

List of Major Subjects and Academic Advisors for 2023 Academic Year

*The major subjects and academic advisors may change as needed.

1) Field of Clinical Laboratory Medicine

Department of Clinical Laboratory Medicine

Course Title	Course Aims and Research Subject
Graduate Thesis of Clinical Laboratory Medicine SAITO Kuniaki ICHINO Naohiro TAKEMATSU Hiromu OHASHI Koji ISHIKAWA Hiroaki NARUSE Hiroyuki SUZUKI Koji MOURI Akihiro SUGIMOTO Keiko MATSUSHITA Fumio NAGAO Shizuko YAMAMOTO Naoki OSAKABE Keisuke YAMAMOTO Yasuko FUJIGAKI Hidetsugu SHIOGAMA Kazuya HOSHI Masato MATSUURA Hideaki	<p><i>SAITO Kuniaki</i> To help realize healthy life expectancy and preemptive medicine, we develop biomarkers and diagnostic systems for predicting early disease onset through industry-government-academia collaboration.</p> <ol style="list-style-type: none"> 1. Amino acid metabolism and immune system 2. Analysis of various diseases based on metabolic changes 3. Personalized medicine - drug effect/side effect/prognosis prediction <p><i>ICHINO Naohiro</i> Current ultrasonography has made it possible to measure tissue stiffness. We will provide research for the early detection and diagnosis of diseases by applying this technology. Specifically, research guidance will be provided on the following topics.</p> <ol style="list-style-type: none"> 1. A novel scoring system for non-invasive and differential diagnosis of NAFLD/NASH. 2. Development of biomarkers for pre-arteriosclerosis diagnosis to preemptive medicine. <p><i>TAKEMATSU Hiromu</i> We utilize genetics to understand important biological phenomena in the molecular biological level. Projects includes cellular responses of immune cells such as lymphocytes. Target molecules includes cellular glycans and lipids.</p> <ol style="list-style-type: none"> 1. B cell antigen receptor signaling to control antibody production 2. Endomitosis, a specific cell cycle event to produce giant cells, controlled by glycolipid 3. Development of human-specific condition with xeno-auto-antigen mediated autoimmunity in mice <p><i>OHASHI Koji, ISHIKAWA Hiroaki</i> We aim to elucidate the pathogenic mechanism of metabolic syndrome from the perspective of epigenetics and apply it to clinical examinations. We will also study the effects of functional foods on biometabolic function.</p> <ol style="list-style-type: none"> 1. Epigenetic influences of fructose overdose on the next generation. 2. Analysis DNA methylation in metabolic syndrome. 3. Analysis of HDL miRNA in various disease. <p><i>NARUSE Hiroyuki</i> We aim to elucidate the pathophysiology of various diseases using the clinical data and biomarkers, and apply it to clinical practice.</p> <ol style="list-style-type: none"> 1. Study on the pathophysiology of cardiovascular disease using biomarkers. 2. Study on the pathophysiology of acute kidney injury using biomarkers. <p><i>SUZUKI Koji</i> Through molecular epidemiological study using high-performance liquid chromatography and molecular biology techniques, we will contribute to elucidating the mechanism of lifestyle related diseases and aim to establish disease prevention from a new perspective.</p> <ol style="list-style-type: none"> 1. Molecular epidemiological study on prevention of lifestyle-related diseases 2. Large-scale cohort study for evaluation of cancer risk

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<p data-bbox="148 232 384 338">Graduate Thesis of Clinical Laboratory Medicine</p> <p data-bbox="129 387 400 1070">SAITO Kuniaki ICHINO Naohiro TAKEMATSU Hiromu OHASHI Koji ISHIKAWA Hiroaki NARUSE Hiroyuki SUZUKI Koji MOURI Akihiro SUGIMOTO Keiko MATSUSHITA Fumio NAGAO Shizuko YAMAMOTO Naoki OSAKABE Keisuke YAMAMOTO Yasuko FUJIGAKI Hidetsugu SHIOGAMA Kazuya HOSHI Masato MATSUURA Hideaki</p>	<p data-bbox="424 192 603 221"><i>MOURI Akihiro</i></p> <p data-bbox="448 230 1437 450">Neuropsychiatric disorders such as Alzheimer's disease, Parkinson's disease, depression, schizophrenia, and autism are the targets of research and investigated using patients' blood and other clinical samples. We translate epidemiological and genetic findings in humans to mice and create mouse models of neuropsychiatric disorders to explore pathophysiology and pathogenesis using behavioral, pharmacological and neurochemical techniques. Based on these studies, we try to develop new therapeutics, functional foods, and diagnostic biomarkers and conduct translational research to contribute healthy society and development of medicine.</p> <ol data-bbox="448 456 1410 640" style="list-style-type: none"> 1. Elucidating the pathophysiology of neuropsychiatric disorders using clinical samples and animal models 2. Developing pharmaceuticals and functional foods by basic research using animal models of neuropsychiatric diseases 3. Searching for biomarkers and developing diagnostic drugs for neuropsychiatric diseases <p data-bbox="424 687 635 716"><i>SUGIMOTO Keiko</i></p> <p data-bbox="448 725 1433 833">Recently, the importance of echocardiographic data is increasing with the increase of heart failure patients and advances in the treatment of cardiac disease. In this laboratory, we will examine the clinical usefulness of analytical methods and indices using echocardiography.</p> <ol data-bbox="448 840 1386 947" style="list-style-type: none"> 1. Search of cardiac function index for predicting prognosis by echocardiography 2. Analysis of electromechanical changes of heart due to emotional and physical stress using ECG <p data-bbox="424 994 671 1023"><i>MATSUSHITA Fumio</i></p> <p data-bbox="448 1032 1410 1095">We study mechanisms of neuronal differentiation, and methods to produce easily and certainly specific subtype of neuron, which are applicable to regenerative medicine.</p> <ol data-bbox="448 1102 1302 1164" style="list-style-type: none"> 1. Molecular mechanisms of neuronal differentiation and neural network formation. 2. Direct reprogramming methods of fibroblasts into specific subtype of neuron. <p data-bbox="424 1205 611 1234"><i>NAGAO Shizuko</i></p> <p data-bbox="448 1243 1437 1388">We aim to elucidate cell signaling pathways in the diseases including genetic disorders and lifestyle-related disorders obtained from genome editing animals, transgenic animals, spontaneous disease models, primary cells, cell lines or iPS cells. We also aim to apply clinical applications by activating or suppressing the obtained abnormal cell signaling pathways.</p> <ol data-bbox="448 1395 1430 1579" style="list-style-type: none"> 1. Study on cell signaling pathways related to diseases using genome editing animals, transgenic animals and/or animal models of spontaneous disease 2. Study on cell signaling pathways related to diseases using primary cells, cell lines or iPS cells 3. Research on the development of new therapeutic agents linked to treatment of diseases using clinical laboratory, molecular genetics, pharmacological analysis and omics comprehensive analysis <p data-bbox="424 1619 651 1648"><i>YAMAMOTO Naoki</i></p> <p data-bbox="448 1657 1386 1809">Students will acquire knowledge and skills as cell culture professionals useful in clinical and medical research such as regenerative medicine through the creation of new cell lines of iPS cells, tissue stem cells and genetically modified immortalized cells for use in regenerative medicine and drug discovery research, as well as the creation of new cancer cell lines and isolation research of cancer stem cells for use in cancer research.</p> <ol data-bbox="448 1816 1430 2031" style="list-style-type: none"> 1. Basic research on regenerative medicine using iPS cells. 2. Research on the generation and validation of new genetically modified immortalized cells and iPS cells. 3. Research on the establishment of tissue stem cells and cancer stem cell lines. 4. Qualification as a cell culture technologist or clinical cell culture technologist, exercises at a cell culture processing facility.

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<p data-bbox="153 232 387 338">Graduate Thesis of Clinical Laboratory Medicine</p> <p data-bbox="185 387 355 416">SAITO Kuniaki</p> <p data-bbox="177 427 363 456">ICHINO Naohiro</p> <p data-bbox="145 468 395 497">TAKEMATSU Hiromu</p> <p data-bbox="204 508 352 537">OHASHI Koji</p> <p data-bbox="164 548 379 577">ISHIKAWA Hiroaki</p> <p data-bbox="164 589 379 618">NARUSE Hiroyuki</p> <p data-bbox="193 629 351 658">SUZUKI Koji</p> <p data-bbox="180 669 363 698">MOURI Akihiro</p> <p data-bbox="164 710 379 739">SUGIMOTO Keiko</p> <p data-bbox="148 750 395 779">MATSUSHITA Fumio</p> <p data-bbox="172 790 371 819">NAGAO Shizuko</p> <p data-bbox="156 831 387 860">YAMAMOTO Naoki</p> <p data-bbox="161 871 383 900">OSAKABE Keisuke</p> <p data-bbox="137 911 406 940">YAMAMOTO Yasuko</p> <p data-bbox="137 952 406 981">FUJIGAKI Hidetsugu</p> <p data-bbox="156 992 387 1021">SHIOGAMA Kazuya</p> <p data-bbox="196 1032 347 1061">HOSHI Masato</p> <p data-bbox="164 1072 395 1102">MATSUURA Hideaki</p>	<p data-bbox="424 197 639 226"><i>OSAKABE Keisuke</i></p> <p data-bbox="448 237 1441 327">Using ultrasonography, which can be performed noninvasively, we will study the usefulness of liver stiffness measurements and ultrasonic attenuation coefficients in the pathological stage diagnosis of chronic liver disease and in the evaluation of treatment efficacy.</p> <ol data-bbox="448 338 1406 439" style="list-style-type: none"> 1. Non-invasive evaluation of liver fibrosis in chronic hepatitis B 2. Study on evaluation of liver fibrosis in follow-up of chronic liver disease 3. Study on evaluation method of liver fibrosis and steatosis in nonalcoholic fatty liver disease <p data-bbox="424 477 659 506"><i>YAMAMOTO Yasuko</i></p> <p data-bbox="448 517 1422 607">To realize preemptive medicine, we develop biomarkers and diagnostic systems to predict early disease onset using healthy volunteer database samples, including samples with the risk of lifestyle-related diseases.</p> <ol data-bbox="448 618 1342 730" style="list-style-type: none"> 1. Analysis of biofunctional molecules by molecular biological techniques 2. Proteomic analysis in several diseases related to metabolic changes 3. Behavioral analysis using animal models – focus on metabolic changes of tryptophan metabolism <p data-bbox="424 768 667 797"><i>FUJIGAKI Hidetsugu</i></p> <p data-bbox="448 808 1414 931">To develop companion diagnostics by predicting drug efficacy and side effects, we develop diagnostic agents targeting metabolism of amino acids and drugs. We also try to develop novel therapeutics for several diseases such as psychiatric disorders and cancer using metabolic enzyme inhibitors.</p> <ol data-bbox="448 943 1374 1066" style="list-style-type: none"> 1. Development of therapeutic drugs and functional foods targeting enzymes in tryptophan metabolism 2. Development of biomarkers and diagnostic drugs by metabolomic analysis using mass spectrometry <p data-bbox="424 1104 659 1133"><i>SHIOGAMA Kazuya</i></p> <p data-bbox="448 1144 1441 1200">The main focus in clinical research using pathological specimens of various diseases, and aims to clarify the pathology of that disease through comprehensive analysis using imaging techniques.</p> <ol data-bbox="448 1211 1441 1424" style="list-style-type: none"> 1. The rule of neutrophil extracellular traps (NETs) in inflammatory diseases 2. The role of neutrophil included NETs in the cancer microenvironment and its significance 3. Immunohistochemical study of the concept of new cell death called PANoptosis in pathological specimens. 4. Molecular pathological study of bacterial vaginosis and various bacteria in cytology specimens 5. Technological development of available for pathological diagnosis <p data-bbox="424 1462 595 1491"><i>HOSHI Masato</i></p> <p data-bbox="448 1503 1441 1648">We aim to elucidate the role of tryptophan and glucose metabolism in immune cells, and establish novel immunotherapies for inflammatory diseases, mainly tumors, with a view to clinical application. We also aim to establish biomarkers for the early diagnosis and prognosis of chronic kidney disease, a national disease.</p> <ol data-bbox="448 1659 1126 1760" style="list-style-type: none"> 1. The role of tryptophan and glucose metabolism in immune cells 2. Establishment of novel biomarkers in chronic kidney disease 3. The effects of rare sugars in various inflammatory diseases <p data-bbox="424 1798 663 1827"><i>MATSUURA Hideaki</i></p> <p data-bbox="448 1839 1441 1962">We aim to elucidate the mechanisms of antibody production, which is clinically important in blood transfusion and transplantation medicine, and to establish methods to regulate it. In addition, we will conduct research on blood transfusion and transplantation-related tests performed in clinical practice to standardize and improve the quality of these tests.</p> <ol data-bbox="448 1973 1246 2074" style="list-style-type: none"> 1. Mechanism of production of anti-erythrocyte antibodies 2. Development of new compatibility tests (blood transfusion, transplantation) 3. Investigate on HLA and disease sensitivities.

Department of Genetic Counseling

Course Title	Course Aims and Research Subject
<p>Graduate Thesis of Genetics</p> <p>OHYE Tamae</p>	<p>Create a master's thesis by researching specific themes related to genetic counseling, and reviewing the literature or gaining deep insight into the problems associated with the cases in which you were present. Through master's research, cultivate the qualifications involved in a certified genetic counselor with thinking and insight.</p> <p><i>OHYE Tamae</i></p> <ol style="list-style-type: none"> 1. Study on support for patients with hereditary diseases and their families 2. Study on medical care and social support systems related to hereditary diseases 3. Study on coping with secondary findings found by accident by comprehensive inspection method

Department of Assisted reproductive medicine

Course Title	Course Aims and Research Subject
<p>Graduate Thesis of Assisted Reproductive Medicine</p> <p>NISHIO Eiji</p>	<p>Our training course instructs assisted reproductive technology with murine gamete, fertilized egg and embryo using required culture media in incubating instruments. As the next step, clinical training will be performed using human gamete, fertilized egg and embryo, at clinical practice facilities of in-vitro fertilization and embryo transfer registered by the Japan Society of Obstetrics and Gynecology (Training mainly in Fujita Health University Hospital and/or other collaborating fertility clinics). Further, attendees will get higher ethical standards and dignity for assisted reproductive technology in experiencing the duties of clinical embryologist, with intense interest in this field.</p> <p><i>NISHIO Eiji</i></p> <ol style="list-style-type: none"> 1. Research on the improvement of assisted reproductive technology through a basic approach. 2. Acquisition of essential knowledge and skills for assisted reproductive technology. 3. Obtain eligibility requirements for clinical embryologist qualifying examination. 4. Present case reports in a treatise format.

2) Field of Nursing

Department of Adult and Gerontological Nursing

Course Title	Course Aims and Research Subject
Graduate Thesis of Self-Care Nursing SUGAMA Junko NAKAMURA Sayuri	<p>Graduate students write a master's thesis on nursing care for adults, elderly patients, and families with chronic health problems by integrating with nursing practice.</p> <p>They will explore various problems related to health promotion and self-care of chronic disabilities by utilizing the theories and nursing models learned in the seminar and exercises.</p> <p>And they clarify their research topics related to nursing care for adults and the elderly, conduct nursing research, and prepare a master's thesis.</p> <p>SUGAMA Junko</p> <ol style="list-style-type: none"> 1. Study on health issue that arise in older adults with reduced self-care ability due to aging and disease 2. Study on a care model using technology to support older adults who continue to live in their own community <p>NAKAMURA Sayuri</p> <ol style="list-style-type: none"> 1. Study on support for diabetic patients in adulthood 2. Study on prevention of lifestyle-related diseases 3. Study on the development of communication skills 4. Study on interprofessional collaboration in health care

Department of Mental Health and Community Health Nursing

Course Title	Course Aims and Research Subject
Graduate Thesis of Mental Health and Community Health Nursing SEKO Rumi MIYAMOTO Miho	<p>Students clarify research topics related to mental health and community health nursing, plan and implement research, and create a master's thesis. Through this process, Students will acquire basic abilities for the development of mental health and community health nursing practices.</p> <p>SEKO Rumi</p> <ol style="list-style-type: none"> 1. Annual changes in healthy life expectancy and evaluation of regional distribution 2. Forecast of average independence period based on long-term care insurance 3. Smoking status of women and their families based on anonymous data from the Basic Survey on National Life <p>MIYAMOTO Miho</p> <ol style="list-style-type: none"> 1. Study on support to older adults and family members in the community 2. Study on care prevention for older adults in the community 3. Study on public health nurses working at community general support centers

Department of Maternal and Pediatric Nursing

Course Title	Course Aims and Research Subject
Graduate Thesis of Maternal Nursing FUJIWARA Iku TASAKI Ayumi	<p>Maternal Nursing clarifies research subjects related to nursing of subjects from puberty to menopause and their families. Proactively and systematically work on research themes and prepare a master's thesis. In the process, develop the basic ability to contribute to the development of maternal nursing.</p> <p>In Child Health Nursing, students will clarify a research theme regarding the nursing care of children and families at all levels of health, engage in independent research, and create a master thesis. In the process, students will explore nursing care for children's growth and development and independence, nursing care that protects the best interests of children, and nursing care for families that support children, and develop the basic skills to create and change quality child health care nursing.</p> <p>FUJIWARA Iku</p> <ol style="list-style-type: none"> 1. Study on parental readiness and childcare in adolescence 2. Study on menstruation in adolescence 3. Research on recovery of body shape after childbirth <p>TASAKI Ayumi</p> <ol style="list-style-type: none"> 1. Research on supporting children with chronic diseases to acquire self-care 2. Research on nursing for children and families with all diseases 3. Research on nursing support and coordination for children and families who need renal replacement therapy in childhood 4. Research on supporting the transition of children with chronic diseases

Department of Basic and Integrated Nursing

Course Title	Course Aims and Research Subject
Graduate Thesis of Basic and Integrated Nursing MURAYAMA Ryoko TAKEHARA Kimie DAI Misako MINAGAWA Atsuko	<p>Students work on research projects related to nursing education, nursing administration, nursing science and engineering, and social implementation nursing, conduct research independently and systematically, and prepare a master's thesis. In the process, students develop basic skills to contribute to the development of their respective fields of specialization.</p> <p>The major research topics are as follows:</p> <p>MURAYAMA Ryoko</p> <ol style="list-style-type: none"> 1. Research on the development of nursing technology based on nursing science and engineering, and social implementation of the developed technology 2. Research on the development and dissemination of ultrasound visualization technology as the sixth physical assessment tool <p>TAKEHARA Kimie</p> <ol style="list-style-type: none"> 1. Research on the development and social implementation of advanced skin care for diabetic foot ulcer prevention, insulin balls, etc. using nursing science and engineering methods 2. Research on a series or part of the process from the creation of new nursing care by the seeds of clinical research to its widespread application for clinical field 3. Research on the study of a seamless educational environment between basic nursing education and clinical practice 4. Research on the working environment and education of nurses, and patient education <p>DAI Misako</p> <ol style="list-style-type: none"> 1. Research on the development of assessment and nursing technologies and social implementation for patients with lymphedema or chronic edema 2. Research on the development and social implementation of a distance learning system for lymphedema or chronic edema management <p>MINAGAWA Atsuko</p> <ol style="list-style-type: none"> 1. Research on educational methods to promote understanding of technical terms 2. Research on educational methods using simulated patients

Department of Acute phase and Perioperative Period

Course Title	Course Aims and Research Subject
Graduate Thesis of Acute and Perioperative Period HAYASHI Mutsuharu UENISHI Norimichi, ITOU Masahiro FUNABIKI Tomohiro	<p>From the perspective of a team approach in medical care, we study the problems regarding perioperative care, emergency care, disaster medical care, highly advanced medical treatment (robot surgery, transplant medical care, minimally invasive surgery, auxiliary artificial heart treatment, etc.), medical care security, medical care economy, training, and, based on knowledge, the technique that each obtained in seminar, practice, training, and making announcements. In addition, we learn about how diagnoses (including the symptom), treatment, nursing, and other factors affect a study widely.</p> <p>During late term in the first grade, we learn pharmacodynamics, the clinicopathology associated with the study, and a class associated with the clinical diagnosis.</p> <p>Through group work and group discussion, develop the ability to find solutions to problems.</p>

Department of Transplant Coordination

Course Title	Course Aims and Research Subject
Graduate Thesis of Recipient Coordination ASAI Tomoko	<p>This course deals with clarification of research issues related to transplant coordination and paper writing from a clinically based perspective. Students will achieve basic skills and ability as a transplant coordinator to develop concepts and theories through this process and clinical training.</p> <p>ASAI Tomoko</p> <ol style="list-style-type: none"> 1. Research on decision-making support for patient and family choosing organ transplant 2. Research on coordination at every stage of organ transplant 3. Research on nursing interventions for self-care, adherence, patient education, and more 4. Research on nursing interventions for living-donor transplant recipient 5. Research on organ transplant such as allocation system or perception of medical professionals
Graduate Thesis of Donor Coordination ASAI Tomoko	<p>This course deals with clarification of research issues related to transplant coordination and paper writing from a clinically based perspective. Students will achieve basic skills and ability as a transplant coordinator to develop concepts and theories through this process and clinical training.</p> <p>ASAI Tomoko</p> <ol style="list-style-type: none"> 1. Research on coordination of deceased organ/tissue donation 2. Research on deceased donor family care 3. Research on donation and allocation system 4. Research on in-hospital organ/tissue donation system 5. Research on organ transplant such as perception of medical professionals

Department of Medical Radiation Sciences

Course Title	Course Aims and Research Subject
<p>Graduate Thesis of Medical Radiation Sciences</p> <p>KOBAYASHI Shigeki TERAMOTO Atsushi MINAMI Kazuyuki TAKATSU Yasuo SHIRAKAWA Seiji UMEZAWA Eizou SHIIBA Takuro MUTO Koichi KOBAYASHI Masanao HATTORI Hidekazu TATEYAMA Tomoko MIZUTANI Kenmei YOKOYAMA Sumi</p>	<p><i>KOBAYASHI Shigeki</i> To promote research that contributes to the creation of next-generation medical care forms.</p> <ol style="list-style-type: none"> 1. Study on the development of next-generation mammography using energy-resolved photon-counting X-ray detector 2. Study on improvement of medical efficiency using artificial intelligence for next-generation hospital forms. <p><i>TERAMOTO Atsushi</i> In my research course, the following studies on medical applications of artificial intelligence and deep learning will be conducted.</p> <ol style="list-style-type: none"> 1. Study on automated detection, quantitative analysis, classification, and prediction of lesions in various medical data using artificial intelligence and deep learning 2. Study on image quality improvement and correction of medical images using artificial intelligence and deep learning <p><i>MINAMI Kazuyuki</i> In this laboratory, we will conduct research on measurement and simulation of exposure dose in the field of nuclear medicine.</p> <ol style="list-style-type: none"> 1. Study on radiation exposure evaluation method in nuclear medicine 2. Study on radiation protection measures in the field of nuclear medicine 3. Study on radiation exposure simulation <p><i>TAKATSU Yasuo</i> To study the involvement of biological systems using magnetic resonance imaging. Considering imaging techniques and their clinical applications, the aim is to provide information from the analysis and evaluation of images.</p> <ol style="list-style-type: none"> 1. Analysis of clinical images using Magnetic Resonance Imaging. 2. Investigation of imaging methods and clinical evaluation in Magnetic Resonance Imaging <p><i>SHIRAKAWA Seiji</i> Through Monte Carlo simulation, this course will understand the physical processes related to nuclear medicine images, and will study image reconstruction and various compensation methods.</p> <ol style="list-style-type: none"> 1. Monte Carlo simulation-based SPECT reconstruction 2. Study on image processing using deep learning <p><i>UMEZAWA Eizou</i> Water molecules in living systems move around randomly in diffusion motion. Diffusion MRI uses its statistical properties to obtain information about tissue microstructure and function. We use physics, mathematics, and mathematical data science to study diffusion MRI.</p> <ol style="list-style-type: none"> 1. Study on diffusion MRI 2. Study on mathematical and physical foundation of MRI, and new imaging and analysis methods of MRI based on it.

Course Title	Course Aims and Research Subject
Graduate Thesis of Medical Radiation Sciences KOBAYASHI Shigeki TERAMOTO Atsushi MINAMI Kazuyuki TAKATSU Yasuo SHIRAKAWA Seiji UMEZAWA Eizou SHIIBA Takuro MUTO Koichi KOBAYASHI Masanao HATTORI Hidekazu TATEYAMA Tomoko MIZUTANI Kenmei YOKOYAMA Sumi	<p>SHIIBA Takuro To develop the ability to respond flexibly to a wide range of issues, understand the characteristics of molecular imaging, such as MRI and nuclear medicine, the acquisition of image processing, machine learning and Monte Carlo simulation techniques. 1. Analysis of medical imaging for neurodegenerative diseases 2. Study on evaluation of SPECT quantitative techniques. 3. Study on dose evaluation using Monte Carlo simulation for nuclear medicine therapy</p> <p>MUTO Koichi The research will focus on the application of medical informatics to radiology, from the development of information systems for radiology departments to the standardization of information related to the field of radiology, such as DICOM. Furthermore, the management and processing of the radiological big data will be studied. 1. Standardization of medical information and its application 2. Utilization of open source software in medical information system development 3. Data management and processing required for medical big data</p> <p>KOBAYASHI Masanao 1. Study on improvement of dosimetry and evaluation method in X-ray diagnosis 2. Study on development of dose evaluation method using Monte Carlo simulation 3. Research on international trends and evaluation of medical radiation systems 4. Study on development of digital teaching materials using virtual reality</p> <p>HATTORI Hidekazu To promote research that conducted in the field of radiology, which effectively utilizes artificial intelligence for informatics. 1. Study on automatic lesion detection in simple chest radiographs using Deep-Learning 2. Study on safety assurance when using contrast media</p> <p>TATEYAMA Tomoko While CAD provides valuable information for diagnosis and clinical treatment, it is daily collecting medical images, biopsy information, and many other types of data of various types and properties, too. The effective establishment, storage, processing, and representation of the data will have a significant contribution to the enhancement of AI and CAD applications and their accuracy in the future.. 1. Data visualization and analysis in clinical scenes, and database publication (Fundamental research) 2. Medical Data fusion and Analysis of multimodality based on Artificial Intelligence (Fundamental research) 3. Assessment and Stage Estimation of Disease using 3D Morphological Changes of Organs based on AI (CAD) 4. Gesture Analysis and Database Publication for Support Clinical Operations (Support for diagnostic, surgical and therapeutic)</p> <p>MIZUTANI Kenmei Research on paralysis recovery and molecular mechanisms in the brain related to stroke rehabilitation and development of combined drug and rehabilitation therapy 1. Analysis of plasticity changes in the brain using MRI 2. Identification of functional molecules by proteome analysis and elucidation of molecular mechanisms of paralysis recovery 3. Research on the development of combined rehabilitation and drug therapy</p> <p>YOKOYAMA Sumi When using ionization radiation, it is necessary to always consider radiation safety and protection. In order to contribute to radiation safety regulations and safety management, we research on radiation protection not only for patients but also for workers and the general public, and environmental safety. 1. Study on radiation protection and dosimetry 2. Study on measurement methods for environmental radiation and radio-active materials 3. Analysis and research on radiation risk communication</p>

Course Title	Course Aims and Research Subject
<p>Graduate Thesis of Medical Physics</p> <p>ASADA Yasuki HAYASHI Naoki MATSUBARA Hiroaki KUNITOMO Hiroshi YASUI Keisuke HIRANO Harutoyo</p>	<p>Medical physics is application of physics to medicine and healthcare; using physics for patient imaging, management and treatment. In this course, students understand the significance of learning medical physics (especially, health physics and therapeutic radiological physics), and carry out individual theme study regarding development of the new technique or knowledge. Finally, students write thesis for master degree including the outcome in master course term.</p> <p>ASADA Yasuki</p> <ol style="list-style-type: none"> 1. Analysis of patient exposure by general radiography and mammography 2. Study on measurement of X-ray quality and output 3. Development of software for estimation of patient exposure in diagnostic X-ray domain <p>HAYASHI Naoki</p> <ol style="list-style-type: none"> 1. Study on standard dosimetry for therapeutic radiation. 2. Study on safer radiotherapy procedure and its assessment with FMEA. 3. Study on improvement of accuracy and precision in radiotherapy. 4. Study on development of surface image guidance system <p>MATSUBARA Hiroaki</p> <ol style="list-style-type: none"> 1. Study of malfunctions in cardiac implantable electronic devices caused by diagnostic and therapeutic radiation 2. Medical physics particularly based on nuclear physics <p>KUNITOMO Hiroshi</p> <p>My laboratory focuses on</p> <ol style="list-style-type: none"> 1) image quality metrics for digital radiography 2) procedural optimization of dose metrics based on image quality 3) image quality metrics for mammography and tomosynthesis 4) image quality metrics for fluoroscopy <p>YASUI Keisuke</p> <ol style="list-style-type: none"> 1. Study on proton dosimetry using Monte Carlo simulation 2. Development of dosimetry devices using 3D printers 3. Evaluation of dose rate dependence of cell survival rate 4. Verification of new technologies related to treatment planning systems. <p>HIRANO Harutoyo</p> <ol style="list-style-type: none"> 1. A study on the effects of low-dose radiation for vascular function 2. A study on early arterial stiffness estimation using machine learning 3. Measurement of autonomic nerve response to stimulation based on Arterial Mechanical impedance

4) Field of Rehabilitation

Department of Life Activities Sciences

Course Title	Course Aims and Research Subject
Graduate Thesis of Life Activities Sciences TERANIASHI Toshio SUZUKI Megumi OHTSUKA Kei	<p>Clinically oriented research on physical therapy and occupational therapy for activity disorders will be conducted regardless of whether it is basic or clinical research.</p> <p>In other words, physical and occupational therapy will be examined from the neurophysiological and neuropsychological aspects of conventional treatment methods based on kinesiology, neuropsychology, electrophysiology, prosthetics and orthotics.</p> <p>In addition to physical and psychological factors, people should be understood together with the environmental factors surrounding them, and it is important that a comprehensive approach be taken to their activities.</p> <p>In the field of life activities sciences, we will develop biometrics, treatment techniques, orthotics, and welfare support devices, and will discuss and decide on themes that can widely contribute to clinical medicine for future generations.</p> <p>While discussing with their supervisors as needed, students advance their research and present their findings at conferences and in academic papers, and write their master's thesis.</p> <p><i>TERANISHI Toshio</i></p> <ol style="list-style-type: none"> 1. Study on therapeutic intervention and consequences of physical therapy. 2. Development of fall risk assessment tools and management method in hospital. 3. Development of clinical-oriented motion analysis method. 4. Study on treadmill gait analysis and motion analysis. 5. Development of walking practice method. 6. Study on orthosis treatment for paralytic disease. <p><i>SUZUKI Megumi</i></p> <ol style="list-style-type: none"> 1. Research about subjective and objective QOL of persons with cognitive dysfunction 2. Research about the evaluation and training of persons with cognitive dysfunction or dementia patients 3. Research about social participation of persons with cognitive dysfunction <p><i>OHTSUKA Kei</i></p> <ol style="list-style-type: none"> 1. Development of clinical-oriented gait analysis system. 2. Studies on the gait analysis in stroke patients with hemiparesis. 3. Development of the balance evaluation methods in stroke patients with hemiparesis. 4. Studies on the gait analysis in patients with hip osteoarthritis. 5. Quantitative analysis of knowledge of results in walking.

Department of Dysphasia Therapeutics

Course Title	Course Aims and Research Subject
<p>Graduate Thesis of Dysphasia Therapeutics</p> <p>INAMOTO Yoko ONOGI Keiko</p>	<p>In this course, to determine the theme of thesis, current findings and consensus in swallowing function and dysphagia rehabilitation will be discussed based on the classes of dysphagia therapeutics and graduate seminar of dysphagia therapeutic. The themes range from basic research (anatomy, physiology, kinetic analysis, etc.) to clinical research (training effects, outcome evaluation, etc.). Students will plan and conduct research while carefully reading and discussing research papers on the selected theme up to that point. The results obtained will be summarized, analyzed, interpreted, and compiled into a master's thesis. Through this process, emphasis is placed on cultivating the ability to carry out research. The master's thesis will then be submitted to a major research journal.</p> <p><i>INAMOTO Yoko</i></p> <ol style="list-style-type: none"> 1. Kinematic analysis of swallowing maneuvers 2. Analysis of the effect of tongue muscle strengthening on the swallowing kinematics 3. Development of exercise for strengthening pharyngeal contraction during swallowing 4. Kinematic analysis of hyolaryngeal movement during swallowing <p><i>ONOGI Keiko</i></p> <ol style="list-style-type: none"> 1. Development of severity scale for oral phase of swallowing 2. Investigation of swallowing outcome by dysphagia rehabilitation 3. Invention of severity scale for VFSS and FEES

Course Title	Course Aims and Research Subject
<p>Graduate Thesis of Rehabilitation Functional Morphology</p> <p>YAMADA Kouji NISHII Kazuhiro</p>	<p>Explain the functional analysis not to remain in form and structure observation about problems, determination of prognosis occurring in a treatment process undergoing rehabilitation in a clinic based on bones, ligament, tendon, the articular knowledge and theory that macroscopic, are histologic including muscle.</p> <p>It is macroscopic as a method of analysis and wears a histological observation method and, using immunohistochemistry, biochemical and molecular analytical technique, makes clear that it is in the form of tissue, cells of the locomotor system about a function. Also, we perform it in the neurologic analysis similarly. In addition, we explain neuropsychological methods to understand motor control.</p> <p>We clarify a research theme of each person and give an explanation that we make the substantial master's thesis that demonstrated the supposition about the tissue of various locomotor systems, many problems about cells.</p> <p>YAMADA Kouji</p> <ol style="list-style-type: none"> 1. We wear an immunohistologic method, genetic technique, a biochemical technique, and understand bones, a muscular physiologic mechanism and lecture by the process of study, utilization of the literature, the evaluation method of results. 2. Of the bone morphometric enforcement and parameter calculate it, and understand a way of the histologic bone analysis, and determine it. 3. We learn knowledge and a technique to analyze the bones by the exercise test for the having many kinds and a muscular morphological change and a change of the onset of protein and deepen, and does a research theme of the self and determines it. 4. Using model mice, we will analyze the effects of exercise on the central nervous system by behavioral analysis and brain tissue image analysis, and investigate the causes that cause them. 5. To understand the motor control strategies in patients with motor impairments, we objectively measure body awareness involved in human motor control by using neuropsychological methods. 6. To determine the neural basis of body-specific attention involved in human motor control by using electroencephalography (EEG). 7. We explore ways to solve each clinical problem from a functional anatomical perspective by objectively measuring joint motion and muscle contraction. <p>NISHII Kazuhiro</p> <ol style="list-style-type: none"> 1. We explain the experimental drafting method using the animal, a basic technique. 2. We determine the distribution of the serotonin neuron in the spinal nerve using histologic technique. 3. We understand a change of the locomotorium after the spinal cord injury in the model animal and we analyze it about a mechanism of the neurotization and determine it.

Department of Rehabilitation Educational Sciences

Course Title	Course Aims and Research Subject
<p>Graduate Thesis of Rehabilitation Educational Science</p> <p>KANADA Yoshikiyo SAKURAI Hiroaki</p>	<p>The students research the knowledge, skills, and attitudes necessary for educating therapists from the perspective of EBM (Evidence-Based Medicine) and pursue science.</p> <p>KANADA Yoshikiyo</p> <ol style="list-style-type: none"> 1. Studies on the prediction of the outcome of therapist education. 2. Studies on the standardization of therapists' treatment techniques. 3. Studies on the guidance of clinical training for therapists. <p>SAKURAI Hiroaki</p> <ol style="list-style-type: none"> 1. Development of clinical skills and OSCE (Objective Structured Clinical Examination) for physical and occupational therapists. 2. Studies on the development of methods to evaluate clinical skills in physical and occupational therapist education for students and novice therapists. 3. Studies on the standardization of clinical techniques used by clinical practice leaders (physical and occupational therapists) to educate students and novice therapists (Development of clinical practice leadership training courses). 4. Studies on the usefulness of OSCE (objective structured clinical examination), PBL (problem-based learning), and TBL (team-based learning) in physical and occupational therapist education for students and novice therapists.

Department of Rehabilitation Biomedical Engineering

Course Title	Course Aims and Research Subject
<p>Graduate Thesis of Rehabilitation biomedical engineering</p> <p>TANABE Shigeo TAKEDA Kotaro</p>	<p>The research theme will be a clinical-oriented one that addresses clinical questions and/or problems identified from a survey of previous studies and will be determined through discussions with the faculty members. The field of the research covers fundamental sciences (neurophysiology, neuroscience, and cognitive science), clinical sciences (clinical evaluation, predicting prognosis, and intervention methods), and applied sciences (development of therapeutic instruments, evaluation apparatus, and welfare devices). Students will be encouraged to give a presentation of their study at conferences and publish a scientific paper in journals.</p> <p>TANABE Shigeo</p> <ol style="list-style-type: none"> 1. Studies on the development of activity assistive devices. 2. Studies on the evaluation methods in sensory-motor system. 3. Studies on the exercise methods in sensory-motor system. <p>TAKEDA Kotaro</p> <ol style="list-style-type: none"> 1. Studies on the objective clinical evaluation. 2. Studies on the predicting prognosis. 3. Studies on the measurement and evaluation of brain and motor functions. 4. Development of the measurement and intervention devices

5) Field of Clinical Engineering

Department of Clinical Engineering

Course Title	Course Aims and Research Subject
<p>Graduate Thesis of Clinical Engineering</p> <p>HIBIYA Makoto IHIRA Masaru NAKAI Shigeru OHASHI Atsushi HOSHINO Hiroki SAKUSABE Takaya</p>	<p><i>HIBIYA Makoto</i> Extracorporeal circulation, as practiced by artificial heart-lung machines used in cardiac surgery, places the patient in a non-physiological setting. Disposable products and other products used for extracorporeal circulation have been improved in terms of biocompatibility. In addition, technologies for extracorporeal circulation have been developed that use the supply-demand balance of oxygen as an indicator. We will study the effects of these newer technologies. 1. Study on the effect of extracorporeal circulation on living body</p> <p><i>IHIRA Masaru</i> Our research is mainly focused on rapid diagnostic methods using isothermal gene amplification. The main research themes are the multiplex LAMP method using gene chips and a novel gene amplification method for using microRNA as a novel biomarker. 1. The development of rapid diagnostic methods as new biomarker using miRNA for myocardial infarction. 2. Development of multiplex LAMP method using gene chips 3. Study for natural history of herpes virus or rotavirus</p> <p><i>NAKAI Shigeru</i> 1. Study on nutritional evaluation and renal function prognosis using 24-hour urine collection Based on a 24-hour urine collection database of 600 patients with chronic kidney disease (CKD) provided by a clinic in Nagoya City, we will retrospectively analyze factors related to renal function prognosis. Approximately 13,000 24-hour urine collection test data are registered in this database. 2. Study on body fluid volume evaluation using uric acid kinetic model From the pre-dialysis serum uric acid level and the post-dialysis serum uric acid level of the hemodialysis patient, the extracellular fluid volume and the intracellular fluid volume of the patient can be calculated (Shinzato T, et al. Int J Artif Organs 2020: 391398820909835). The relationship between the fluid volume index calculated using this method and various clinical indexes will be retrospectively analyzed for hemodialysis patients.</p> <p><i>OHASHI Atsushi</i> The blood components of patients undergoing extracorporeal circulation therapy are under excessive oxidative stress due to the inflammatory response. Our laboratory analyzes and evaluates oxidative stress markers for biocompatibility between medical materials and blood. We are also developing treatments that improve biocompatibility. 1. Study on the effect of apheresis therapy on living body 2. Study on the effect of redox state of body fluid components on somatic cells</p> <p><i>HOSHINO Hiroki</i> We study mathematical models related to life sciences, especially those described by differential equations. 1. Mathematical analysis and numerical simulations for phenomena related to clinical engineering : For example, we understand various phenomena related to a blood flow by studying partial differential equations describing the motion of fluid theoretically and numerically. Alternatively, we build more precise models of blood purification therapy and blood circulation when an artificial heart is attached, and aim at mathematical understanding for them. 2. Mathematical analysis of various biological functions : For example, we construct a theory for systems of differential equations describing the invasion of a malignant tumor or those related to the immune system, and we perform numerical simulations for them.</p>

Course Title	Course Aims and Research Subject
<p>Graduate Thesis of Clinical Engineering</p> <p>HIBIYA Makoto IHIRA Masaru NAKAI Shigeru OHASHI Atsushi HOSHINO Hiroki SAKUSABE Takaya</p>	<p><i>SAKUSABE Takaya</i></p> <p>1. Development of non-contact man-machine interface based on gesture recognition by image processing By image processing, we will develop a computer program recognizes the movement (gesture) of the operator's hand as intention and operates a machine. In particularly, we aim to develop a gesture protocol specialized for the operation of medical devices.</p> <p>2. Development of a genomics processing system has web-based user interface Genome analysis is becoming essential in clinical research, but bioinformatics software is difficult to use. We aim to develop a analysis system with web-based interface that clinicians can easily use.</p>