) course





Outline of Biomedical Sciences (Master's Program)

4 Curriculum

- 1) Subjects are categorized as Basic Subjects, Practical Subjects, and Research Subjects.
- 2) Basic Subjects are taken in the 1st year. In “required subjects”, basic knowledge on life sciences and medical sciences, and basic techniques necessary in biomedical research will be acquired. In “required elective subjects,” basic biomedical knowledge needed in multiple fields will be acquired (11 credits of required subjects, 4 credits of required elective subjects).
- 3) Practical Subjects are electives selected according to research theme and/ or postgraduate career. Practical and applied knowledge needed for specialization and/ or research in chosen fields will be acquired (4 or more credits of Practical Subjects).
- 4) In Research Subjects, students will conduct biomedical research in their chosen field and compose a master's thesis. They will acquire knowledge and techniques needed to propose and conduct research, and present research findings (13 credits of Research Subjects).

Requirements for degree award

- Acquisition of required credits
- Successful completion of Master's thesis review process and passing final examination

Graduation Requirements

Curriculum									
Subdivision	Subject	An academic year	Credits			Teaching methods			Remarks
			Required subjects	Required Elective subjects	Elective subjects	Lecture	Seminar	Technical Course	
Basic	Research Ethics	1	1			○	○		Take all these required subjects
	Research Ethics(e-learning)	1	1			○	○		
	Introduction to Clinical Sciences	1	2			○			
	Philosophy	1	2			○			
	Basic Scientific Language	1	2			○			
	Statistical Informatics	1	2				○		
	Bio-Scientific Training	1	1					○	Take more than 2 out of 5 subjects for 4 credits or more. ※「Analytical Physiology」 corresponds to "Integrative Physiology" or "Neurophysiology"
	Anatomy	1		2		○			
	Analytical Physiology	1		2		○			
	Biomolecular Chemistry	1		2		○			
	Socio-Environmental Medicine	1		2		○			
	Laboratory Animal Science	1		2			○		
	Subtotal (12 subjects)	—	11	10	0				
Practical	Molecular and cellular biology	2			2	○			Take 2 subjects for 4 credits or more.
	An Introduction to Pathology	2			2	○			
	Bacteriology & Infection Control	2			2	○			
	Neuroscience lecture	2			2	○			
	Reproduction, Regeneration and Development	2			2	○			
	Informational Management	2			2	○			
	International Public Health	2			2	○			
	Ion beam technology for bioengineering	2			2	○			
	Drug Discovery	2			2		○		
	Clinical Trial and Research	2			2		○		
	Exercises in Genomic Medicine	2			2		○		
	Rehabilitation Medicine & Sociology	2			2		○		
	Subtotal (12 subjects)	—	0	0	24				
Research	Biomedical Sciences Methodology	1~2	2				○		Required subjects
	Biomedical Sciences Research	1~2	10				○		
	Research Discussion Seminar	2	1				○		
	Subtotal (3 subjects)	—	13	0	0		—		
Total (27 subjects)		—	24	10	24		—		
Degree	Master (Biomedical Science)								
Required							terms		
Students should 1) obtain credits described above, 2) write a dissertation with mentors' guidance, and 3) pass the thesis defense.							terms per year	two terms	
							school weeks per terms	15 weeks	
							time of one class	60-90 minutes	



Admission Policy

Course of Biomedical Sciences in Graduate School of Medicine, Gunma University (Master's Program)

~The Biomedical Sciences course is looking for the following candidates.~

<Aims in Human Resources Development>

Our program aims to cultivate scientists who will pursue medical science, medical ethics, and medical skills. We hope our graduates will integrate these pursuits and contribute to the progress of medical research and education, and become leaders in health care and medical science.

<Attributes of Desired Candidate>

We will accept students who wish to gain knowledge and skills in biomedical sciences through our program, and become highly-skilled professionals or researchers. Specifically, we will accept those who:

1. strive to gain the ability to perform research independently based on high ethical values and profound academic knowledge.
2. strive to contribute to the society in medical science, health care and welfare filed as highly-skilled professionals by making use of the knowledge and skills they acquired.
3. strive to further develop the knowledge and skills they acquire, and continue to the PhD program to become researchers and/or educators in Biomedical Sciences field.

<Screening Process>

In order to enroll candidates consistent with our admission policy, we will comprehensively evaluate the results of the entrance examination (written test and interview) and undergraduate academic transcripts. We will take the variety in academic backgrounds of applicants into consideration, and allow applicants to select questions from either the biomedical field or the medical physics field for the written examination. We offer October admission in addition to the traditional April admission to increase educational opportunity.

Introduction of Major Field

Basic Medicine



The basic medicine consists of 13 fields.
Research and education of biomedical sciences will be conducted based on basic medicine.

Anatomy
Anatomy and Cell Biology
Molecular and Cellular Neurobiology
Biochemistry
Integrative Physiology
Neurophysiology and Neural Repair
Neurobiology and Behavior
Genetic and Behavioral Neuroscience
Bacteriology
Infectious Diseases and Host Defense
Public Health
Legal Medicine
Medical Philosophy and Ethics

Clinical Medicine



The clinical medicine consists of 35 fields (Including 7 Internal Medicine and 6 General Surgical Science). Research and education of biomedical sciences will be conducted based on clinical medicine.

(Internal Medicine)
Cardiovascular Medicine
Respiratory Medicine
Gastroenterology and Hepatology
Endocrinology and Metabolism
Nephrology and Rheumatology
Hematology
Neurology
(General Surgical Science)
Cardiovascular Surgery
General Thoracic Surgery
Gastroenterological Surgery
Breast and Endocrine Surgery
Hepatobiliary and Pancreatic Surgery
Pediatric Surgery

Radiation Oncology
Diagnostic Radiology and Nuclear Medicine
Psychiatry and Neuroscience
Anesthesiology
Emergency Medicine
General Practice Medicine
Rehabilitation Medicine
Clinical Laboratory Medicine
Human Pathology
Diagnostic Pathology
Pediatrics
Obstetrics and Gynecology
Urology
Neurosurgery
Ophthalmology
Otolaryngology Head and Neck Surgery
Dermatology
Plastic Surgery
Orthopaedic Surgery
Clinical Pharmacology and Therapeutics
Oral and Maxillofacial Surgery
Quality and Safety in Healthcare

Cooperative and joint Department



The cooperative department and joint department consist of 9 fields of Institute for Molecular and Cellular Regulation, 2 clinical division of University Hospital, 2 fields of Heavy Ion Medical Center, 1 field of Center for Food Science and Wellness, 1 field of Center for Mathematics and Data Science and 1 field of Takasaki Advanced Radiation Research Institute, Japan Atomic Energy Agency.

(University Hospital)
Clinical Trials and Regulatory Science
Medical Informatics

(Institute for Molecular and Cellular Regulation)
Molecular Traffic
Molecular Membrane Biology
Molecular Endocrinology and Metabolism
Developmental Biology and Metabolism
Metabolic Signaling
Laboratory of Epigenetics and Metabolism
Molecular Genetics
Genome Sciences
Laboratory of Integrated Signaling Systems

(Heavy Ion Clinical Medicine)
Medical Physics and Biology for Ion Therapy
Heavy Ion Clinical Medicine

(Center for Food Science and Wellness)
Food Science and Wellness

(Center for Mathematics and Data Science)
Mathematics and Data Science

(Takasaki Advanced Radiation Research Institute, National Institute for Quantum and Radiological Sciences and Technology)
Quantum Biology

Note : Inquiries about admission should be made directly to supervisors in desired Major Field of Study (from page 8 on) prior to the actual application process. Major Department can be changed at the end of the 1st semester of the 1st year.



Description of Research Objectives

Basic Medicine

Anatomy

Hirohide Iwasaki

[Keywords] neuronal circuit, connectome, synapse remodeling, development, vesicle transport, imaging technology, light microscopy, electron microscopy

Anatomy and Cell Biology

Toshiyuki Matsuzaki

[Keywords] membrane protein, water channel, transporter, immunofluorescence microscopy, immunoelectron microscopy, molecular biology

Molecular and Cellular Neurobiology

Yasuki Ishizaki (Due to retire in March 2021)

[Keywords] neural stem cells, neuronal precursor cells, glial precursor cells, glial cells, vascular cells, regenerative medicine

Biochemistry

Yoji Andrew Minamishima

[Keywords] Hypoxic response, energy metabolism, DNA damage & repair, cell cycle, cellular senescence, lipid mediators, proteomics, metabolomics, and lipidomics <http://biochemistry.med.gunma-u.ac.jp/en/>

Integrative Physiology

Noriyuki Koibuchi

[Keywords] hormone, development, plasticity, regeneration, environmental factors, endocrine disruption

Neurophysiology and Neural Repair

Hirokazu Hirai

[Keywords] memory; learning; motor control; regenerative medicine; viral vector; neurodegenerative disease; marmoset; non-human primate model; aging; stem cell therapy; gene therapy; patch clamp.

Neurobiology and Behavior

Yasuki Ishizaki (Due to retire in March 2021)

[Keywords] synaptic morphology and function, actin cytoskeleton, imaging techniques, human iPS cells-derived neurons, radiation damage, high-throughput

Genetic and Behavioral Neuroscience

Yuchio Yanagawa (Due to retire in March 2021)

[Keywords] neurotransmitter, GABA, knockout mice, transgenic rats, neuropsychiatric disorders, model mouse

Bacteriology

Haruyoshi Tomita

[Keywords] multi-drug resistant bacteria, VRE, MDRP, enterococcus, bacteriocin, conjugative plasmid, transposon

Infectious Diseases and Host Defense

Wataru Kamitani

[Keywords] Coronavirus, Molecular biology, Reverse genetics of Virus, Host-Pathogen interaction, Malaria, Infectious immunity

Public Health

Hiroshi Koyama (Due to retire in March 2021)

[Keywords] trace element, selenium, cancer prevention, depression screening, and epidemiology, public health ethics

Legal Medicine

Yoshihiko Kominato

[Keywords] legal medicine, personal identification, ABO blood group, enhancer

Medical Philosophy and Ethics

Kenji Hattori

[Keywords] clinical ethics, medical ethics, philosophy of medicine, medical ethics education

Clinical Medicine

Cardiovascular Medicine

Masahiko Kurabayashi

(Due to retire in March 2021)

(Internal Medicine)

[Keywords] vascular biology, atherosclerosis, heart failure, myocardial infarction, transcription factors

Respiratory Medicine

Toshitaka Maeno (Associate Professor)

(Internal Medicine)

[Keywords] lung cancer, allergic respiratory disease, COPD, lung fibrosis, infectious lung disease

Gastroenterology and Hepatology

Toshio Uraoka

(Internal Medicine)

[Keywords] gastrointestinal tumor, endoscopy, esophageal motility disorder, inflammatory bowel disease, hepatocarcinogenesis, non-alcoholic steatohepatitis

Endocrinology and Metabolism

Masanobu Yamada

(Internal Medicine)

[Keywords] lifestyle-related diseases, endocrine-metabolic disorders, diabetes mellitus, respiratory allergy disorders, hepatometabolic-digestive disorders

Nephrology and Rheumatology

Keiju Hiromura

(Internal Medicine)

[Keywords] nephrology, glomerulonephritis, tubulointerstitial injury, rheumatology, lupus nephritis, vasculitic syndrome

Hematology

Hiroshi Handa (Associate Professor)

(Internal Medicine)

[Keywords] hematologic malignancy, genome, epigenome, coagulation disorder, next generation sequencer

Neurology

Yoshio Ikeda

(Internal Medicine)

[Keywords] Alzheimer disease, dementia, amyotrophic lateral sclerosis (ALS), spinocerebellar ataxia (SCA), microsatellite-repeat

Cardiovascular Surgery

Tomonobu Abe

(General Surgical Science)

[Keywords] surgery, heart, brain, ischemia, reperfusion injury, organ protection

General Thoracic Surgery

Ken Shirabe

(General Surgical Science)

[Keywords] surgical oncology, mechanism of proliferation, invasion and metastasis, driver gene, diagnosis and treatment



Description of Research Objectives

Gastroenterological Surgery

Hiroshi Saeki

(General Surgical Science)

[Keywords] carcinogenesis and cancer progression, gastrointestinal motility, novel diagnostic method, development of therapeutic method, surgical education

Breast and Endocrine Surgery

Takaaki Fujii (Associate Professor) (General Surgical Science)

[Keywords] breast cancer, biomarkers, lymph node metastasis, TILs, microRNA, PET

Hepatobiliary and Pancreatic Surgery

Ken Shirabe

(General Surgical Science)

[Keywords] cancer microenvironment, hepato-biliary and pancreatic cancer, sarcopenia, and laparoscopic surgery for hepato-biliary and pancreatic disease

Pediatric Surgery

Makoto Suzuki (Associate Professor)

(General Surgical Science)

[Keywords] surgical oncology, circulating tumor cells, minimally invasive surgery, gastro-intestinal motility, enterobacterial flora

Radiation Oncology

Tatsuya Ohno

[Keywords] radiation therapy, heavy ion therapy, radiation biology, radiation oncology, radiation pathology

Diagnostic Radiology and Nuclear Medicine

Yoshito Tsushima

[Keywords] diagnostic radiology, nuclear medicine, CT, MRI, US, SPECT, PET, interventional radiology

Psychiatry and Neuroscience

Masato Fukuda

[Keywords] psychiatric disorder, neuroimaging, stress, mental illness, brain function

Anesthesiology

Shigeru Saito

[Keywords] anesthesia, neuroimaging, consciousness, pain, brain function

Emergency Medicine

Kiyohiro Oshima

[Keywords] cardiopulmonary arrest, cardiopulmonary resuscitation, severe trauma, reperfusion injury, coagulation

General Practice Medicine

Junichi Tamura

(Due to retire in March 2021)

[Keywords] general medicine, gerontology, primary care, nutrition

Rehabilitation Medicine

Naoki Wada

[Keywords] rehabilitation medicine, disability studies, motion analysis, autonomic nervous system, virtual reality

Clinical Laboratory Medicine

Masami Murakami

[Keywords] clinical laboratory medicine, gene analysis, diabetes mellitus, thyroid disease, atherosclerosis, infectious diseases, sports medicine, lifestyle-related disease

Human Pathology

Hideaki Yokoo

[Keywords] neuropathology, brain tumor, molecular and cytogenetics of tumor, glial cells, translational research

Diagnostic Pathology

Tetsunari Oyama

[Keywords] cancer morphology, multi-step carcinogenesis, oncogene, tumor suppressor gene, protein expression

Pediatrics

Yasuki Ishizaki (Due to retire in March 2021)

[Keywords] chromatin, nuclear organization, epigenetics, transcription, neural cells

Obstetrics and Gynecology

Akira Iwase

[Keywords] Reproductive medicine and biology, Reproductive endocrinology, Gynecologic oncology, Perinatal medicine, Endometriosis, Minimally invasive surgery

Urology

Kazuhiro Suzuki

[Keywords] urological tumor, prostate cancer, androgen dependency, screening

Neurosurgery

Yuhei Yoshimoto

[Keywords] micro-neurosurgery, interventional radiology, endoscopic neurosurgery, intraoperative imaging, intraoperative neurophysiology

Ophthalmology

Hideo Akiyama

[Keywords] optical coherence tomography, iridium complex, phosphorescence, oxygen partial pressure, retinal detachment

Otolaryngology Head and Neck Surgery

Kazuaki Chikamatsu

[Keywords] head and neck cancer, immunosuppression, cancer immunotherapy, tumor microenvironment

Dermatology

Kazuhiro Suzuki

[Keywords] Skin, skin sclerosis, cutaneous malignant tumors, wound healing, hereditary skin diseases

Plastic Surgery

Satoshi Yokoo

[Keywords] reconstruction, free flap, wound healing, breast reconstruction



Description of Research Objectives

Orthopaedic Surgery

Hiroataka Chikuda

[Keywords] osteoarthritis, spondylotic deformans, joint arthroplasty, sports injury, musculo-skeletal tumor

Clinical Pharmacology and Therapeutics

Koujiro Yamamoto

[Keywords] clinical pharmacology, pharmacokinetics, genetic polymorphisms, individualization of drug therapy

Oral and Maxillofacial Surgery

Satoshi Yokoo

[Keywords] oral mucous wound healing, oral and maxillofacial reconstruction, oral cancer, salivary gland, jaw deformity

Healthcare Quality and Safety

Yasuhiro Komatsu

[Keywords] healthcare quality, patient safety, quality indicator, shared decision making, interprofessional collaboration

Cooperative Department
(University Hospital)

Clinical Trials and Regulatory Science

Tetsuya Nakamura

[Keywords] clinical research, study design, statistics

Medical Informatics

Yuichiro Saito (Associate Professor)

[Keywords] medical information, health care, hospital information system

(Institute for Molecular and Cellular Regulation)

Molecular Traffic

Ken Sato

[Keywords] membrane trafficking, secretion, metabolism, development, *C. elegans*, knockout mouse

Molecular Membrane Biology

Miyuki Sato

[Keywords] *C. elegans*, organelle, autophagy, endocytosis, mitochondria, maternal inheritance

Molecular Endocrinology and Metabolism

Tetsuro Izumi

[Keywords] insulin granule exocytosis, membrane trafficking, fat accumulation, immune cell interaction, genetically mutated mouse, live cell imaging

Developmental Biology and Metabolism

Yoshio Fujitani

[Keywords] diabetes, glucose metabolism, developmental biology, pancreatic beta cells, genetically engineered mice, beige adipocyte, zinc biology, zinc transporter

Metabolic Signaling

Tadahiro Kitamura

[Keywords] diabetes, obesity, metabolic syndrome, transcription factor, knockout mouse, insulin, glucagon

Description of Research Objectives

Laboratory of Epigenetics and Metabolism

Takeshi Inagaki

[Keywords] Epigenetics and Metabolism, Obesity, Diabetes, Energy Metabolism, Transcription Factors, Chromatin Conformation, Histone Modifications

Molecular Genetics

Takayuki Yamashita (Due to retire in March 2021)

[Keywords] DNA replication stress, genomic instability, carcinogenesis, heat shock transcription factor 1, cellular senescence

Genome Sciences

Izuho Hatada

[Keywords] epigenetics, epigenome, DNA methylation, microarray, genome-wide analysis

(Heavy Ion Clinical Medicine)

Medical Physics and Biology for Heavy Ion Therapy

Akihisa Takahashi (Medical Biology)
Mutsumi Tashiro (Associate Professor) (Medical Physics)

[Keywords] radiotherapy, heavy ion radiotherapy, medical physics, accelerator, radiation biology, effect of space radiation

Heavy Ion Clinical Medicine

Tatsuya Ohno

[Keywords] heavy ion radiotherapy, multimodality cancer therapy, biological response, high LET, hypofractionation, Image-guided adaptive radiotherapy

(Center for Food Science and Wellness)

Food Science and Wellness

Seiji Torii

[Keywords] cancer, metabolism, endocrine, cell biology, peptide hormones, insulin, reactive oxygen species, ferroptosis

(Center for Mathematics and Data Science)

Mathematics and Data Science

Takayuki Asao

[Keywords] Medical devices, PMDA, Database, Natural language processing, Artificial intelligence, Robotic Process Automation, Python

Joint Department

(Takasaki Advanced Radiation Research Institute, National Institute for Quantum and Radiological Sciences and Technology)

Quantum Biology

Yasuyuki Ishii Yasuhiko Kobayashi Kazuo Funayama

[Keywords] ion beam, microbeam, micro-PIXE, single-ion hit, irradiation of targeted cell, radiomicrosurgery, bystander effect



Location

(Showa Campus)

<i>Graduate School of Medicine Faculty of Medicine</i>	<i>3-39-22, Showa-machi, Maebashi City, Gunma 371-8511</i>	<i>Telephone +81-27-220-7111</i>
<i>University Hospital</i>	<i>3-39-15, Showa-machi, Maebashi City, Gunma 371-8511</i>	

