Academic Year 2025

GRADUATE SCHOOL OF MEDICAL SCIENCES

SYLLABUS

MASTER'S COURSE

FUJITA HEALTH UNIVERSITY
GRADUATE SCHOOL OF MEDICAL SCIENCES

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Concerning the curriculum of the Fujita Health University Graduate School of Medical Sciences

"Aiming to acquire a wide knowledge in medical sciences and to create an original master's thesis."

Shigeki Kobayashi, Dean of the Graduate School of Medical Sciences, Fujita Health University

The master's program of the Graduate School of Medical Sciences, Fujita Health University, was established in April 2024 with the goal of "teaching and studying academic theories and applications related to health science, contributing to the promotion of national health and the development of academic culture, and training highly specialized professionals, researchers, and educators who will become leading human resources." Building on this slogan as the central theme, our unique curriculum is organized in the three fields of Clinical Laboratory Sciences, Radiological Sciences, and Radiological Sciences. Common and specialized subjects are the two methods by which the completion of such courses is determined.

A total of 30 credits is required to complete the master's program of the graduate school (39 credits in Clinical Laboratory Sciences and Genetic Counseling, 34 credits in Assisted Reproductive Medicine. In the graduate school, students are required to summarize the results of their autonomous and independent research activities and "submit a thesis based on original research." To accomplish this task, students are given sufficient time for preparation. It is my hope that you will make every effort to come up with an original master's thesis from the beginning of the first year of the master's course. To achieve this goal, it is advisable to investigate the achievements of the predecessors in the field of your chosen study, strive to understand the research results of the academic advisor, and actively engage in preparations with the aim of writing a highly novel master's thesis. Moreover, when writing the master's thesis based on experimental results, one should keep in mind the fact that a thesis is the end result of a high degree of trial and error in the field.

Graduate Thesis is directly added for the creation of a master's thesis, and the remaining are added for Seminars and Exercises in the field of study. Thus, students are given the opportunity to pursue courses in both common subjects and Graduate Thesis other than their preferred specialization. The syllabus is essentially used to get an overview of a particular subject. In the syllabus, the course periods, outline, goals, lesson plans, evaluation methods, teaching materials/textbooks/reference materials, preparatory learning, and points to note for taking courses are given in a detailed for each subject, which allows the graduate students to develop their learning activities as independently as possible.

The syllabus is also useful when clarifying the responsibilities and obligations of teachers and graduate students, which is particularly necessary to attain the predetermined goals and achieve the best learning outcomes based on the lesson plan. It is my hope that the graduate students understand the overall picture of the classes in accordance with the syllabi and enthusiastically engage in learning activities to come up with original and credible research results with a strong sense of motivation.

It is the desire of all faculty and staff members that the two years of research will be a fulfilling experience that forms a strong basis for the future career development of graduate students at the Graduate School of Medical Sciences, Fujita Health University.

Three policies of the Graduate School of Medical Sciences

1. Admission policy

For the Master's Program in Medical Sciences at the Graduate School of Medical Sciences, the following students are accepted: individuals who have completed a four-year university degree or have equivalent or higher abilities.

(1) Individuals who have a deep interest and passion in the field of Clinical Laboratory Sciences, Radiological Science and Biomedical Engineering, and who are willing to learn and explore medical issues on their own.
(2) Individuals with a deep understanding of their research topic and willingness to work towards new discoveries.
(3) Individuals who aim to become highly qualified professionals in various fields of medical science and good medical practitioners who provide optimal medical care to individual patients.
(4) Individuals who aim to make a global social contribution to the development of various fields of medical science as researchers.

To select students who are in agreement with the educational philosophy and objectives of the Graduate School, the entrance examination is conducted as follows:

(1) General entrance examination

- The abilities and qualities related to (1) to (3) above will be evaluated based on specialized subjects related to the applicant's chosen field of study and interviews.
- Basic language skills related to (4) will be evaluated through an English examination.

(2) Special entrance examination for working people

- The abilities and qualities related to (1) to (3) above will be evaluated based on interviews.
- Basic language skills related to (4) will be evaluated through an English examination.

- The University's priority for admission is not affected by sex, race, religion, sexual orientation, socio-economic status, or physical ability.
- Antismoking initiative:

As a university that trains medical professionals to protect people's health, Fujita Health University requires applicants to be able to promise that they will not smoke.

2. Curriculum and implementation policy (Curriculum Policy)

The Master of Medical Sciences degree at the Graduate School of Medical Sciences has three disciplines: "Clinical Laboratory Sciences", "Radiological Sciences, and "Biomedical Engineering". For students to acquire the five abilities listed in the Diploma Policy, coursework and research work are systematically arranged in accordance with the curricular organization policy outlined below. Coursework consists of specialized and common subjects, with an appropriate combination of lectures and exercises, leading to the effective acquisition of specific knowledge, skills, and practical abilities. Research work consists of activities that lead to the setting and solving of problems, promotion of research, and acquisition of the abilities required for advanced professional positions.

Educational content, methods, evaluation, and feedback are defined as follows:

(1) Educational contents

(1-1) In the field of “Clinical Laboratory Sciences,” the subjects are arranged as follows. To train outstanding laboratory scientists who can cope with changes in medicine and develop into researchers and leaders, the department arranges ' Clinical laboratory sciences seminars I and II', ' Clinical laboratory sciences exercises', ' Graduate Thesis on clinical laboratory sciences', ' Genetic counselling exercises', ' Genetic counselling practice', ‘Graduate Thesis on Genetic counselling' Assisted reproductive medicine special research', 'Assisted reproductive medicine seminar', 'Exercise of assisted reproductive medicine I and II', 'Graduate Thesis of assisted reproductive medicine', and others.

(1-2) In the field of Radiological Sciences, the subjects are arranged as follows:

To develop human resources who can respond appropriately to rapidly developing technologies and who can develop into researchers and leaders who can contribute to the development of clinical applications of radiation medicine with high precision and safety, The following courses are offered: 'Radiological Sciences seminar', 'Radiological Sciences Exercise', 'Graduate Thesis of Radiological Sciences', 'Medical Physics Seminar', ‘Science and Technology in Medicine Seminar’ 'Medical Physics Exercise', 'Medical Physics Hospital training', and 'Graduate Thesis of Medical Physics', and others.

(1-3) In the field of “Biomedical Engineering,” the subjects are arranged as follows.

To develop outstanding medical researchers and engineers who can play leading roles in technological innovation, this course will arrange 'Biomedical Engineering Seminars I and II', 'Biomedical Engineering Exercise', and 'Graduate Thesis of Biomedical Engineering', and others.

(2) Educational methods.

- Interactive education through a small class system was adopted to develop highly specialized professionals to acquire knowledge, clinical judgment skills, and management skills.
- Promote active learning and incorporate student presentations as well as group discussions on issues.
- To acquire presentation and communication skills, in carrying out research and presenting papers, supervisors provide detailed guidance on writing and presenting papers.
- To understand the latest research trends, medical science seminars are organized by experts in their fields.

(3) Evaluation and feedback

- Based on the research plan and progress report submitted annually, supervisors provide feedback on the efforts of the students in charge.
- Feedback from professors on presentations and deliverables made by students, including explanations and suggestions for improvement based on their achievements.
- The master's thesis examination and thesis presentation assess whether the student has developed the ability to carry out research, ethics, logical development, thesis writing, and presentation skills.
- With the aim of ensuring the effective functioning of the educational programs, the results of degree programs are monitored and evaluated based on the three policies of

diploma, curriculum, and admission.

3. Criteria for graduation (Diploma Policy)

In the Master of Medical Sciences, the criteria for degree recognition are that the student has been enrolled in the course for the prescribed number of years, has earned the prescribed credits set in accordance with the educational philosophy and objectives, and has acquired the following abilities. Finally, the thesis on the research results on a specific subject is examined.

(1) Ability to set issues

The student must have academic knowledge from a broad perspective, a deep understanding of previous research, and the ability to think about and set issues related to medicine and life sciences on their own.

(2) Ability to work together

The student must have the ability to solve problems while also carrying out industry-government-academia-industry and cross-sectoral cooperation.

(3) Ability to promote research

The ability to promote original research to advance future medicine.

(4) Ability to expand job skills.

The ability to incorporate research findings into society and expand their profession by promoting research based on medical needs.

(5) Ability to work as a highly qualified professional.

The ability to work as medical professionals who provide optimal medical care to individual patients; as corporate researchers who conduct research and development based on medical needs; and as advanced professionals such as cytologists, medical physicists, clinical research coordinators, genetic counsellors, embryologists, and cell culturists.

The total number of credits required

1）Clinical Laboratory Sciences

Course	Number of credits		Notes
	Mandatory	Elective	
Common subjects	4 credits		
Clinical Laboratory Sciences	22 credits		
Common subjects or Seminars		4 credits or more	4 credits or more
Total	30 credits or more		

2）Clinical Laboratory Sciences（Genetic Counseling）

Course	Number of credits		Notes
	Mandatory	Elective	
Common subjects	10 credits		
Genetic Counseling	29 credits		
Total	39 credits or more		

3）Clinical Laboratory Sciences（Assisted reproductive medicine）

Course	Number of credits		Notes
	Mandatory	Elective	
Common subjects	12 credits		
Assisted reproductive medicine	20 credits		
Seminars in fields not majored	2 credits		
Total	34 credits or more		

４）Radiological Sciences

Course	Number of credits		Notes
	Mandatory	Elective	
Common subjects	2 credits		
Radiological Sciences	22 credits		
Common subjects or Seminars in fields not majored		6 credits or more	6 credits or more
Total	30 credits or more		

５）Radiological Sciences （Medical Physics）

Course	Number of credits		Notes
	Mandatory	Elective	
Common subjects	2 credits		
Medical Physics	16 credits		
Common subjects or Advanced Seminars		12 credits or more	12 credits or more
Total	30 credits or more		

６）Biomedical Engineering

Course	Number of credits		Notes
	Mandatory	Elective	
Common subjects	2 credits		
Biomedical Engineering	22 credits		
Common subjects or Seminars in fields not majored		6 credits or more	6 credits or more
Total	30 credits or more		

Curriculum table

1）Common subjects

Field	Subject	Credit (Hours)		1st year		2nd year		Notes
		Mandatory	Elective	Autumn semester	Spring semester	Autumn semester	Spring semester	
Common subjects	Medical Sciences Seminar	2(30)		1		1		
	Introduction to Entrepreneurship		2(30)	2				
	Bioethics		2(30)	2				
	Outline of Immunology		2(30)	2				
	Medical Information Processing		2(30)		2			
	Clinical Genetics		2(30)		2			
	Medical Technology Seminar ※1		2(30)	2				
	Molecular Genetics Seminar		2(30)	2				
	Consultation		2(30)		2			
	Biological Information Engineering		2(30)		2			
	Radiological Information Technology		2(30)		2			
	Radiological Basic Medicine		2(30)		2			
	Radiation Hygiene		2(30)	2				
	Magnetic Resonance Imaging Analysis		2(30)	2				
	Environmental Pathophysiology		2(30)		2			
	Medical Engineering		2(30)		2			
	Medical Robotics Engineering		2(30)	2				

※1) Students majoring in the field of Clinical Laboratory Sciences must take "Medical Technology Seminar". (except students majoring in *Genetic Counseling*)

2） Clinical Laboratory Sciences

Department	Course title	Credit (Hours)		1st year		2nd year		Notes
		Mandatory	Elective	Autumn semester	Spring semester	Autumn semester	Spring semester	
※1 Clinical Laboratory Sciences	Clinical Laboratory Sciences Seminar I		2 (30)	2				
	Clinical Laboratory Sciences Seminar II		2 (30)		2			
	Laboratory Animal Science Seminar		2 (30)	2				
	Advanced Medical Development Seminar		2 (30)	2				
	Principle Lecture of Clinical Studies and Trials		2 (30)	2				
	Practice of Clinical Research Coordinate		2 (30)		2			
	Clinical Laboratory Sciences Exercise		6 (180)	2	2	2		
	Graduate Thesis of Clinical Laboratory Sciences		12(360)		4	4	4	
※2 Genetic Counseling	Basic Human Genetics		2 (30)	2				
	Basic Human Genetics Exercise		2 (60)	2				
	Clinical Genetics Exercise		2 (60)		2			
	Bioinformatics Exercise		1 (30)		1			
	Genetics and Society		2 (30)	2				
	Genetics and Ethics Exercise		1 (30)	1				
	Genetic Counseling		1 (15)	1				
	Genetic Counseling Exercise		2 (60)		2			
	Clinical Practice of Genetic Counseling		6 (180)		4	2		
	Graduate Thesis of Genetics Counseling		10(300)		2	4	4	
※3 Assisted reproductive medicine	Assisted Reproductive Medicine Seminar		2 (30)	2				
	Assisted Reproductive Medicine Exercise I		4 (120)	2	2			
	Assisted Reproductive Medicine Exercise II		4 (120)			2	2	
	Graduate Thesis of Assisted Reproductive Medicine		10(300)			5	5	

※1)Students in the field of Clinical Laboratory Sciences must take " Clinical Laboratory Sciences Seminar Ⅰ" and " Clinical Laboratory Sciences Seminar Ⅱ".

※2) Students majoring in the field of Genetic Counseling must take Bioethics, Clinical Genetics, Molecular Genetics Seminar, Consultation, as common subjects.

※3)Students majoring in the field of Assisted reproductive medicine must take Outline of Immunology, Clinical Genetics, Molecular Genetics Seminar, Environmental Pathophysiology as common subjects, and Laboratory Animal Science Seminar in the field of Clinical Laboratory Sciences.

3）Radiological Sciences

Department	Course title	Credit (Hours)		1st year		2nd year		Notes
		Mandatory	Elective	Spring semester	Autumn semester	Spring semester	Autumn semester	
Radiological Sciences	Radiological Sciences Seminar		4 (60)	2	2			
	Radiological Sciences Exercise		6 (180)	2	2	2		
	Graduate Thesis of Radiological Sciences		12(360)	1	3	4	4	
Medical Physics	Medical Physics Seminar		2 (30)	2				
	Science and Technology in Medicine Seminar		2 (30)		2			
	Medical Physics Exercise		4 (120)	2	1	1		
	Hospital Training of Medical Physics ※1		4 (120)	4				
	Graduate Thesis of Medical Physics		10(300)	1	2	3	4	

※1) In case of choosing to take the Hospital Training of Medical Physics, The students required to take the Medical Physics Exercise.

4）Biomedical Engineering

Department	Course title	Credit（Hours）		1st year		2nd year		Notes
		Mandatory	Elective	Spring semester	Autumn semester	Spring semester	Autumn semester	
Biomedical Engineering	Biomedical Engineering Seminar Ⅰ		2(30)	2				
	Biomedical Engineering Seminar Ⅱ		2(30)		2			
	Biomedical Engineering Exercise		6(180)	2	2	2		
	Graduate Thesis of Biomedical Engineering		12(360)		4	4	4	

Subjects and instructors

１）Common subjects

Department	Course Titles	Credits	Hours	Instructor Name
Common subjects	Medical Sciences Seminar	2	30	KOBAYASHI Shigeki
	Introduction to Entrepreneurship	2	30	MURAKAWA Shuichi, Seto Koichi AOKI Noboru, YABUUCHI Hikaru KOSHIMIZU Hisatsugu
	Bioethics	2	30	SATO Tsutomu
	Outline of Immunology	2	30	NARUSE Hiroyuki TAKEMATSU Hiromu MATSUURA Hideaki, NAITO Yuko IMAMURA Seiji, HIGASHIMOTO Yuki TEZUKA Hiroyuki
	Medical Information Processing	2	30	KAMEI Tetsuya, SUZUKI Koji HAYASHI Naoki
	Clinical Genetics	2	30	OHYE Tamae, NISHIZAWA Haruki YAMAMOTO Yasuko INAGAKI Hidehito
	Medical Technology Seminar	2	30	ICHINO Naohiro, TAKEMATSU Hiromu OHASHI Koji, SUZUKI Koji NARUSE Hiroyuki, MOURI Akihiro SUGIMOTO Keiko, OHYE Tamae ISHIKAWA Hiroaki, OSAKABE Keisuke YAMAMOTO Yasuko FUJIGAKI Hidetsugu SHIOGAMA Kazuya, HOSHI Masato MATSUURA Hideaki
	Molecular Genetics Seminar	2	30	OHYE Tamae, TAKEMATSU Hiromu INAGAKI Hidehito, MIZUTANI Kenmei
	Consultation	2	30	ITO Sakurako
	Biological Information Engineering	2	30	UMEZAWA Eizou HATTORI Hidekazu, HIRANO Harutoyo
	Radiological Information Technology	2	30	SHIRAKAWA Seiji
	Radiological Basic Medicine	2	30	KOBAYASHI Shigeki HATTORI Hidekazu
	Radiation Hygiene	2	30	ASADA Yasuki, YOKOYAMA Sumi
	Magnetic Resonance Imaging Analysis	2	30	TAKATSU Yasuo, SHIIBA Takuro
	Environmental Pathophysiology	2	30	SUZUKI Koji, SUGIMOTO Keiko KAMEI Tetsuya, FUJIGAKI Hidetsugu SAKAGUCHI Eirin, KUNISAWA Kazuo
	Medical Engineering	2	30	HIBIYA Makoto, IHIRA Masaru OHASHI Atsushi, HORI Hideo KAWAGUCHI Kazunori
	Medical Robotics Engineering	2	30	ITO Hiroyasu, FUJIGAKI Hidetsugu

2） Clinical Laboratory Sciences

Department	Course Titles	Credits	Hours	Instructor Name
Clinical Laboratory Sciences	Clinical Laboratory Sciences Seminar Ⅰ	2	30	ICHINO Naohiro, OHASHI Koji NARUSE Hiroyuki, SUGIMOTO Keiko ISHIKAWA Hiroaki, OSAKABE Keisuke SHIOGAMA Kazuya, HOSHI Masato IMAMURA Seiji, MATSUURA Hideaki SAKAGUCHI Eirin HIGASHIMOTO Yuki
	Clinical Laboratory Sciences Seminar Ⅱ	2	30	SAITO Kuniaki, TAKEMATSU Hiromu SUZUKI Koji, MOURI Akihiro NAITO Yuko, YAMAMOTO Naoki YAMAMOTO Yasuko KUNISAWA Kazuo
	Laboratory Animal Science Seminar	2	30	NAGAO Shizuko, KUGITA Masanori KUMAMOTO Kanako YOSHIMURA Aya
	Practice of Clinical Research Coordinate	2	30	MOURI Akihiro, UESUGI Keiko NANATUMURA Megumi TERAMACHI Mayumi WAKINOSONO Mari NAKAI Tsuyoshi, KOSEKI Takenao OHARA Kentaro
	Principle Lecture of Clinical Studies and Trials	2	30	MOURI Akihiro, UESUGI Keiko NANATUMURA Megumi SASAKI Yasuyuki, KOSEKI Takenao TERAMACHI Mayumi WAKINOSONO Mari
	Advanced Medical Development Seminar	2	30	MOURI Akihiro, KUNISAWA Kazuo CHIHARA Takeshi, MORIYA Yuka ARIOKA Yuko, SAKURAI Kohei
	Clinical Laboratory Sciences Exercise	6	180	SAITO Kuniaki, ICHINO Naohiro TAKEMATSU Hiromu, OHASHI Koji NARUSE Hiroyuki, SUZUKI Koji MOURI Akihiro, SUGIMOTO Keiko NAGAO Shizuko, YAMAMOTO Naoki ISHIKAWA Hiroaki OSAKABE Keisuke YAMAMOTO Yasuko SHIOGAMA Kazuya, HOSHI Masato MATSUURA Hideaki WACHINO Junichi
	Graduate Thesis of Clinical Laboratory Sciences	12	360	SAITO Kuniaki, ICHINO Naohiro TAKEMATSU Hiromu, OHASHI Koji NARUSE Hiroyuki, SUZUKI Koji MOURI Akihiro, SUGIMOTO Keiko NAGAO Shizuko, YAMAMOTO Naoki ISHIKAWA Hiroaki OSAKABE Keisuke YAMAMOTO Yasuko SHIOGAMA Kazuya, HOSHI Masato MATSUURA Hideaki WACHINO Junichi

Genetic Counseling	Basic Human Genetics	2	30	OHYE Tamae, NAKAJIMA Yoko
	Basic Human Genetics Exercise	2	60	OHYE Tamae, SHIOGAMA Kazuya INAGAKI Hidehito
	Clinical Genetics Exercise	2	60	OHYE Tamae etc.
	Bioinformatics Exercise	1	30	INAGAKI Hidehito
	Genetics and Society	2	30	FUJIE Rieko
	Genetics and Ethics Exercise	1	30	SATO Tsutomu
	Genetic Counseling	1	15	OHYE Tamae, NISHIZAWA Haruki ISHIHARA Naoko, Mizuno Seiji Ueno Sayaka
	Genetic Counseling Exercise	2	60	OHYE Tamae, FUJIE Rieko
	Clinical Practice of Genetic Counseling	6	180	OHYE Tamae, NISHIZAWA Haruki ISHIHARA Naoko MIYAMURA Hironori
	Graduate Thesis of Genetic Counseling	10	300	OHYE Tamae
Assisted reproductive medicine	Assisted Reproductive Medicine Seminar	2	30	NISHIO Eiji, YAMAMOTO Yasuko NAGAO Shizuko KUMAMOTO Kanako YOSHIMURA Aya, KUGITA Masanori ASANO Yukiko
	Assisted Reproductive Medicine Exercise I	4	120	NAGAO Shizuko, KUMAMOTO Kanako YOSHIMURA Aya, KUGITA Masanori
	Assisted Reproductive Medicine Exercise II	4	120	NISHIO Eiji, NAGAO Shizuko OIKAWA Shota
	Graduate Thesis of Assisted Reproductive Medicine	10	300	NISHIO Eiji

３） Radiological Sciences

Department	Course Titles	Credits	Hours	Instructor Name
Radiological Sciences	Radiological Sciences Seminar	4	60	KOBAYASHI Shigeki, MINAMI Kazuyuki TAKATSU Yasuo, SHIRAKAWA Seiji SHIIBA Takuro, KOBAYASHI Masanao MUTO Koichi, KASAI Satoshi YOKOYAMA Sumi
	Radiological Sciences Exercise	6	180	KOBAYASHI Shigeki, MINAMI Kazuyuki TAKATSU Yasuo, SHIRAKAWA Seiji SHIIBA Takuro, KOBAYASHI Masanao MUTO Koichi, KASAI Satoshi
	Graduate Thesis of Radiological Sciences	12	360	KOBAYASHI Shigeki, MINAMI Kazuyuki TAKATSU Yasuo, SHIRAKAWA Seiji SHIIBA Takuro, KOBAYASHI Masanao MUTO Koichi, KASAI Satoshi
Medical Physics	Medical Physics Seminar	2	30	ASADA Yasuki, HAYASHI Naoki MATSUBARA Hiroaki KUNITOMO Hiroshi, YASUI Keisuke
	Science and Technology in Medicine Seminar	2	30	HAYASHI Naoki MATSUBARA Hiroaki, YASUI Keisuke
	Medical Physics Exercise	4	120	ASADA Yasuki, HAYASHI Naoki MATSUBARA Hiroaki KUNITOMO Hiroshi, YASUI Keisuke
	Hospital Training of Medical Physics	4	120	HAYASHI Naoki, YASUI Keisuke HAYASHI Shinya, SAITO Yasunori
	Graduate Thesis of Medical Physics	10	300	ASADA Yasuki, HAYASHI Naoki MATSUBARA Hiroaki KUNITOMO Hiroshi, YASUI Keisuke

4） Biomedical Engineering

Department	Course Titles	Credits	Hours	Instructor Name
Biomedical Engineering	Biomedical Engineering Seminar Ⅰ	2	30	HIBIYA Makoto, IHIRA Masaru OHASHI Atsushi, HORI Hideo KAWAGUCHI Kazunori
	Biomedical Engineering Seminar Ⅱ	2	30	ITO Hiroyasu, MIURA Yasuo FUJIGAKI Hidetsugu, UMEZAWA Eizou HATTORI Hidekazu, MIZUTANI Kenmei HIRANO Harutoyo
	Biomedical Engineering Exercise	6	120	HIBIYA Makoto, IHIRA Masaru ITO Hiroyasu, MIURA Yasuo FUJIGAKI Hidetsugu, UMEZAWA Eizou HATTORI Hidekazu, MIZUTANI Kenmei OHASHI Atsushi, HORI Hideo HIRANO Harutoyo
	Graduate Thesis of Biomedical Engineering	12	300	HIBIYA Makoto, IHIRA Masaru ITO Hiroyasu, MIURA Yasuo FUJIGAKI Hidetsugu, UMEZAWA Eizou HATTORI Hidekazu, MIZUTANI Kenmei OHASHI Atsushi, HORI Hideo HIRANO Harutoyo

1. Common Subjects

Medical Sciences Seminar

専攻分野 Major Field	Common (collaboration)	学年 Grade	1st・2nd year	期　間 Semester	Full year
授業形態 Style	Lecture	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese		
使用言語 Language	Japanese				
担当教員名 Instructor	KOBAYASHI Shigeki				
科目概要 Course Aims	In line with the goal of providing quality health and medical care that caters to the needs of patients, residents, and local communities, the course aims to impart the latest and most advanced knowledge necessary for equipping and honing medical personnel to becoming highly specialized professionals, researchers, and educators as well as elucidating the current status of and issues related to health and medical care in Japan.				
到達目標 Objectives	1. Understand the current status of and issues related to health and medical care in Japan 2. Gain the latest and most advanced knowledge necessary for equipping and training medical workers to be highly specialized professionals, researchers, and educators				
回数 Chapters	授業計画（各回のテーマ） Course Schedule (topic for each time)				担当教員 Instructor
1-8 (1st year)	1. Participation in a lecture or health science seminar will be counted as attendance of a single class (2 hours). 2. A total of two lectures will be held each year (May and December). Moreover, the special lectures and symposia of the Fujita Medical Society, compliance seminars, ethics seminar, research seminar and the master's thesis presentation will be counted as one class each. A total of 8 classes per year will be used for medical science seminars. 3. During the two-year period, 4 medical science seminars, 2 Fujita Medical Society special lectures, 2 symposia, 2 compliance seminars, 2 ethics seminar, 2 research seminar and 2 master's thesis presentations (final sum of 16 times) must be attended. 4. Attending a lecture on another campus is counted as attendance based on the submission of the prescribed documents (i.e., application for attendance certification/transfer certification for medical science seminar). (To verify such attendance, the seal of the instructor in charge of the subject is necessary.) 5. The preparation and management of the seminars will be done in cooperation with the Graduate School Academic Affairs Committee, the secretariat, and the students.				KOBAYASHI Shigeki
9-16 (2nd year)					
評価法・基準 Grading Policies	Attendance of 16 classes corresponds to 100 points. However, each instance of an absence is equivalent to a deduction of 5 points. Attendance of ≤9 classes will be regarded as credits not being acquired. If, however, the absences are compensated by attending other on-campus lectures (e.g., Health Sciences Seminars) and the prescribed documents are submitted and certified (points transferable up to 4 times during the two-year period), the said attendance will be regarded as course attendance and added to the evaluation.				
教科書 Textbook	None	教材・参考書 Reference Book	To be studied by each student based on the topic of the lecture.		
オフィスアワー Office Hours	10 minutes after the medical sciences seminar	連絡先 Contact			
準備学習 Preparation of study	Gather related information and knowledge on medicine and proactively participate in tasks. Active participation in class is highly expected of the students.	履修上の注意点 Notice for Students			

Introduction to Entrepreneurship

専攻分野 Major Field	common subject	学年 Grade	1 year	期 間 Semester	1st semester
授業形態 Style	Lectures and Exercises	単位 Credits	2 credits	時間数 Hours	30
授業方法 Class Methods	face-to-face teaching	使用言語 Language	Japanese		
担当教員名 Instructor	MURAKAWA Shuichi (Subject manager), SETO Koichi, AOKI Noboru, KOSHIMIZU Hisatsugu, YABUUCHI Hikaru				
科目概要 Course Aims	In this course, students will acquire skills for surviving in today's society, such as logical thinking, problem searching/solving, multifaceted viewpoints, and presentation skills. Entrepreneurship" is the attitude of creating new businesses and taking risks, a concept that is required in all professions. In this lecture, we invite venture business entrepreneurs who hold medical professional qualifications and have experience in starting their own businesses after working in medical and research institutions. By listening to their stories of how they started their businesses in the lecture, students will have the opportunity to learn about the perspectives and actualities of business managers. Within this lecture, students from different majors will discuss "what are the current and near-term social issues, why these issues are arising, and what are possible solutions to the issues," summarize the opinions of the group, and make a presentation. The abilities gained through this teaching method are necessary for business and entrepreneurship, but they are also essential for everyday necessary problem-solving thinking and for carrying out "research". In addition, while most graduate school lectures are designed to deepen students' learning in their major field of study, this course involves group work with students from different majors. By adopting this method of learning, students have been able to "learn how their peers with different perspectives think. By adopting this learning method, we have heard students say that they are learning the elements necessary for the skills required in society and business (basic skills for working adults), such as "I learned the importance of thinking about things from the perspective of someone different from myself. Acquire the abilities required in your major field of study, and at the same time, cultivate the basic skills required in society and business. We welcome a wide range of participants, not only those who aim to start a business in the future, but also those who wish to acquire basic management knowledge, broaden their career horizons, or find new goals in life.				
到達目標 Objectives	1. understand and explain the basic flow from start-up to company management. 2. understand the latest developments in the healthcare industry and apply them to business plans. 3. be able to draw business models and develop solutions with team members. 4. be able to prepare, present and discuss presentation materials. 5. to be able to envision social implementation and commercialization of one's research project (or research plan). 6. listen to lectures by entrepreneurs to broaden their perspectives on future career choices.				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topics)	担当教員 Instructor
1-2-3	Orientation, introduction of each person's issues, recognition of issues in the world, etc. Introduction to Entrepreneurship (overview including case studies of pharmaceuticals, AI, healthcare, etc.) Case studies of projects to solve social issues and commercialization ideas	Shuichi Murakawa Koichi Seto External Lecturers
4-5-6	Theme selection and team formation, work groups New business start-up and management in the medical industry Group work (persona setting, business model canvas)	Shuichi Murakawa External Lecturers

7-8-9	Entrepreneurship and Basic Finance - Learn to see society through the flow of money. Student Entrepreneurs, Case Studies of Idea Contests by Students Group work (in-depth exploration of issues and solutions, structural analysis of problems, investigation of cause-and-effect relationships)		Shuichi Murakawa External Lecturers
10-11-12	Preparation for commercialization and basics of business model creation Presentations that communicate (creating materials - improving communication skills) Group work (market research, technical analysis, presentation preparation) Learn from exposure to the lives of medical professionals who are also artists, designers, entrepreneurs, and other diverse career paths (Medical Career Design)		Shuichi Murakawa Hisatsugu Koshimizu External Lecturers
13-14-15	Finalizing presentations for group presentations, mentoring by entrepreneurs Group presentations and evaluation from judges (entrepreneurs), brush-up, and interaction with outside speakers		All faculty members in charge External Lecturers
評価法・基準 Grading Policies	Each participant is free to set an issue and work in groups to solve the issue and commercialize the project. Participation in group work, team contribution and attitude, etc. will be evaluated. (Group work and presentation: 80%, Report: 20%)		
教科書 Textbook	Each time, the instructor in charge of the course prepares and distributes an original resume according to the student's level. (You do not need to purchase the materials and reference books, as they will be explained by the instructor. (It is acceptable for each student to read the material to deepen his/her interest in it.)	教材・参考書 Reference Book	Working in a Company like an Entrepreneur Reiwa Ban, Toshiya Kosugi The World's Easiest Way to Find What You Want to Do: A Method for Self-Understanding to Free Yourself from Life's Moyamoya (in Japanese), Jinpei Yagi Medical and Welfare System: New Self-Design Book, Shinzo Higashida, Shuichi Murakawa From career planning to entrepreneurship, Shuichi Murakawa Learning from entrepreneurs in the medical and healthcare fields, Shuichi Murakawa.
オフィス アワー Office Hour	Research Promotion Division (Murakawa et al.) You can always contact us by email.	連絡先 Contact	
準備学習 Preparation of study	Each participant is invited to bring an issue to the lecture that he/she would like to work on. You are free to choose your own theme. It is recommended that you organize your own research topics, interests, etc. so that you can briefly introduce various social issues. The assignment for the first day will be announced in advance. (Self-introductions will be made. It is recommended that you prepare in advance your background and what you would like to do in graduate school so that we can get to know you better.)	履修上の注意点 Notice for Students	After confirming the laboratory's and students' schedule intentions (conference presentations, experimental plans, etc.), we will arrange 4-5 days of intensive lectures around August. Participants will select a theme based on the issues brought by each participant and proceed with group work. On the final day, participants will present their commercialization ideas to the entrepreneurs. You will be asked to bring your own tablet or laptop for information retrieval and presentation.

Bioethics

専攻分野 Major Field	common subject	学年 Grade	1st year	期 間 Semester	day class:1st semester
授業形態 Style	lecture, seminar	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese		
担当教員名 Instructor	SATO Tsutomu				
科目概要 Course Aims	Bioethics is an interdisciplinary field of research on life. The Graduate School of this University is an interdisciplinary learning opportunity where graduate students from various fields can learn together about ethical issues that arise in clinical medical practice. Cultivate the ability to notice, consider, adjust, and resolve ethical issues and conflicts. The rapid advances in medicine and medical technology over the past few decades have led to the emergence of a new situation in the medical field with ethical issues. In other words, issues such as the definition of death, human rights, and questions about the quality of life are calling for changes in the ethical approach of conventional medical professionals, and specific decisions are being made in clinical practice. Therefore, with these specific decisions in mind, this course examines the methods and issues of clinical ethics while explaining the historical issues and basic concepts of bioethics. Students will deepen their understanding by setting tasks so that they can make ethical adjustments, discussing and presenting them, such as discovering and resolving ethical problems that arise between doctors, co-medical staff, and patients/families envisioned in their respective themes or specialties. In particular, graduate students in nursing are required to have the ability to coordinate problems that arise in the clinical practice of pediatric and critical (death with dignity and organ transplantation).				
到達目標 Objectives	The goals of this course are to 1. be able to explain the basic principles of bioethics and medical ethics. 2. be able to explain patient rights and health care provider responsibilities. 3. be able to explain clinical ethical issues involving doctors, comedies, patients and families. 4. be able to make ethical adjustments to find solutions to ethical problems.				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1	What are bioethics and ethical adjustment	SATO Tsutomu
2	Discovering Ethical Issues Related to Assisted Reproductive Technology (Lectures and Seminars)	SATO Tsutomu
3	Coordination and Resolution of Ethical Issues Related to Assisted Reproductive Technology (Lectures and Seminars)	SATO Tsutomu
4	Coordination and Resolution of Ethical Issues Related to Assisted Reproductive Technology (Presentation by Graduate Students)	SATO Tsutomu
5	Discovering Ethical Issues Related to Intractable Diseases and Disabilities in Children (Lectures and Seminars)	SATO Tsutomu
6	Coordination and Resolution of Ethical Issues Related to Intractable Diseases and Disabilities in Children (Lectures and Seminars)	SATO Tsutomu
7	Coordination and Resolution of Ethical Issues Related to Intractable Diseases and Disability in Children (Presentations by Graduate Students)	SATO Tsutomu
8	Discovering Ethical Issues Related to End-of-Life Care (Lectures and Seminars)	SATO Tsutomu
9	Coordination and Resolution of Ethical Issues Related to End-of-Life Care (Lectures and Seminars)	SATO Tsutomu
10	Coordination and Resolution of Ethical Issues Related to End-of-Life Care (Presentation by Graduate Students)	SATO Tsutomu

11	Fundamentals of Clinical Ethics (Lecture)		SATO Tsutomu
12	Use of the Four Division Tables of Clinical Ethics (1) Emergency Medicine		SATO Tsutomu
13	Utilization of the Four-Division Table of Clinical Ethics (2) End-of-Life Care		SATO Tsutomu
14	Utilization of the Four-Division Table of Clinical Ethics (3) Severely Handicapped Newborns		SATO Tsutomu
15	Bioethics, Summary		SATO Tsutomu
評価法・基準 Grading Policies	Comprehensively evaluate class attitudes and presentation materials. Evaluation criteria are class attitudes and reports.		
教科書 Textbook	Will be introduced in the class.	教材・参考書 Reference Book	
オフィスアワー Office Hour		連絡先 Contact	
準備学習 Preparation of study	Students are expected to read the documents for 30 minutes before class.	履修上の注意点 Notice for Students	To make a presentation, you will need a laptop with PowerPoint installed.

Outline of Immunology

専攻分野 Major Field	Common subjects	学年 Grade	1st year	期　間 Semester	day class:1st semester night class:2nd semester
授業形態 Style	lecture, seminar	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese		
担当教員名 Instructor	NARUSE Hiroyuki, TAKEMATSU Hiromu, MATSUURA Hideaki, NAITO Yuko, IMAMURA Seiji, HIGASHIMOTO Yuki, TEZUKA Hiroyuki				
科目概要 Course Aims	The human body stays healthy by dealing with a variety of enemies, such as invading pathogenic microorganisms and autoimmune diseases. It largely depends on the highly developed immune system, but it is not universal. Some diseases cannot be overcome by humans with the response of the brilliant immune system, while others are caused by the immune system itself. In this course, you will learn how the human immune systems and maintain their steadiness.				
到達目標 Objectives	You will be able to understand the immune system and consider the mechanisms by which various diseases occur.				

回数 Chapters	授業計画（各回のテーマ） Course Schedule (topic for each time)	担当教員 Instructor
1	Immune systems, brief introduction	TAKEMATSU Hiromu
2	Antigen receptor	TAKEMATSU Hiromu
3	Immune cells	NAITO Yuko
4	Germinal center reaction and antibody production	NAITO Yuko
5	Dendritic cells and their role in immune responses	TEZUKA Hiroyuki
6	Mucosal immunity	TEZUKA Hiroyuki
7	Infection defense mechanism in organisms-role of intestinal bacteria	IMAMURA Seiji
8	Immune response mechanism for microorganisms	IMAMURA Seiji
9	Rotavirus Infection and Vaccine Effectiveness	HIGASHIMOTO Yuki
10	Viral Infections and Immune Responses	HIGASHIMOTO Yuki
11	Development of new vaccines	NARUSE Hiroyuki
12	Coronavirus disease 2019 (COVID-19) and vaccine	NARUSE Hiroyuki
13	Cell therapy and regenerative medicine	MATSUURA Hideaki
14	Immunology related to blood group and transfusion	MATSUURA Hideaki
15	Transplant immunity and histocompatibility	MATSUURA Hideaki

評価法・基準 Grading Policies	Your overall grade in the class will be decided based on the presentation and short reports. Feedback on your presentation will be provided by each instructor.		
教科書 Textbook	Will be introduced in the class.	教材・参考書 Reference Book	

オフィス アワー Office Hours	Room: NARUSE : building3-2F-206 TAKEMATSU: building3-3F-325 MATSUURA: building3-3F-303 NAITO : building3-3F-324 IMAMURA : building3-3F-305 HIGASHIMOTO : building3-3F-308 TEZUKA : building1-3F-321 Time: After class, or 12:30-13:00	連絡先 Contacts	
準備学習 Preparation of study	Students are expected to read the documents for 30 minutes after class.	履修上の注意点 Notice for Students	No talking in class. Keep a positive attitude.

Medical Information Processing

専攻分野 Major Field	common subject	学年 Grade	1st year	期 間 Semester	Night class:2nd semester
授業形態 Style	lecture, seminar	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese		
担当教員名 Instructor	KAMEI Tetsuya, SUZUKI Koji, HAYASHI Naoki				
科目概要 Course Aims	In this lecture, students will learn a series of statistical methods necessary for collecting and analyzing various data encountered in medical practice. In-class exercises will allow students to analyze and process data they have collected, using typical statistical software such as Excel Statistics, SPSS, JMP or R. General statistical analysis software uniformly displays all the results of numerical processing, but it is important for the analyst to decide how to interpret the data. Students will practice not only statistical processing and interpretation of numerical experiments but also analysis methods such as questionnaires required in social medicine (nursing and rehabilitation).				
到達目標 Objectives	The course goals are for students to be able to: - Explain the terminology of basic statistics. - Understand and explain the basic statistical analysis of experimental data. - Use basic methods of analysis such as questionnaire surveys. - Logically explain the purpose, analysis results, conclusions, etc. of in-class exercises.				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1	Principle of data cleansing	KAMEI Tetsuya
2	Basic statistics	KAMEI Tetsuya
2	Questionnaire survey design and analysis	KAMEI Tetsuya
4	Study design of Epidemiologic study	SUZUKI Koji
5	Types of variables and basics of statistical software	SUZUKI Koji
6	Comparison of average values	SUZUKI Koji
7	Multiple comparison test	SUZUKI Koji
8	Chi-squared test	SUZUKI Koji
9	Correlation and regression	SUZUKI Koji
10	Implementation of statistics in radiological technology	HAYASHI Naoki
11	Practice of statistical analysis and testing	HAYASHI Naoki
12	Lecture of survival analysis and logrank test	HAYASHI Naoki
13	Practice of survival analysis and logrank test	HAYASHI Naoki
14	Lecture of signal theory and ROC analysis	HAYASHI Naoki
15	Practice of signal theory and ROC analysis	HAYASHI Naoki

評価法・基準 Grading Policies	Students will be comprehensively evaluated on their class attitude, understanding and assignments for the lecture (100%). The evaluation ratio of each faculty member will be decided according to the number of lectures given.

教科書 Textbook	Not applicable	教材・参考書 Reference Book	石村卓夫, すぐわかる統計用語の基礎知識, 東京図書, 2016 藤井亮輔, 鈴木康司 超入門! R でできるビジュアル統計学, 金芳堂, 2021
オフィスアワー Office Hour	Office hours are 30 minutes after every lecture time.	連絡先 Contact	
準備学習 Preparation of study	Understand basic Statistical term.	履修上の注意点 Notice for Students	Even beginners can learn step by step.

Clinical Genetics

専攻分野 Major Field	common subject	学年 Grade	1st year	期 間 Semester	night class:2nd semester
授業形態 Style	lecture, seminar	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese		
担当教員名 Instructor	OHYE Tamae, NISHIZAWA Haruki YAMAMOTO Yasuko, INAGAKI Hidehito				
科目概要 Course Aims	Genetic testing is gradually being adopted in general clinical testing. Even if the patient has the gene mutation, the effects on the symptoms need to be closely examined. Therefore, it is important to analyze the functional changes caused by gene variants, and it is necessary to understand the pathological state and molecular mechanism. Although there is still prejudice in the general public for patients with hereditary diseases, even medical professionals have troubles in dealing with them, and have not even thought deeply about not dealing with patients. In this lecture, the pathological functions and medical and social support brought about by gene variants, will be learned through lectures and group discussions.				
到達目標 Objectives	The goals of this course are to -be able to explain the basics of inherited diseases. -be able to explain the basics of non-hereditary disease. -be able to explain the pregnancy, fetal and reproductive medicine				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1	Chromosome abnormalities-1 Normal variation	OHYE Tamae
2	Chromosome abnormalities-2 Numerical abnormality	OHYE Tamae
3	Chromosome abnormalities-3 Structural abnormalities	OHYE Tamae
4	Cancer related genes -1	YAMAMOTO Yasuko
5	Cancer related genes -2	YAMAMOTO Yasuko
6	Progress seminar	YAMAMOTO Yasuko
7	Disease-causing genes and their functional analyses	INAGAKI Hidehito
8	Genome editing technology	INAGAKI Hidehito
9	Variant classification	INAGAKI Hidehito
10	Developmental biology	NISHIZAWA Haruki
11	Fetal development	NISHIZAWA Haruki
12	Fetal ultrasound examination	NISHIZAWA Haruki
13	Prenatal testing	NISHIZAWA Haruki
14	Preimplantation genetic testing	NISHIZAWA Haruki
15	Fetal congenital disease	NISHIZAWA Haruki

評価法・基準 Grading Policies	Your overall grade in the class will be decided based on the question-and-answer session and short reports (Evaluation method differs for each teacher). The evaluation of each teacher is rated 1/4 and summed up to make a total evaluation (100%). Feedback on the question-and-answer session will be provided by each instructor.

教科書 Textbook	Distribute lecture materials. English literature is used appropriate.	教材・参考書 Reference Book	1. Thompson & Thompson Genetics in Medicine 2. Genetic counseling manual ISBN: 978-4-524-26667-8
オフィスアワー Office Hour	Ohye Tamae: after lecture, room 103, building 10 NISHIZAWA：Staff Building I, 9F, Obstetrics and Gynecology Office (weekdays 9:00-17:00) YAMAMOTO Yasuko : after lecture, room329, building3 INAGAKI Hidehito: Weekday at 302, building 4	連絡先 Contact	
準備学習 Preparation of study	Students are expected to read the documents and check the technical terms for 30 minutes before class.	履修上の注意点 Notice for Students	lecture, seminar

Medical Technology Seminar

専攻分野 Major Field	common subject	学年 Grade	1st year	期 間 Semester	1st semester
授業形態 Style	lecture, seminar	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese		
担当教員名 Instructor	SUZUKI Koji, ICHINO Naohiro, OHASHI Koji, TAKEMATSU Hiromu, NARUSE Hiroyuki, MOURI Akihiro, SUGIMOTO Keiko, OHYE Tamae, ISHIKAWA Hiroaki, OSAKABE Keisuke, YAMAMOTO Yasuko, FUJIGAKI Hidetsugu, SHIOGAMA Kazuya, HOSHI Masato, MATSUURA Hideaki				
科目概要 Course Aims	In medical technology seminar, it will be given on basic knowledge and research methods required for clinical laboratory science. This seminar is a reference for future research, and learning in the first year will enable future research to develop.				
到達目標 Objectives	The goals of this course are to − be able to explain basic research in clinical laboratory science. − be able to explain experimental techniques in each field. − be able to develop your research in the future by understanding basic science.				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1	Epidemiology and prevention of lifestyle related diseases	SUZUKI Koji
2	Usefulness of liver stiffness measurement for diagnosis of liver disease	ICHINO Naohiro
3	Evolutionary medicine: Human medical conditions driven by evolution	TAKEMATSU Hiromu
4	Epigenetics and diseases	OHASHI Koji
5	Usefulness of biomarkers for cardiovascular disease	NARUSE Hiroyuki
6	Abnormalities of neurotransmission in neuropsychiatric and neurodegenerative disorders	MOURI Akihiro
7	Analysis of left ventricular dysfunction caused by emotional and physical stress using cardiac imaging	SUGIMOTO Keiko
8	Mechanisms of chromosomal aberrations	OHYE Tamae
9	HDL-miRNA as biomarker for the development of arteriosclerosis	ISHIKAWA Hiroaki
10	Usefulness of ultrasonography in gastroenterology	OSAKABE Keisuke
11	Effect of tryptophan metabolism on tumor immunity	YAMAMOTO Yasuko
12	Developing novel methods for metabolite analysis and applying drug discovery	FUJIGAKI Hidetsugu
13	Technical development of a useful tool for pathological diagnosis	SHIOGAMA Kazuya
14	Application to inflammatory diseases through various metabolic controls	HOSHI Masato
15	Promoting safe and appropriate blood transfusion and transplantation medicine	MATSUURA Hideaki

評価法・基準 Grading Policies	Your overall grade in the class will be decided based on the presentation and short reports. Feedback on your presentation will be provided by each instructor.

教科書 Textbook	Lecture materials are provided in the class when needed.	教材・参考書 Reference Book	Not specified.
オフィス アワー Office Hour	After the lecture, the questions will be accepted in each doctoral laboratory. Contact us by email if you have any questions.	連絡先 Contact	
準備学習 Preparation of study	Students prepare about each theme for 30 minutes before the class and review the theme for 30 minutes.	履修上の注意点 Notice for Students	

Molecular Genetics Seminar

専攻分野 Major Field	common subject	学年 Grade	1st year	期 間 Semester	1st semester
授業形態 Style	lecture, seminar	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	Face to face class	使用言語 Language	Japanese		
担当教員名 Instructor	OHYE Tamae, TAKEMATSU Hiromu, INAGAKI Hidehito, MIZUTANI Kenmei				
科目概要 Course Aims	Human genome clearly is the basis of health and disease of human. This course focuses onto the fundamental/molecular aspects on how genomic information is translated to human life. This knowledge is essential for medical practice as current medical information cannot be understood without it. Each class pick up topics on how genetic information is utilized at the levels of molecules, cells and organisms. In addition, emerging knowledge on genetic understanding of disease, such as chromosomal and genetic mutation will be covered.				
到達目標 Objectives	The goals of this course are to -be able to explain the basics of human genetics. -be able to explain the basics of molecular genetics. -be able to explain the application of molecular genetic knowledge in clinical practice. - be able to improve their linguistic skills through textbooks, reference books, and literature in English.				
回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)				担当教員 Instructor
1	From DNA to gene expression				INAGAKI Hidehito
2	DNA replication, recombination, and repair				INAGAKI Hidehito
3	Junk DNA sequences				INAGAKI Hidehito
4	Functional Genomics				INAGAKI Hidehito
5	Protein post-translational modification 1 (glycosylation)				TAKEMATSU Hiromu
6	Protein post-translational modification 2 (phosphorylation)				TAKEMATSU Hiromu
7	Genetics in cell biology and genetic modification of cells				TAKEMATSU Hiromu
8	Cell division and chromosome segregation				OHYE Tamae
9	Chromosome structure, Chromosome analysis				OHYE Tamae
10	Chromosome abnormalities and developmental mechanisms				OHYE Tamae
11	Cells and Tissues, Musculoskeletal System				MIZUTANI Kenmei
12	Respiratory System				MIZUTANI Kenmei
13	Digestive system				MIZUTANI Kenmei
14	Cardiovascular system				MIZUTANI Kenmei
15	Endocrine and nervous system, Urogenital and reproductive system				MIZUTANI Kenmei
評価法・基準 Grading Policies	Your overall grade in the class will be decided based on the question-and-answer session and short reports (Evaluation method differs for each teacher). The evaluation of each teacher is rated 1/4 and summed up to make a total evaluation (100%). Feedback of your the question-and-answer session will be provided by each instructor.				

教科書 Textbook	Information is supplied in the class when needed.	教材・参考書 Reference Book	1. The Cell (by B. Alberts, et al) 2. Molecular Cell Biology (by Lodish et al, Media Connected) 3. Campbell・Biology（by Maruzen）
オフィス アワー Office Hour	OHYE Tamae: 12:15-12:45, Monday-Friday at 103, building 10 TAKEMATSU Hiromu Rm325, Build3; contact with e-mail first INAGAKI Hidehito: Weekday at 302, building 4 MIZUTANI Kenmei : 12:15-12:45, Monday-Friday at room 504, building 6	連絡先 Contact	
準備学習 Preparation of study	Students are expected to read the documents and check the technical terms for 20 minutes before class.	履修上の注意点 Notice for Students	Active participation, hope for questions.

Consultation

専攻分野 Major Field	common subject	学年 Grade	1st year	期　間 Semester	2nd semester
授業形態 Style	Lecture, Seminar, Group work	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese		
担当教員名 Instructor	ITO Sakurako				
科目概要 Course Aims	This course teaches the theories and methodologies of consultation for supporting clinical and community healthcare providers to solve their problems effectively and practically. This course introduces the psychological characteristics of interpersonal and supportive relationships in consultation. The problems likely to arise in consultation, and the attitudes and techniques necessary to overcome those problems, such as self-awareness and counseling mind, are introduced through seminars and group work. The solution-focused approach, empowerment techniques, and supportive attitudes, which are useful to support others in solving their problems, would also be introduced through practical exercises.				
到達目標 Objectives	The goals of this course are to - be able to explain the basic concepts and principles of consultation, - be able to understand and explain the methodologies of advice, guidance, and coordination inside and outside of the medical team, - be able to understand the problems likely to occur during the consultation and their solutions, - be able to acquire the knowledge necessary to conduct effective consultation.				

回数 Chapters	授業計画（各回のテーマ） Course Schedule (topic for each time)	担当教員 Instructor
1-3	Consultation: Consultant and Consultee. Roles and required ability.	ITO Sakurako
4-5	Knowledge required for consulting and understanding consultees: Counseling mind.	ITO Sakurako
6-9	Basic knowledge and skills required for effective consultation: Micro-Counseling (Attending behavior, reflection, summarization, and focusing)	ITO Sakurako
10	Effective communication and prevention of miscommunication	ITO Sakurako
11-12	Multidimensional and comprehensive perspectives of consultation: Individual presentation on the research paper.	ITO Sakurako
13	Practical knowledge and skills for effective problem-solving: Solution-focused approach and the essence of solution building.	ITO Sakurako
14	Collaborative problem-solving: Tailor-made support for resource-based construction of solutions.	ITO Sakurako
15	Supportive attitudes toward problem-solving: Empowerment of consultees.	ITO Sakurako

評価法・基準 Grading policies	The overall grade for this course is evaluated based on the performance of the research paper and its presentation 40%, two short reports 30%, and active participation in the class 30%. Feedback on reports and presentations will be provided in the class.		
教科書 Textbook	Handouts are provided in the class.	教材・参考書 Reference Book	To be introduced in the class.
オフィス アワー Office Hour	ITO Sakurako: Thursday 12:00-12:50 or by appt. At Rm 408, Building 9.	連絡先 Contact	

準備学習 Preparation of study	For the preparation, read the handouts and do your homework when assigned (for 30 mins). Then, for the review, write the main points, new learnings, and questions (for 30 mins).	履修上の注意点 Notice for Students	Use MS PowerPoint slides for the presentation. Active participation, questions, and comments are highly encouraged and welcomed in this class.

Biological Information Engineering

専攻分野 Major Field	common subject	学年 Grade	1st year	期 間 Semester	night class:2nd semester
授業形態 Style	lecture, seminar	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese (Partly in English)		
担当教員名 Instructor	UMEZAWA Eizo, HATTORI Hidekazu, HIRANO Harutoyo				
科目概要 Course Aims	This course deals with artificial intelligent technologies. We first introduce the artificial neural network that simulates the information processing system of brain. And then, we will focus on the architecture and application of deep learning technologies. In addition, the application of radiation technology to biological research will be introduced. The work of the course is done via discussion (presentation).				
到達目標 Objectives	The goals of this course are to - be able to explain the principle of artificial neural network and deep learning, - be able to understand and explain the application of artificial neural network and deep learning, - be able to understand and explain the application of radiation technology to biological research.				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1	Mathematics for understanding the principles of artificial neural networks, Principles of back propagation method in deep learning 1	UMEZAWA Eizo
2	Mathematics for understanding the principles of artificial neural networks, Principles of back propagation method in deep learning 2	UMEZAWA Eizo
3	Mathematics for understanding the principles of artificial neural networks, Principles of back propagation method in deep learning 3	UMEZAWA Eizo
4	Mathematics for understanding the principles of artificial neural networks, Principles of back propagation method in deep learning 4	UMEZAWA Eizo
5	Mathematics for understanding the principles of artificial neural networks, Principles of back propagation method in deep learning 5	UMEZAWA Eizo
6	Introduction to CAD and its operation using artificial intelligence and statistical analysis for performance evaluation.	HATTORI Hidekazu
7	Introduction to CAD and its operation using artificial intelligence and statistical analysis for performance evaluation 2	HATTORI Hidekazu
8	Introduction to CAD and its operation using artificial intelligence and statistical analysis for performance evaluation 3	HATTORI Hidekazu
9	Introduction to CAD and its operation using artificial intelligence and statistical analysis for performance evaluation 4	HATTORI Hidekazu
10	Introduction to CAD and its operation using artificial intelligence and statistical analysis for performance evaluation 5	HATTORI Hidekazu
11	Fundamentals and recent research examples on recognition and regression models.	HIRANO Harutoyo
12	Fundamentals and recent research examples on recognition and regression models 2	HIRANO Harutoyo
13	Fundamentals and recent research examples on recognition and regression models 3	HIRANO Harutoyo
14	Fundamentals and recent research examples on recognition and regression models 4	HIRANO Harutoyo
15	Fundamentals and recent research examples on recognition and regression models 5	HIRANO Harutoyo

評価法・基準 Grading policies	Your overall grade in the class will be decided based on the presentation (50%) and short reports (50%). Feedback on your presentation will be provided by each instructor.		
教科書 Textbook	Will be introduced in the class.	教材・参考書 Reference Book	
オフィス アワー Office Hour	Ten minutes after class	連絡先 Contact	
準備学習 Preparation of study	Students are expected to read the documents for 30 minutes before class.	履修上の注意点 Notice for Students	To make a presentation, you will need a laptop with PowerPoint installed.

Radiological Information Technology

専攻分野 Major Field	common subject	学年 Grade	1st year	期　間 Semester	night class:1st semester, 2nd semester
授業形態 Style	Lecture, Practice	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese		
担当教員名 Instructor	SHIRAKAWA Seiji				
科目概要 Course Aims	In the medical radiation field, image processing is frequently used for digital images of each modality. In recent years, with the spread of AI (Artificial Intelligence), it is necessary to learn information processing technology. In radiological information technology, students will learn the basics of the Python language programming technology with a view to application to AI. Then, through programming of image processing and image reconstruction, the principle is understood.				
到達目標 Objectives	The goals of this course are to - be able to master Python language programming skills, - be able to understand and explain the principles of image processing and image reconstruction through programming.				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1	Introduction: Information processing in radiological technology	SHIRAKAWA Seiji
2	Python programming (1) Installation of programming tools	SHIRAKAWA Seiji
3	Python programming (2) Input and output, Arithmetic operations	SHIRAKAWA Seiji
4	Python programming (3) Control flow tools	SHIRAKAWA Seiji
5	Python programming (4) Programming exercise	SHIRAKAWA Seiji
6	Introduction: Image processing programming	SHIRAKAWA Seiji
7	Fundamentals of image processing programming: Smoothing (1)	SHIRAKAWA Seiji
8	Fundamentals of image processing programming: Smoothing (2)	SHIRAKAWA Seiji
9	Introduction: Image reconstruction (Filtered back projection: FBP)	SHIRAKAWA Seiji
10	Image reconstruction programming: Fourier transform (1)	SHIRAKAWA Seiji
11	Image reconstruction programming: Fourier transform (2)	SHIRAKAWA Seiji
12	Image reconstruction programming: Ramp filter	SHIRAKAWA Seiji
13	Image reconstruction programming: Inverse Fourier transform	SHIRAKAWA Seiji
14	Image reconstruction programming: Back projection processing	SHIRAKAWA Seiji
15	Image reconstruction programming: Creating a reconstructed image	SHIRAKAWA Seiji

評価法・基準 Grading Policies	Your final grade will be calculated according to the following process: 1) attitude in class (20%), 2) created programs (80%). Feedback describes the created program and processing results.		
教科書 Textbook	Textbooks and documents will be introduced in the class.	教材・参考書 Reference Book	

オフィス アワー Office Hour	SHIRAKAWA Seiji: 16:30-19:00, Friday, at 401-3, building 7	連絡先 Contact	
準備学習 Preparation of study	Students are expected to read documents about the lecture contents for 30 minutes before class.	履修上の注意点 Notice for Students	Students prepare a personal computer that can write and run python.

Radiological Basic Medicine

専攻分野 Major Field	common subject	学年 Grade	1st year	期 間 Semester	day class:2nd semester
授業形態 Style	lecture, seminar	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese		
担当教員名 Instructor	KOBAYASHI Shigeki, HATTORI Hidekazu				
科目概要 Course Aims	Lectures on basic radiation techniques applied to the field of radiology. We introduce and read the latest journals on advanced radiation basic technologies that are not conducted in undergraduate education and how to apply them to the latest medical radiation equipment and give lectures in the form of seminars.				
到達目標 Objectives	1. To acquire the latest basic radiation techniques in each field. 2. To understand the outline of medical radiation equipment and tests using the latest basic radiation technology. 3. To apply the contents of learning to own specialized research field.				
回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)				担当教員 Instructor
1	Basic Radiology				KOBAYASHI Shigeki
2	Basics and Clinical Applications of Single Photon Scan				KOBAYASHI Shigeki
3	Positron Emission Tomography: The History and Present Situation of Development and the Future				KOBAYASHI Shigeki
4	Fundamentals and Clinical Applications of Positron Emission Tomography 1				KOBAYASHI Shigeki
5	Basics and Clinical Applications of Positron Emission Tomography 2				KOBAYASHI Shigeki
6	MRI: History and Current Status of Development				KOBAYASHI Shigeki
7	MRI Latest Basic Technologies, Equipment and Clinical Applications 1				KOBAYASHI Shigeki
8	MRI Latest Basic Technologies, Equipment and Clinical Applications 2				KOBAYASHI Shigeki
9	CT Latest Basic Technologies, Equipment and Clinical Applications 1				HATTORI Hidekazu
10	CT Latest Basic Technologies, Equipment and Clinical Applications 2				HATTORI Hidekazu
11	The Basics, Current Status and Future of Contrast Agents				HATTORI Hidekazu
12	Latest basic technologies and clinical applications of flat panel detectors				HATTORI Hidekazu
13	Basics of Radiation Treatment (External Irradiation) and the Latest Circumstances				HATTORI Hidekazu
14	Basics and the latest circumstances of interstitial brachytherapy				HATTORI Hidekazu
15	Basics and latest circumstances of Radionuclide therapy				HATTORI Hidekazu
評価法・基準 Grading Policies	Attitude and understanding (report) Hold seminars centered on the moderators who decide every class. The evaluation method shall be made by remarks at the seminar and reports submitted after completion.				

教科書 Textbook	Distribute materials as needed.	教材・参考書 Reference Book	None
オフィス アワー Office Hour	KOBAYASHI: Building 7-4F-403 Monday 18:00～19:00 HATTORI: Building 3-2F-205, Thursday Friday 16:00～17:00	連絡先 Contact	
準備学習 Preparation of study	In each class, prepare and review at least 30 minutes of distributed journals.	履修上の注意点 Notice for Students	To actively speak and participate in discussions in order to proceed with discussions in the form of seminars. It is desirable to check in advance as the content, order, date of lecture, and time may change. Working students should be in touch with the faculty in charge of research prior to the first class.

Radiation Hygiene

専攻分野 Major Field	common subject	学年 Grade	1st year	期　間 Semester	night class: 1st, 2nd semester
授業形態 Style	lecture, seminar	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	1st semester (in Japanese), 2nd semester (in English)		
担当教員名 Instructor	ASADA Yasuki, YOKOYAMA Sumi				
科目概要 Course Aims	This course deals with the natural and artificial radiation sources and radiation exposure. In addition, we will focus on basic concepts of radiation protection systems and social impact.				
到達目標 Objectives	The goals of this course are to - be able to explain the natural and artificial radiation sources and radiation exposures. - be able to explain the national and international radiation protection systems. - be able to explain the above to the general public easily				

回数 Chapters	授業計画（各回のテーマ） Course Schedule (topic for each time)	担当教員 Instructor
1	Overview: Radiation hygiene	ASADA Yasuki
2	Radiation health effects	ASADA Yasuki
3	Natural radiation exposure	ASADA Yasuki
4	Medical exposure	ASADA Yasuki
5	Optimization of radiation protection	ASADA Yasuki
6	Historical overview of patient exposure	ASADA Yasuki
7	Diagnostic reference levels（1）：Overview	ASADA Yasuki
8	Diagnostic reference levels（2）：Historical overview	ASADA Yasuki
9	Diagnostic reference levels（3）：Diagnostic reference levels in Japan	ASADA Yasuki
10	Diagnostic reference levels（4）：Summarize	ASADA Yasuki
11	Radiation risks（1）：natural radiation and radionuclides	YOKOYAMA Sumi
12	Radiation risks（2）：lesson and learn from radiation accidents	YOKOYAMA Sumi
13	Radiation risks（3）：radioactive waste	YOKOYAMA Sumi
14	Radiation risk communication(1)：Radiation exposure（Discussion）	YOKOYAMA Sumi
15	Radiation risk communication(2)：Radiation protection（Discussion）	YOKOYAMA Sumi

評価法・基準 Grading Policies	Your overall grade in the class will be decided based on the following: - Class attitude in class and class contribution: 70%, Preparation for classes: 20% and Report : 10% Feedback: Assess by discussing issues during each lecture.		
教科書 Textbook	Will be introduced in the class.	教材・参考書 Reference Book	ICRP Publication 103 and other books related to the topics
オフィス アワー Office Hour	Tuesday 19：30～19：40 ASADA Yasuki：building 7 3F 301 YOKOYAMA Sumi：after lecture	連絡先 Contact	
準備学習 Preparation of study	Students are expected to read the documents for 15 minutes before class.	履修上の注意点 Notice for Students	Students are expected to actively participate in discussions.

Magnetic Resonance Imaging Analysis

専攻分野 Major Field	common subject	学年 Grade	1st year	期 間 Semester	night class:1st semester
授業形態 Style	lecture, seminar	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese		
担当教員名 Instructor	TAKATSU Yasuo, SHIIBA Takuro				
科目概要 Course Aims	The quantitative information obtained by magnetic resonance imaging (MRI) analysis has become essential in diagnostic imaging and neuroimaging research. In this course, we will learn about the principles of magnetic resonance imaging, imaging techniques, and analysis methods and will be introduced to some of its clinical applications.				
到達目標 Objectives	The goals of this course are to - be able to explain the imaging techniques and characteristics of MRI. - be able to explain the principles of MRI analysis. - be able to explain the clinical applications of MRI analysis.				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1	Basics of MRI analysis 1: Outline of MRI analysis	TAKATSU Yasuo
2	Basics of MRI analysis 2: SNR	TAKATSU Yasuo
3	Basics of MRI analysis 3: Uniformity	TAKATSU Yasuo
4	Basics of MRI analysis 4: Slice thickness	TAKATSU Yasuo
5	Basics of MRI analysis 5: Relaxation time	TAKATSU Yasuo
6	Basics of MRI analysis 6: The other measurement	TAKATSU Yasuo
7	Analysis of the Brain: Principles of VBM Analysis	SHIIBA Takuro
8	Analysis of the Brain: Processing required for VBM analysis: spatial normalization and signal bias correction techniques	SHIIBA Takuro
9	Analysis of the Brain: Practice in VBM Analysis	SHIIBA Takuro
10	Analysis of the Brain: Principles of Diffusion Tensor Image Analysis	SHIIBA Takuro
11	Analysis of the Brain: Practice in Diffusion Tensor Image Analysis	SHIIBA Takuro
12	Histogram analysis of ADC images	SHIIBA Takuro
13	Hemodynamic Analysis	SHIIBA Takuro
14	Clinical Application Ⅰ: Neurodegenerative Diseases	SHIIBA Takuro
15	Clinical Application Ⅱ: Oncology	SHIIBA Takuro

評価法・基準 Grading Policies	Your overall grade in the class will be decided based on the reports (100%) to evaluate knowledge and logical expression skills. Reports will be feedback by Moodle system.		
教科書 Textbook	The instructor will distribute materials as needed.	教材・参考書 Reference Book	MRI 応用自在 第 4 版、高原太郎(監修)、メジカルビュー社 ISBN-13: 978-4758321020 決定版 MRI 完全解説 第 2 版 、荒木力(著)、学研メディカル秀潤社 ISBN-13: 978-4780908855

オフィス アワー Office Hour	TAKATSU Yasuo: 17:30–18:30, Tuesday to Thursday at 401, building 7. SHIIBA Takuro: 16:10-17:00, Tuesday to Thursday at 401, building 7.	連絡先 Contact	
準備学習 Preparation of study	Students are expected to read the documents or articles for 30 minutes before class and summarize the lecture's key points in a notebook for 30 minutes after class.	履修上の注意点 Notice for Students	Pay attention to e-mail communication, as timetables may change. If you are absent from the lecture, please contact the instructor by e-mail in advance.

Environmental Pathophysiology

専攻分野 Major Field	common subjects	学年 Grade	1st year	期 間 Semester	2nd semester
授業形態 Style	lectures and seminars	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese		
担当教員名 Instructor	SUZUKI Koji, KAMEI Tetsuya, SUGIMOTO Keiko, FUJIGAKI Hidetsugu, SAKAGUCHI Eirin, KUNISAWA Kazuo				
科目概要 Course Aims	Human biological functions maintain homeostasis by responding to various external and internal environments. However, various stressors in the daily environment cause homeostasis modulation and rupture, causing disease. In this course, we will provide the means and topics for understanding the factors that cause these conditions, their mechanism of action, biological reactions, and acquire knowledge to think about various environments that threaten health.				
到達目標 Objectives	1) Understand the interrelationship between a ring factor and a living body and explain it to others. 2) To be able to acquire the knowledge and the ability to consider the basics of environmental and pathological sciences and explain them to others. 3) To be able to understand the outline of various diseases and the research methods, and explain to others.				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1	Environmental factors and diseases	SUZUKI Koji
2	Lifestyle and health	SUZUKI Koji
3	The Role of Epidemiological Study in Guidelines	SUGIMOTO Keiko
4	Guidelines related to lifestyle-related diseases	SUGIMOTO Keiko
5	Relationship between Heavy Metals and Diseases	KAMEI Tetsuya
6	Reality of Heavy Metal Poisoning	KAMEI Tetsuya
7	Environmental pollution and environmental hormones	FUJIGAKI Hidetsugu
8	Effects of environmental endocrine disruptors on human health	FUJIGAKI Hidetsugu
9	Recent topics of environmental hormones and their effects	FUJIGAKI Hidetsugu
10	Hormones and diseases 1 pituitary gland	SAKAGUCHI Eirin
11	Hormones and diseases 2 thyroid gland	SAKAGUCHI Eirin
12	Hormones and diseases 3 adrenal glands	SAKAGUCHI Eirin
13	The relevance of environmental stress to disease	KUNISAWA Kazuo
14	The relevance of environmental factors to immune system	KUNISAWA Kazuo
15	The relevance of environmental factors to gut microbiota	KUNISAWA Kazuo

評価法・基準 Grading Policies	Evaluation method: Comprehensive evaluation is made based on the attitude of participation in the class, the content of discussion (80%), and assignment reports (20%). Standard: Create and submit reports as needed to check the achievement of the target. Feedback: After the assignment report, give a model explanation.		
教科書 Textbook	Each faculty distributes materials.	教材・参考書 Reference Book	Each faculty member will introduce.

オフィス アワー Office Hour	10 minutes after class Others will be emailed to each faculty member.	連絡先 Contact	
準備学習 Preparation of study	For each theme, prepare for about 30 minutes and prepare your thoughts. After taking the course, review and summarize about 60 minutes with reference to the handouts.	履修上の注意点 Notice for Students	Some faculty members are required to submit reports.

Medical Engineering

専攻分野 Major Field	common subjects	学年 Grade	1st year	期 間 Semester	2nd semester
授業形態 Style	seminar	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese		
担当教員名 Instructor	HIBIYA Makoto, IHIRA Masaru, OHASHI Atsushi, HORI Hideo, KAWAGUCHI Kazunori				
科目概要 Course Aims	In this seminar, we lecture the influences of life support equipment or other medical instruments on living human body, such as artificial heart and lung or blood purifier. The influences of these equipment will be discussed from the perspectives both of the living body's condition as a treatment recipient and of the equipment itself as influencing factors. We assume the following factors as influencing factors of the equipment; their physical factors such as their functions or materials, medicine including substitute fluid used for the equipment. Through this lecture, we hope that students will gain the ability to consider the management and medical safety of medical equipment based on their knowledge of the equipment features and of pathophysiology of patients' diseases. We proceed with this lecture through the students' group work or group discussion.				
到達目標 Objectives	1. The students can explain the patient's pathophysiological condition to others based on the physiological understanding of whole human body. 2. The students can explain the relationship between the medical devices and living human body to others based on their deep consideration from various aspects. 3. The students can explain the effects, invasion, stress or other influences of treatment using medical equipment to others based on their deep consideration. 4. The students can explain the safety measures to accidents caused by medical equipment. 5. The students can explain the medical safety associated to medical equipment to others.				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1	The history of problem solving to the development of cardiopulmonary bypass	HIBIYA Makoto
2	Cardiopulmonary bypass operation and equipment management	HIBIYA Makoto
3	Past and present status of safety devices used for extracorporeal circulation Extracorporeal circulation technology and its evidence	HIBIYA Makoto
4	Cardiac function and its monitoring	IHIRA Masaru
5	The evaluation of cardiac function and its monitoring	IHIRA Masaru
6	Monitoring of non-invasive biological information	IHIRA Masaru
7	The history of blood purification therapy and related risks	OHASHI Atsushi
8	The relationship between blood purification-related devices and biocompatibility	OHASHI Atsushi
9	The onset of uremic sarcopenia in dialysis patients and the possibility of removing protein-bound uremic toxin using blood purification method.	OHASHI Atsushi
10	The safety management of electromagnetic therapy equipment, mechanical therapy equipment, light therapy equipment, ultrasound therapy equipment, endoscopes, and heat therapy equipment.	HORI Hideo
11		
12		

13	Advanced Information Literacy 1（Learn about remote control using PC and mobile devices）	KAWAGICHI Kazunori
14	Advanced Information Literacy 2（Learn about handling IoT sensors）	KAWAGICHI Kazunori
15	Advanced Information Literacy 3（Learn about file compression and file format conversion）	KAWAGICHI Kazunori

評価法・基準 Grading Policies	Evaluating method：We evaluate based on class notes (30%, Show the rubric), group work and group discussion (70%). Standard：We evaluate about “objectives 1-5” mentioned in the above column. Feedback：Instructors will inform the results of group work and group discussions during the seminars.		
教科書 Textbook	There is no specific textbook. Necessary materials are prepared by teachers.	教材・参考書 Reference Book	Yuichi Ueda. “Progress in cardio-pulmonary bypass”. Nagoya Univ.
オフィスアワー Office Hours	Office hours are basically 10 minutes after the lecture. Otherwise, at any time (Please contact us by email first).	連絡先 Contacts	
準備学習 Preparation of study	There is no preparatory study, but review the materials distributed during the lecture for about 2hours. Questions will be taken during class. We expect positive remarks.	履修上の注意点 Notice for Students	It assumes knowledge of undergraduate physiology, anatomy, biochemistry, and basic mathematics. The content may change depending on the background of the student.

Medical Robotics Engineering

専攻分野 Major Field	common subjects	学年 Grade	1st year	期　間 Semester	1st semester
授業形態 Style	seminar	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese		
担当教員名 Instructor	ITO Hiroyasu, FUJIGAKI Hidetsugu				
科目概要 Course Aims	Robots are beginning to be used in a variety of fields such as healthcare, welfare, and disaster relief. For example, robotic assisted surgery systems enable less invasive and more precise remote surgeries. Robots are also being used to automate the processing of medicines and specimens, enabling safe and accurate medications and laboratory testing. The purpose of this course is to provide the knowledge necessary to utilize robot technology in the medical and welfare fields.				
到達目標 Objectives	1) To be able to list examples of robots used in the medical and welfare fields. 2) To be able to understand and explain the characteristics of robots used in the medical and welfare fields. 3) To be able to state their own ideas about the future use of robots in the medical and welfare fields.				
回数 Chapters	授業計画（各回のテーマ） Course Schedule			担当教員 Instructor	
1	Basic robot operating principles and control methods			FUJIGAKI Hidetsugu	
2	Development of clinical laboratory-related robots and history of automation of laboratory equipment			ITO Hiroyasu	
3	Development and application of surgical robots			ITO Hiroyasu	
4	Development and application of fully automated PCR system			ITO Hiroyasu	
5	Development and application of automated microbiological testing system			ITO Hiroyasu	
6	Development and application of automated medicine and laboratory sample transportation robots			ITO Hiroyasu	
7	Development and application of automated blood collection device			ITO Hiroyasu	
8	Development and application of automated medical samples sorting robots			ITO Hiroyasu	
9	Development and application of automated biochemistry and hematology analyzers			FUJIGAKI Hidetsugu	
10	The future of clinical laboratory and robotics			ITO Hiroyasu	
11	General discussion 1			ITO Hiroyasu	
12	Development and application of robots in basic research			FUJIGAKI Hidetsugu	
13	Current status and future prospects of microbiological testing			FUJIGAKI Hidetsugu	
14	Utilization of robots in the medical nursing care field			FUJIGAKI Hidetsugu	
15	General discussion 2			ITO Hiroyasu	
評価法・基準 Grading Policies	Evaluation method: The content of reports (100%). Criteria: Create and submit reports as needed to check the achievement of the objectives. Feedback: After the assignment report, give a model explanation.				

教科書 Textbook	Each faculty distributes materials.	教材・参考書 Reference Book	Each faculty member will introduce some reference books.
オフィス アワー Office Hour	ITO：after class FUJIGAKI：after class	連絡先 Contact	
準備学習 Preparation of study	For each theme, prepare for about 30 minutes and prepare your thoughts. After taking the course, review and summarize about 60 minutes with reference to the handouts.	履修上の注意点 Notice for Students	Participate actively during the discussion time.

2. Clinical Laboratory Sciences

Clinical Laboratory Sciences Seminar I

専攻分野 Major Field	Clinical Laboratory Sciences	学年 Grade	1st year	期 間 Semester	1st semester
授業形態 Style	lecture, seminar	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese		
担当教員名 Instructor	ICHINO Naohiro, OHASHI Koji, NARUSE Hiroyuki, SUGIMOTO Keiko, ISHIKAWA Hiroaki, OSAKABE Keisuke, SHIOGAMA Kazuya, HOSHI Masato, IMAMURA Seiji, MATSUURA Hideaki, SAKAGUCHI Eirin, HIGASHIMOTO Yuki				
科目概要 Course Aims	In Clinical Laboratory Medicine Seminar I, we will give a developmental lecture on each of our studies. Lectures will cover basic knowledge and research methods required in the field of clinical laboratory science. This lecture is intended as a reference for graduate students to begin or further develop their research in the future.				
到達目標 Objectives	1. To be able to understand and explain research in the field of clinical laboratory science. 2. Learn how to plan experimental designs and describe them logically. 3. To be able to establish and develop methodologies for future research.				
回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)				担当教員 Instructor
1	Clinical significance of tissue stiffness measurement in ultrasonography				ICHINO Naohiro
2	Mechanisms of oxidative stress to cellular damage and ferotosis				OHASHI Koji
3	Clinical research on cardiovascular disease				NARUSE Hiroyuki
4	The Latest Analysis Methods for Echocardiography				SUGIMOTO Keiko
5	Importance of miRNAs analysis for each miRNA carrier				ISHIKAWA Hiroaki
6	Usefulness of Ultrasonography in Gastrointestinal Diseases				OSAKABE Keisuke
7	Principles and practice of immunostaining				SHIOGAMA Kazuya
8	Principles and practice of in situ hybridization				SHIOGAMA Kazuya
9	Clinical research on urine particles				HOSHI Masato
10	Controlling Antibodies in Hemolytic Transfusion Reactions				MATSUURA Hideaki
11	Tissue Compatibility in Transplantation				MATSUURA Hideaki
12	Antimicrobial susceptibility testing of β-lactamase producing bacteria				IMAMURA Seiji
13	Clinical research in cardiac ultrasound				SAKAGUCHI Eirin
14	Clinical research in renal disease				SAKAGUCHI Eirin
15	Genomic Analysis and MALDI-TOF MS in Clinical Microbiology				HIGASHIMOTO Yuki
評価法・基準 Grading Policies	Evaluation method and criteria: 100% based on class participation and attitude. Feedback: When assignments are submitted, they will be returned with a written evaluation.				
教科書 Textbook	Handouts will be distributed as appropriate.	教材・参考書 Reference Book	None in particular.		

オフィス アワー Office Hour	ICHINO : lunch break and after class. Students need to contact to each instructor by e-mail. OHASHI : 12:10-13:00 Monday Friday, at 213, building 3. NARUSE : lunch break and after class. Students need to contact to each instructor by e-mail. SUGIMOTO : 17:00-18:00 Monday-Friday at 501, building 6 ISHIKAWA : 12:10-13:00 Monday-Friday, at 212, building 3 OSAKABE : lunch break and after class. Students need to contact to each instructor by e-mail. SHIOGAMA : lunch break and after class. Students need to contact to each instructor by e-mail. Monday-Friday, at 210, building3 IMAMURA : 17:00-19:00, Monday-Friday at 305, building 3 MATSUURA : 17:00-19:00, Monday-Friday at 303, building 3 SAKAGUCHI : Monday 12 : 10～13 : 00, at 203, building 3 HIGASHIMOTO : 17:00-19:00, Monday-Friday at 308, building 3	連絡先 Contact	
準備学習 Preparation of study	Graduate students should research and study the lecture content for about 30 minutes in advance.	履修上の注意点 Notice for Students	Review for approximately 30 minutes with handouts from the instructor.

Clinical Laboratory Sciences Seminar II

専攻分野 Major Field	Clinical Laboratory Sciences	学年 Grade	1st year	期 間 Semester	2nd semester
授業形態 Style	lecture, seminar	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese		
担当教員名 Instructor	SAITO Kuniaki, TAKEMATSU Hiromu, SUZUKI Koji, MOURI Akihiro, NAITO Yuko, YAMAMOTO Naoki, YAMAMOTO Yasuko, KUNISAWA Kazuo				
科目概要 Course Aims	Laboratory Medicine Seminar II offers special lectures on various research fields that are different from Advanced Laboratory Medicine I. The content covers a wide range of research and methods, including molecular biology, epidemiology/statistics, regenerative medicine, and pharmacology, and is useful for future research.				
到達目標 Objectives	The goals of this course are to − be able to understand the latest research methods and techniques used in life sciences research. − be able to interpret and explain the outline of the latest research in the life sciences. − be able to explore new approaches to research.				
回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)				担当教員 Instructor
1	Omics analyses in various diseases				SAITO Kuniaki
2	Cell division cycle and glycolipids				TAKEMATSU Hiromu
3	Intracellular signaling and protein degradation				TAKEMASTSU Hiromu
4	The basics of epidemiological studies and prevention of disease				SUZUKI Koji
5	Molecular epidemiology of lifestyle-related diseases				SUZUKI Koji
6	Pathological hypothesis and pharmacology of psychiatric disorders				MOURI Akihiro
7	Drug development and its methodology using animal models of psychiatric disorders				MOURI Akihiro
8	Modulation of immune responses by glycans				NAITO YUKO
9	Animal species specificity of diseases caused by differences in glycans				NAITO YUKO
10	Basic and clinical regenerative medicine with iPS cells.				YAMAMOTO Naoki
11	Basic of tissue and cancer stem cells, and the certification system for cell culture technician				YAMAMOTO Naoki
12	Metabolic changes in various diseases.				YAMAMOTO Yasuko
13	Development of biomarkers by metabolomic analysis				YAMAMOTO Yasuko
14	Pathophysiological hypothesis and pharmacology of neurodegenerative diseases				KUNISAWA Kazuo
15	Drug development using animal models of neurodegenerative diseases				KUNISAWA Kazuo
評価法・基準 Grading Policies	Grading will be described based on students' attitude (30%), Discussion with faculty members etc. (70%) by course manager SAITO Kuniaki.				

教科書 Textbook	Handouts will be distributed as appropriate.	教材･参考書 Reference Book	None in particular.
オフィス アワー Office Hour	SAITO : Tuesday 12 : 00～13:00 TAKEMATSU : 17:00-19:00, Monday-Friday at 101, building 10 SUZUKI : 12 : 10-12 : 45 or after the class, at 201, building 3. Anytime by e-mail. MOURI : 10:30-11:30, Wednesday at 102, building 10. NAITO : after each class or Tuesday 15:00-17:00, at 324, building 3 YAMAMOTO Naoki : At teacher room, No.202, building 11; after the class; Anytime by e-mail YAMAMOTO Yasuko : Tuesday 12 : 00-13:00 KUNISAWA : 12:00-13:00, Wednesday at 102, building 10	連絡先 Contact	
準備学習 Preparation of study	30 min preparation on each seminar are needed.	履修上の注意点 Notice for Students	Students are advised to summarize each seminar after the class.

Laboratory Animal Science Seminar

専攻分野 Major Field	Clinical Laboratory Sciences	学年 Grade	1st year	期 間 Semester	1st semester
授業形態 Style	lecture, practice	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class / face-to-face class	使用言語 Language	Japanese (partly in English)		
担当教員名 Instructor	NAGAO Shizuko, YOSHIMURA Aya, KUGITA Masanori, KUMAMOTO Kanako				
科目概要 Course Aims	Disease model animals for human are indispensable for basic research in the medical field. Therefor the main aims of this course are follows: (1) Proper breeding and management of animal models for human diseases. (2) Laws and regulations related to animal experiments and ethics of animal experiments. (3) Points necessary for designing an appropriate animal experiment. (4) Proper handling of experimental animals and appropriate procedures for animal experiments. Through these, students learn the appropriate research methods using diseases animal that can contribute to the development of medical care.				
到達目標 Objectives	The goals of this course are to - be able to learn and explain the basics of proper breeding, breeding and management methods. - be able to understand and explain relevant laws and ethics of animal experiments. - be able to learn how to formulate an animal experiment plan and state logically. - be able to learn and practice experimental animal handling and animal experimentation techniques.				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1	How to proceed with this lecture and to grade evaluation	NAGAO Shizuko
2	Lecture- Animal experiments, and handling of laboratory animals	NAGAO Shizuko
3	Lecture- Breeding and storage of laboratory animals	NAGAO Shizuko
4	Lecture- Law for the Humane Treatment and Management of Animals, related laws, ordinances, guidelines	NAGAO Shizuko
5	Lecture-Regulations for the Management of Laboratory Animals in Fujita Health University and guidelines	NAGAO Shizuko
6	Lecture- How to get your safety in animal experiment, How to design animal experimental plans	NAGAO Shizuko
7	Lecture- How to use the facility, Topics about animal experiments	NAGAO Shizuko
8	Practice- Handling of laboratory animals, Administration (oral, intraperitoneal, subcutaneous, intravenous) to laboratory animals-1	NAGAO Shizuko, YOSHIMURA Aya, KUGITA Masanori, KUMAMOTO Kanako
9	Practice- Handling of laboratory animals, Administration (oral, intraperitoneal, subcutaneous, intravenous) to laboratory animals-2	NAGAO Shizuko, YOSHIMURA Aya, KUGITA Masanori, KUMAMOTO Kanako
10	Practice- How to animal experiments; Inhalation anesthesia, CT imaging (head, chest, abdomen, contrast agent), In vivo bioluminescence and fluorescence imaging captured with LagoX-1	NAGAO Shizuko, YOSHIMURA Aya, KUGITA Masanori, KUMAMOTO Kanako

11	Practice- How to animal experiments; Inhalation anesthesia, CT imaging (head, chest, abdomen, contrast agent), In vivo bioluminescence and fluorescence imaging captured with LagoX -2	NAGAO Shizuko, YOSHIMURA Aya, KUGITA Masanori, KUMAMOTO Kanako
12	Practice- How to animal experiments; Clinical biochemical test (blood glucose level, urine collecting method), Clinical physiology test (blood pressure measurement), Practice suture using pseudo skin, and Euthanasia by carbon dioxide-1	NAGAO Shizuko, YOSHIMURA Aya, KUGITA Masanori, KUMAMOTO Kanako
13	Practice- How to animal experiments; Clinical biochemical test (blood glucose level, urine collecting method), Clinical physiology test (blood pressure measurement), Practice suture using pseudo skin, and Euthanasia by carbon dioxide-2	NAGAO Shizuko, YOSHIMURA Aya, KUGITA Masanori, KUMAMOTO Kanako
14	Practice- How to animal experiments; Reproductive physiology (vaginal smear specimen, impedance), and 1) Drawing blood and organ observation, 2) Perfusion fixation, or 3) Anesthesia and surgery (Choose specializations from 1, 2 and/or 3)-1	NAGAO Shizuko, YOSHIMURA Aya, KUGITA Masanori, KUMAMOTO Kanako
15	Practice- How to animal experiments; Reproductive physiology (vaginal smear specimen, impedance), and 1) Drawing blood and organ observation, 2) Perfusion fixation, or 3) Anesthesia and surgery (Choose specializations from 1, 2 and/or 3)-2	NAGAO Shizuko, YOSHIMURA Aya, KUGITA Masanori, KUMAMOTO Kanako
評価法・基準 Grading Policies	Your overall grade in the class will be decided based on the following: Class attendance and attitude in class:40%, Short reports:30%, oral examination:30% Create reports for lectures and practical training to measure the level of understanding of the goals. After the oral examination, give model answers and commentary and give feedback.	

教科書 Textbook	Handouts	教材・参考書 Reference Book	NONE
オフィスアワー Office Hour	12:00-13:00 Monday-Friday At Animal center, B3F, building 1 15 minutes before and after the class Anytime by e-mail	連絡先 Contact	
準備学習 Preparation of study	Students are expected to read handout for 45 minutes before the class and understand technical terms. Students are expected to review the lecture for 45 minutes after the lecture and prepare for oral examinations.	履修上の注意点 Notice for Students	Students should keep positive attitude. If students wish to conduct an animal experiment when creating the master's thesis, you must attend the course.

Practice of Clinical Research Coordinate

専攻分野 Major Field	Clinical Laboratory Sciences	学年 Grade	1st year	期 間 Semester	2nd semester
授業形態 Style	practice	単位 Credits	2	時間数 Hours	60
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese		
担当教員名 Instructor	MOURI Akihiro, UESUGI Keiko, NANATSUMURA Megumi, TERAMACHI Mayumi, WAKINOSONO Mari, OHARA Kentaro, NAKAI Tsuyoshi, KOSEKI Takenao				
科目概要 Course Aims	The aim of this practice is understanding the role of clinical trials and clinical research coordinators (CRCs). Specifically, students will learn about the clinical trial protocol, explanation to the investigators (such as the details of drug development, mechanisms of action in the body, non-clinical and clinical data), explanation to the subject about clinical trial and support decision making, consultation to the medical team, and preparation a case report about medical check values and follow-ups. Under the guidance of the CRC, students will experience the work on-the-job and master practical skills for CRC.				
到達目標 Objectives	The goals of this course are to - be able to understand clinical trials and the role of CRC				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1	Flow of clinical research and clinical trials, and basic terms, how to read protocols and investigator's brochure	MOURI Akihiro UESUGI Keiko NANATSUMURA Megumi TERAMACHI Mayumi WAKINOSONO Mari OHARA Kentaro NAKAI Tsuyoshi KOSEKI Takenao
2	Rules and guidelines for clinical research and clinical trials	
3	Methodology of clinical research and clinical trials	
4	The role and function of the clinical trial center and institutional review board	
5	The practical CRC operations in medical institutions (1)	
6	The practical CRC operations in medical institutions (2)	
7	Quality control of clinical research and clinical trials in medical institutions, and quality control of inspection devices using evaluation of efficacy and safety.	
8	The role of CRCs in Informed Consent (IC) in clinical research How to support the patients (research subjects) during IC process	
9	Business manners and negotiation skills	
10	The practical data management and preparation of a report (case report) about observational data at clinical research facilities.	
11	The practical project management	
12-30	In attendance on CRC and simulation of CRC. Role-play an IC	

評価法・基準 Grading Policies	Your overall grade in the class will be decided based on the presentation 60% and short reports 40%. Feedback of your presentation will be provided by each instructor.		
教科書 Textbook		教材・参考書 Reference Book	(1)CRC テキストブック、第 4 版(2021 年改訂版)、医学書院 (2)臨床薬理学、第 4 版(2017 年発行)、医学書院

オフィス アワー Office Hour	MOURI Akihiro: 10:30-11:30, Wednesday at 1F 102, building10 UESUGI Keiko: 9:30-11:30, Wednesday at 7F, building9 NANATSUMURA Megumi: 9:30-11:30, Wednesday at 7F, building9 TERAMACHI Mayumi: 9:30-11:30, Wednesday at 7F, building9 WAKINOSONO Mari: 9:30-11:30, Wednesday at 7F, building9 OHARA Kentaro : 9:30-11:30, Wednesday at 5F, building 5. NAKAI Tsuyoshi : 9:30-11:30, Wednesday at 1F, staff building I. KOSEKI Takenao: 9:30-11:30, Wednesday at 7F, building 9	連絡先 Contact	
準備学習 Preparation of study	Students are expected to read the documents for 30 minutes before class.	履修上の注意点 Notice for Students	In principle, this lecture is limited to graduate students affiliated in Regulatory Sciences. Students are advised to summarize each seminar after the class.

Principle Lecture of Clinical Studies and Trials

専攻分野 Major Field	Clinical Laboratory Sciences	学年	1st year	期 間 Semester	1st semester
授業形態 Style	lecture, group work	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese		
担当教員名 Instructor	MOURI Akihiro, UESUGI Keiko, NANATSUMURA Megumi, SASAKI Yasuyuki, TERAMACHI Mayumi, WAKINOSONO Mari, KOSEKI Takenao				
科目概要 Course Aims	The efficacy and safety of candidate substances for pharmaceuticals (diagnostic drugs and therapeutics) are confirmed by clinical trials, reviewed by the Pharmaceuticals and Medical Devices Agency (PMDA), and finally approved by the Ministry of Health, Labour and Welfare. Based on professional function of clinical research coordinators (CRCs) and PMDA reviewer, the history and ethics of clinical research and clinical trials, pharmaceutical regulation, approval review of pharmaceuticals, and roles and operations of stakeholders will be lectured.				
到達目標 Objectives	The goals of this course are to - be able to understand overall clinical research and clinical trials.				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1	The flow of drug development and the system of medical institutions: Professionals involved in clinical trials and Features of clinical trials and medical device trials	KOSEKI Takenao
2	Methodology of clinical trials, basics of biostatistics, and basics of clinical pharmacology	KOSEKI Takenao
3	CRC operations: practical CRC operations (1)	TERAMACHI Mayumi
4	CRC operations: practical CRC operations (2)	MOURI Akihiro KOSEKI Takenao
5	CRC operations: How to read protocols and investigator's brochure, the role of CRCs and ethical attitudes required as research collaborators	NANATSUMURA Megumi
6	Interpersonal (human relations) ability 1. Communication theory/subject's minds: Communication in clinical research teams 2. Experiences of patients participating in clinical research: Learning from narratives	NANATSUMURA Megumi
7	Business manners and negotiation skills	SASAKI Yasuyuki
8	Subject protection 1. The role of CRCs in Informed Consent (IC) in clinical research 2. The role of the ethics review committee (IRB/EC): The role and function of the trial review committee	WAKINOSONO Mari
9	Research ethics: History of clinical research and ethical guideline/ Legal systems for the diversity of clinical research	WAKINOSONO Mari
10	Pharmaceuticals and medical devices act, health insurance law regulations: laws and non-insurance combined medical expenses system applicable to drug development	UESUGI Keiko
11	Responsibility for the management of clinical trial drugs: Practical management of clinical trial drugs	KOSEKI Takenao
12	Quality control and assurance: Monitoring, audit, and inspections for GCP by pharmaceutical regulator	TERAMACHI Mayumi

13	Project management 1. Clinical trial sponser's system and investigator-initiated clinical trial and clinical research system: The role of clinical trial requesters in sponser clinical trials 2. Investigator-initiated clinical research (including investigator-initiated clinical trials) system	TERAMACHI Mayumi
14	Data management: Purpose and methods of data management in clinical research Features of clinical trials for regenerative medicine	KOSEKI Takenao
15	Expectations for CRC: CRC career paths, aims and images, and expectations from researchers, medical institution heads and clinical trial requesters	UESUGI Keiko

評価法・基準 Grading Policies	Your overall grade in the class will be decided based on the presentation 60% and short reports 40%. Feedback of your presentation will be provided by each instructor.		
教科書 Textbook		教材・参考書 Reference Book	CRC テキストブック、第 4 版(2021 年改訂版)、医学書院 臨床薬理学、第 4 版(2017 年発行)、医学書院
オフィス アワー Office Hour	MOURI Akihiro: 10:30-11:30, Wednesday at 1F 102, building 10 UESUGI Keiko: 9:30-11:30, Wednesday at 7F, building 9 NANATSUMURA Megumi: 9:30-11:30, Wednesday at 7F, building 9 SASAKI Yasuyuki: 9:30-11:30, Wednesday at 7F, building 9 TERAMACHI Mayumi: 9:30-11:30, Wednesday at 7F, building 9 WAKINOSONO Mari: 9:30-11:30, Wednesday at 7F, building 9 KOSEKI Takenao: 9:30-11:30, Wednesday at 7F, building 9	連絡先 Contact	
準備学習 Preparation of study	Students are expected to read the documents for 30 minutes before class.	履修上の注意点 Notice for Students	In principle, this lecture is limited to graduate students affiliated in Regulatory Sciences. Students are advised to summarize each seminar after the class.

Advanced Medical Development Seminar

専攻分野 Major Field	Clinical Laboratory Sciences	学年 Grade	1st year	期 間 Semester	1st semester
授業形態 Style	lecture, group work	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese (partly in English)		
担当教員名 Instructor	MOURI Akihiro, KUNISAWA Kazuo, CHIHARA Takeshi, MORIYA Yuka, ARIOKA Yuko, SAKURAI Kohei				
科目概要 Course Aims	The development of advanced medical care requires the ability to surpass the entire basic research. Students will learn about the process from exploratory research to commercialization, based on research and development examples of actual pharmaceuticals (diagnostic drugs and therapeutics) and food companies.				
到達目標 Objectives	The goals of this course are to - be able to explain the knowledge, ideas, and surveys for the development of pharmaceuticals and functional foods.				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1	Overview of development of pharmaceuticals (diagnostics and therapeutics) and functional foods	MOURI Akihiro
2	Trends in advanced medical care for mental disorders	MOURI Akihiro
3	Discovery of pharmaceutical seeds for psychiatric disorders	MOURI Akihiro
4	Trends in advanced medical care for neurodegenerative disorders	KUNISAWA Kazuo
5	Discovery of pharmaceutical seeds for neurodegenerative disorders	KUNISAWA Kazuo
6	Frontiers in diagnostic drug development (1)	MOURI Akihiro
7	Frontiers in diagnostic drug development (2)	KUNISAWA Kazuo
8	Frontiers in diagnostic drug development (3)	SAKURAI Kohei
9	Frontiers in diagnostic drug development (4)	ARIOKA Yuko
10	Frontiers in therapeutics development (1)	KUNISAWA Kazuo
11	Frontiers in therapeutics development (2)	MOURI Akihiro
12	Frontiers in therapeutics development (3)	MORIYA Yuka
13	Frontiers in functional food development (1)	MOURI Akihiro
14	Frontiers in functional food development (2)	KUNISAWA Kazuo
15	Frontiers in functional food development (3)	CHIHARA Takeshi

評価法・基準 Grading Policies	Your overall grade in the class will be decided based on the presentation 60% and short reports 40%. Feedback of your presentation will be provided by each instructor.		
教科書 Textbook		教材・参考書 Reference Book	Lecture materials are provided in the class when needed.

オフィス アワー Office Hour	Representative contact MOURI Akihiro: 10:30-11:30, Wednesday at 1F 102, building 10.	連絡先 Contact	
準備学習 Preparation of study	Students are expected to read the documents for 30 minutes before class.	履修上の注意点 Notice for Students	In principle, this lecture is limited to graduate students affiliated in Regulatory Sciences. Students are advised to summarize each seminar after the class.

Clinical Laboratory Sciences Exercise

専攻分野 Major Field	Clinical Laboratory Sciences	学年 Grade	1st ・ 2nd year	期 間 Semester	1st year : full year 2nd year : 1st semester
授業形態 Style	practice, seminar	単位 Credits	6	時間数 Hours	180
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese		
担当教員名 Instructor	SAITO Kuniaki, ICHINO Naohiro, TAKEMATSU Hiromu, OHASHI Koji, SUZUKI Koji, NARUSE Hiroyuki, MOURI Akihiro, SUGIMOTO Keiko, NAGAO Shizuko, YAMAMOTO Naoki, ISHIKAWA Hiroaki, OSAKABE Keisuke, YAMAMOTO Yasuko, SHIOGAMA Kazuya, HOSHI Masato, MATSUURA Hideaki, WACHINO Jun-ichi				
科目概要 Course Aims	Clinical Laboratory Medicine Exercise provided to help students to understand and comprehend the purpose of the research and to acquire and develop research techniques to develop from the basics to the applications in order to start the research.				
到達目標 Objectives	The goals of this course are to − be able to search the literature on research topic and accurately understand its contents. − be able to understand the techniques, analysis and evaluation methods related to research, and be able to use them correctly. − be able to give an accurate presentation, including their own opinion.				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1-90	(SAITO Kuniaki) To understanding for development for new biomarkers, students will learn the knowledge necessary for the development of laboratory science, such as methods for medical and health science, development of various analytical instruments with using scientific literature and data analysis. (ICHINO Naohiro) References searches and abstracts will be conducted to learn the newest technology in ultrasonography. Students will learn theory and methodology through discussion and questioning. In addition, through practical exercises and data analysis, students will learn basic ultrasonography skills. (TAKEMATSU Hiromu) In this course, current topics on the molecular medicine will be discussed, since every aspects of current medical information is related to and caused by human genes. (OHASHI Koji) Through reading abstracts of articles on research topics, students will learn how to analyze, read data and construct methodologies and theories in accordance with their own research topics. (NARUSE Hiroyuki) Through comprehensively analyze clinical data, understand the purpose of research and acquire the skills to make scientific considerations. (SUZUKI Koji) Through reading articles published in major journals, students learn how to read articles, how to discuss, and how to apply epidemiological methods. Students also acquire the basic knowledge necessary for handling medical data and statistical methods. (MOURI Akihiro) In conducting translational research for neuropsychiatric disorders, in which findings obtained from basic researches are applied for	Each instructor

	development of novel diagnostic markers and therapeutic agents, students will learn methodology, logics, and scientific evidence by searching, abstracting, and reading manuscripts, and answering questions. （SUGIMOTO Keiko） To understand the evaluation of cardiac disease and cardiac function, students practice electrocardiography, echocardiography, and the latest image analysis. （NAGAO Shizuko） For starting your research, you learn the basics and application of sampling methods, processing methods such as extraction, and analysis necessary for clinical laboratory, molecular genetics, pharmacological and omics comprehensive analysis through exercises. （YAMAMOTO Naoki） Learn the characteristics of various cells in the body, basic cell culture techniques, and the characteristics of pluripotent stem cells (e.g. iPS cells) used in regenerative medicine for clinical application, as well as methods for production and verification. （ISHIKAWA Hiroaki） Through reading papers on analytical methods using biological samples in line with their research themes, students learn construct methodologies and theories conforming to their research themes, such as selection of various analytical methods and data analysis methods. （OSAKABE Keisuke） The course will provide students with the basic ultrasonography techniques necessary for research, such as measurement of liver stiffness and attenuation in liver diseases. In addition, students will practice various statistical methods for obtaining results using statistical analysis software. （YAMAMOTO Yasuko） This course provides knowledge and skills in the analytical methods required to perform biochemical and molecular biological analyses on biological samples. （SHIOGAMA Kazuya） We aim to learn the main imaging techniques for histological and pathological analysis and deepen their understanding of morphology through the articles using relevant literature. （HOSHI Masato） We aim to elucidate the relationship between immunity and aging based on tryptophan metabolism and glucose metabolism, and to establish novel immunotherapy with a view to clinical application. We also aim to establish biomarkers and elucidate mechanisms that enable early diagnosis and prognosis prediction of chronic kidney disease, which is a national disease. 1.The role of tryptophan and glucose metabolism in cellular senescence. 2. Establishment of novel biomarkers in chronic kidney disease 3. The effects of rare sugars in various inflammatory diseases （MATSUURA Hideaki） To acquire basic skills related to blood transfusion and transplantation compatibility testing (serological testing, genetic testing, flow cytometry, etc.). Also, to learn logical thinking through reading of relevant articles. (WACHINO Jun-ichi) To advance basic research on pathogens such as bacteria and viruses, we will acquire knowledge and techniques in biochemical, molecular	Each instructor

	biological, and structural biological analysis methods. Additionally, we will thoroughly review literature from other fields to broadly acquire knowledge that contributes to the progress of our own research activities.		
評価法・基準 Grading Policies	Evaluation：Overall evaluation including discussion with teacher（70%）and attitude（30%） Feedback：Explain model answers to each assignments.		
教科書 Textbook	Not specified.	教材・参考書 Reference Book	Not specified.
オフィス アワー Office Hour	SAITO：Tuesday 12：00～13:00 ICHINO：lunch break and after class. Students need to contact to each instructor by e-mail. TAKEMATSU：17:00-19:00, Monday-Friday at 101, building 10 OHASHI：12:10-13:00 Monday Friday, at 213, building 3. NARUSE：lunch break and after class. Students need to contact to each instructor by e-mail. SUZUKI：12：10-12：45 or after the class, at 201, building 3. Anytime by e-mail. MOURI：10:30-11:30, Wednesday at 102, building 10. SUGIMOTO：17:00-18:00 Monday-Friday at 501, building 6 NAGAO：12:00-13:00 Monday-Friday At teacher room, B3F, building 1 15 minutes after the class Anytime by e-mail YAMAMOTO Naoki：At teacher room, No.202, building 11; after the class; Anytime by e-mail ISHIKAWA：12:10-13:00 Monday-Friday, at 212, building 3 OSAKABE：lunch break and after class. Students need to contact to each instructor by e-mail. YAMAMOTO Yasuko：Tuesday 12：00-13:00 SHIOGAMA：Tuesday 10:00～12:00 HOSHI：12:10-13:00 Monday-Friday, at 210, building3 MATSUURA：17:00-19:00, Monday-Friday at 303, building 3 WACHINO：12:00-13:00, Wednesday at 301, building 3	連絡先 Contact	
準備学習 Preparation of study	30 min preparation on each topic are needed	履修上の注意点 Notice for Students	Students are advised to summarize each topic after the class.

Graduate Thesis of Clinical Laboratory Sciences

専攻分野 Major Field	Clinical Laboratory Sciences	学年 Grade	1st ・ 2nd year	期 間 Semester	1st year: 2nd semester 2nd year: full year
授業形態 Style	experiment, research	単位 Credits	12	時間数 Hours	360
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese (partly in English)		
担当教員名 Instructor	SAITO Kuniaki, ICHINO Naohiro, TAKEMATSU Hiromu, OHASHI Koji, SUZUKI Koji, NARUSE Hiroyuki, MOURI Akihiro, SUGIMOTO Keiko, NAGAO Shizuko, YAMAMOTO Naoki, ISHIKAWA Hiroaki, OSAKABE Keisuke, YAMAMOTO Yasuko, SHIOGAMA Kazuya, HOSHI Masato, MATSUURA Hideaki, WACHINO Jun-ichi				
科目概要 Course Aims	***SAITO Kuniaki*** 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. 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 ***ICHINO Naohiro*** 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. 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. ***TAKEMATSU Hiromu*** 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. 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 ***OHASHI Koji, ISHIKAWA Hiroaki*** 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. 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. ***SUZUKI Koji*** 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. 1. Molecular epidemiological study on prevention of lifestyle-related diseases 2. Large-scale cohort study for evaluation of cancer risk				

科目概要 Course Aims	***NARUSE Hiroyuki*** We aim to elucidate the pathophysiology of various diseases using the clinical data and biomarkers and apply it to clinical practice. 1. Study on the pathophysiology of cardiovascular disease using biomarkers. 2. Study on the pathophysiology of acute kidney injury using biomarkers. ***MOURI Akihiro*** 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 the 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. 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 ***SUGIMOTO Keiko*** 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. 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 ***NAGAO Shizuko*** 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. 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 ***YAMAMOTO Naoki*** 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. 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. ***OSAKABE Keisuke*** 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. 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 methods of liver fibrosis and steatosis in nonalcoholic fatty liver disease

	YAMAMOTO Yasuko 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. 1. Analysis of bio functional 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 ***SHIOGAMA Kazuya*** 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. 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 ***HOSHI Masato*** 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. 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 ***MATSUURA Hideaki*** 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. 1. Mechanism of production of anti-erythrocyte antibodies 2. Development of new compatibility tests (blood transfusion, transplantation) 3. Investigate on HLA and disease sensitivities. 4. Analysis of bacterial vaginosis in cytology specimens ***WACHINO Jun-ichi*** Regarding antibiotic-resistant bacteria isolated from clinical settings, our aim is to elucidate their mechanisms of antibiotic resistance at both molecular and atomic levels. Additionally, we seek to develop novel agents to combat infectious diseases caused by antibiotic-resistant bacteria. Our research also extends to clinical virology, focusing on herpesviruses and rotaviruses in children. 1. Molecular characterization of antibiotic resistance mechanisms in bacteria using NGS and X-ray crystallography 2. Development of novel agents to inhibit antibiotic resistance mechanisms in bacteria 3. Clinical virological analysis of human herpesviruses and rotaviruses in children
到達目標 Objectives	The goals of this course are to - be able to create a research plan according to your research theme. - be able to understand and explain the techniques required for data collection and analysis. - be able to consider the ethics required for research. - be able to create a master's thesis.

回数 Chapters	授業計画（各回のテーマ） Course Schedule (topic for each time)		
1st year: 2nd semester (120 hours: 60 chapters)			
1-60	Decide on a research topic and prepare a research plan. Collect and closely read articles related to your research topic. Learn the techniques and methods necessary to implement the research theme. Perform analysis and analysis using acquired techniques and methods.		
2nd year: 1st semester (120 hours: 60 chapters)			
61-120	Collect and closely read articles related to your research topic. Perform analysis and analysis using acquired techniques and methods. Review research progress and assess feasibility. Present your research at conferences and other events.		
2nd year: 2nd semester (120 hours: 60 chapters)			
121-180	Present your research at conferences and other even! Summarize the results of the study. Prepare and report on the master's thesis.		
評価法・基準 Grading Policies	Evaluation：Master's Thesis (80%), Positive attitude toward research topics(20%) Feedback：Provide explanations as appropriate for questions that arise during the research process. Basis：To measure the level of understanding of the attainment objectives, evaluation will be based on the active attitude toward the master's thesis and the research project.		
教科書 Textbook	Lecture materials are provided in the class when needed.	教材・参考書 Reference Book	Not specified.
オフィス アワー Office Hour	SAITO：Tuesday 12：00～13:00 ICHINO：lunch break and after class. Students need to contact to each instructor by e-mail. TAKEMATSU：17:00-19:00, Monday-Friday at 101, building 10 OHASHI：12:10-13:00 Monday Friday, at 213, building 3. NARUSE：lunch break and after class. Students need to contact to each instructor by e-mail. SUZUKI：12：10-12：45 or after the class, at 201, building 3. Anytime by e-mail. MOURI：10:30-11:30, Wednesday at 102, building10. SUGIMOTO：17:00-18:00 Monday-Friday at 501, building 6 NAGAO：12:00-13:00 Monday-Friday At teacher room, B3F, building 1 15 minutes before and after the class Anytime by e-mail YAMAMOTO Naoki：At teacher room, No.202, building 11; after the class; Anytime by e-mail	連絡先 Contact	

	ISHIKAWA：12:10-13:00 Monday-Friday, at 212, building 3 OSAKABE：lunch break and after class. Students need to contact to each instructor by e-mail. YAMAMOTO Yasuko：Tuesday 12：00～13:00 SHIOGAMA：Tuesday 10:00～12:00 HOSHI：12:10-13:00 Monday-Friday, at 210, building3 MATSUURA：17:00-19:00, Monday-Friday at 303, building 3 WACHINO：12:00-13:00, Wednesday at 301, building 3		
準備学習 Preparation of study	Gather and prepare research information in order to work independently on the research topic (at least 30 minutes).	履修上の注意点 Notice for Students	The content carried out in the study should be summarized in a research notebook (at least 30 minutes).

Basic Human Genetics

専攻分野 Major Field	Genetic counseling	学年 Grade	1st year	期　間 Semester	1st semester 2nd semester
授業形態 Style	lecture, seminar	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese		
担当教員名 Instructor	OHYE Tamae, NAKAJIMA Yoko				
科目概要 Course Aims	To acquire basic knowledge of genetics related to human genetic diseases.				
到達目標 Objectives	The goals of this course are to be able to explain the genetics of monogenic diseases (autosomal and sex chromosomal), epigenetics, mitochondrial genetic diseases, multifactorial diseases, pharmacogenetics, chromosomal disorders, tumors (somatic mutations), etc.				

回数 Chapters	授業計画（各回のテーマ） Course Schedule (topic for each time)	担当教員 Instructor
1	Guidance	OHYE Tamae
2	Monogenic diseases（Autosomal dominant disorders）	OHYE Tamae
3	Monogenic diseases（Autosomal recessive disorders）	OHYE Tamae
4	Monogenic diseases（X-linked　disorders）	OHYE Tamae
5	Mitochondrial genetic diseases	OHYE Tamae
6	Genetics of multifactorial diseases	OHYE Tamae
7	Mosaic, Chimera	OHYE Tamae
8	Methylation, demethylation and gene expression	OHYE Tamae
9	Molecular and cellular basis of genetic diseases, Gene variant	OHYE Tamae
10	Developmental Genetics and Congenital Anomalies	OHYE Tamae
11	Genetic risk calculation (Bayes' theorem)	OHYE Tamae
12	Pharmacogenetics	NAKAJIMA Yoko
13	Congenital metabolic syndrome-1	NAKAJIMA Yoko
14	Congenital metabolic syndrome-2, Mitochondrial diseases	NAKAJIMA Yoko
15	Test	OHYE Tamae

評価法・基準 Grading Policies	A score of 60 or higher on the written examination is considered passing. Feedback on your questions will be provided by each instructor.		
教科書 Textbook		教材・参考書 Reference Book	

オフィス アワー Office Hour	After each lecture	連絡先 Contact	
準備学習 Preparation of study	Read the specified documents in advance.	履修上の注意点 Notice for Students	Lecture contents must be summarized

Basic Human Genetics Exercise

専攻分野 Major Field	Genetic counseling	学年	1st year	期 間 Semester	1st semester 2nd semester
授業形態 Style	lecture, seminar	単位 Credits	2	時間数 Hours	60
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese		
担当教員名 Instructor	OHYE Tamae, SHIOGAMA Kazuya, INAGAKI Hidehito				
科目概要 Course Aims	Students will learn the methods and techniques of chromosome and genetic testing through lectures, and understand various molecular biological techniques through hands-on practice. In addition, students will deepen their understanding of the availability, analytical validity, clinical relevance, and limitations of genetic testing with a view to using genetic testing in clinical practice. The course will also develop an understanding of genetic testing from informed consent to result disclosure, actual analysis facilities and testing methods, and ethical review.				
到達目標 Objectives	Explain cell culture, preparation of chromosome specimens, FISH, DNA extraction, PCR, MLPA, chromosomal microarray, southern blot hybridization, SNP analysis, personal identification by microsatellite, genetic diagnosis by Sanger sequencing and tumor tissue testing.				
回数 Chapters	授業計画（各回のテーマ） Course Schedule (topic for each time)				担当教員 Instructor
1-3	DNA extraction and PCR				OHYE Tamae
4-6	Sanger sequence				OHYE Tamae
7-9	Microsatellite personal identification				OHYE Tamae
10-14	Chromosome preparation, G staining, and FISH				OHYE Tamae
15-17	Southern blotting				OHYE Tamae
18-19	Microarray chromosome test、 MLPA method				OHYE Tamae
20-21	Pathology of tumors				SHIOGAMA Kazuya
22-23	Pathology of cancer predisposition syndromes				SHIOGAMA Kazuya
24-25	Cancer Genome Medicine and treatment of pathological tissues				SHIOGAMA Kazuya
26-27	Cancer Genome Medicine and Gene Panel Testing				SHIOGAMA Kazuya
28	Next-generation sequencing (NGS)				INAGAKI Hidehito
29-30	Data analysis using NGS				INAGAKI Hidehito
評価法・基準 Grading Policies	Evaluate based on achievement of achievement goals by reports and oral questions. Feedback on your questions will be provided by each instructor.				
教科書 Textbook		教材・参考書 Reference Book			
オフィス アワー Office Hour	After each lecture.	連絡先 Contact			
準備学習 Preparation of study	Students are expected to read the documents and check the technical terms before class.	履修上の注意点 Notice for Students	Lecture contents must be summarized		

Clinical Genetics Exercise

専攻分野 Major Field	Genetic counseling	学年 Grade	1st year	期 間 Semester	1st year: full year
授業形態 Style	lecture, seminar,	単位 Credits	2	時間数 Hours	60
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese		
担当教員名 Instructor	OHYE Tamae, KAWADA Kenji, ISHIHARA Naoko, BODA Hiroko, MIYATA Masafumi, TANAKA Makito, MATSUOKA Hiroshi, ICHIKAWA Ryoko, MINATOGUCHI Shun, TOMIIE Yumi, SUZUKI Takanori, YAGAMI Akiko, TANIKAWA Atsuhiro, MIZUNO Seiji				
科目概要 Course Aims	Acquire various clinical and genetic evaluation skills that are essential for the practice of genetic medicine (genetic counseling) . Acquire basic knowledge in the area of medical specialties (diagnosis, pathophysiology, treatment, testing, etc.) and knowledge related to typical genetic diseases. Participate in actual case study meetings to understand the significance of genetic testing in actual individual cases.				
到達目標 Objectives	Students can learn the rules of family tree creation, interpret and explain the results of chromosome and genetic tests, interpret and explain the results of prenatal diagnosis, and explain genetic risk calculations.				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1	Preliminary examination of Genetic counseling	OHYE Tamae
2	Gathering genealogical information and calculating the risk of creating a family tree	OHYE Tamae
3	Interpreting chromosome and genetic test results.	OHYE Tamae
4-6	Cancer practice and cancer genomic medicine	KAWADA Kenji
7	Monogenic diseases（Neurological disease）	ISHIHARA Naoko
8	Monogenic diseases（Muscular disease）	ISHIHARA Naoko
9	Monogenic diseases（Genomic imprinting disease）	ISHIHARA Naoko
10	Monogenic diseases（Hereditary Tumors in Children）	ISHIHARA Naoko
11	Pediatric diseases (Head and facial diseases)	BODA Hiroko
12	Pediatric diseases (Basis of Congenital Diseases)	BODA Hiroko
13	Pediatric disease (Multiple malformation syndrome)	BODA Hiroko
14-16	Congenital and chromosomal diseases	MIYATA Masafumi
17	Gastrointestinal disorders	MATSUOKA Hiroshi
18	Blood, coagulation and immunodeficiency	TANAKA Makito
19-20	Hereditary tumors (Gastroenterology)	MATSUOKA Hiroshi
21	Hereditary tumors (Gynecology)	ICHIKAWA Ryoko
22-23	Renal and urological diseases	MINATOGUCHI Shun
24	Endocrine disorder	TOMIIE Yumi

25-26	Cardiovascular and respiratory diseases		SUZUKI Takanori
27	Skin disease		YAGAMI Akiko
28	Eye disease		TANIKAWA Atsuhiro
29	Otorhinolaryngological disease		MIZUNO Seiji
30	Connective Tissue Diseases		MIZUNO Seiji
評価法・基準 Grading Policies	Your overall grade in the class will be decided based on the question-and-answer session and short reports. Feedback on your question-and-answer session will be provided by each instructor.		
教科書 Textbook		教材・参考書 Reference Book	
オフィスアワー Office Hour	After each lecture.	連絡先 Contact	
準備学習 Preparation of study	Students are expected to read the documents and check the technical terms before class.	履修上の注意点 Notice for Students	Lecture contents must be summarized

Bioinformatics Exercise

専攻分野 Major Field	Genetic counseling	学年 Grade	1st year	期　間	2nd semester
授業形態 Style	lecture, seminar,	単位 Credits	1	時間数	30
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese		
担当教員名 Instructor	INAGAKI Hidehito				
科目概要 Course Aims	Acquisition of information, including those at the research stage, is essential for clinical practice in order to provide the recency genetic medicine.				
到達目標 Objectives	The goals of this course are to - be able to search for information using the Internet, - be able to use literature search tools, - be able to use risk calculation software, etc.				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1-3	Overview of information retrieval methods using the Internet	INAGAKI Hidehito
4-6	How to use literature search tools	INAGAKI Hidehito
7-8	Genetic disease database (Gene Reviews, OMIM)	INAGAKI Hidehito
9-10	Gene / Chromosome Database (UCSC)	INAGAKI Hidehito
11-12	Introduction of clinical research and medical statistics	INAGAKI Hidehito
13-15	Data interpretation in scientific papers	INAGAKI Hidehito

評価法・基準 Grading Policies	Evaluate based on achievement of achievement goals by reports and oral questions.		
教科書 Textbook		教材・参考書 Reference Book	
オフィス アワー Office Hour	After each lecture.	連絡先 Contact	
準備学習 Preparation of study	Students are expected to read the documents and check the technical terms before class.	履修上の注意点 Notice for Students	Lecture contents must be summarized

Genetics and Society

専攻分野 Major Field	Genetic counseling	学年 Grade	1st year	期 間 Semester	1st semester
授業形態 Style	lecture, seminar,	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class, exercise	使用言語 Language	Japanese		
担当教員名 Instructor	FUJIE Rieko				
科目概要 Course Aims	Students will learn the general goals of counseling and the counselor's attitude necessary to achieve them, theory, assessment, and psychological reactions for understanding the mind, and communication techniques with exercises.				
到達目標 Objectives	The goals of this course are to be able to do the following: ・Understand the goal of counseling, ・Recognize and recall the paradigms and the possible psychological reactions for comprehending client's minds. ・Understand the attitudes necessary for counselors, and significance of techniques of communication and practice them.				

回数 Chapters	授業計画（各回のテーマ） Course Schedule (topic for each time)	担当教員 Instructor
1	General goal of counseling, Theories of clinical psychology 1 (Person-centered therapy)	FUJIE Rieko
2	Theories of clinical psychology 2 (Psychoanalysis, Behavioral therapy)	FUJIE Rieko
3	Theories of clinical psychology 3 (Cognitive-behavioral therapy, Mindfulness-based cognitive therapy)	FUJIE Rieko
4	Theories of clinical psychology 4 (Family Therapy)	FUJIE Rieko
5	Theories of clinical psychology 5 (Family Therapy2)	FUJIE Rieko
6	What's going on in the mind 1－Loss experience and Defense mechanism	FUJIE Rieko
7	What's going on in the mind 2－Stress and the coping	FUJIE Rieko
8	What's going on in the mind 3 －cognitive bias（problem solving, reasoning, judgement、decision making）	FUJIE Rieko
9	Psychological assessment 1 －Psychopathological level（Neurosis level、Borderline level）	FUJIE Rieko
10	Psychological assessment 2 －（Psychotic level、Case study of each level）	FUJIE Rieko
11	Psychological assessment 3 －transference, reverse transference、supervision	FUJIE Rieko
12	General introduction to communication	FUJIE Rieko
13	Techniques of communication	FUJIE Rieko
14	Practice of attentive listening	FUJIE Rieko
15	Practice of the psycho-social interview	FUJIE Rieko

評価法・基準 Grading Policies	Evaluate based on achievement of achievement goals by reports and oral questions. (Reports are returned with comments.)

教科書 Textbook		教材・参考書 Reference Book	Kuramitsu.O. Introduction to Contemporary psychology5-Clinical Psychology- Iwanami Syoten.
オフィス アワー Office Hour	Lunch hour on Thursday in Building 2-10F-1005	連絡先 Contact	
準備学習 Preparation of study	Students are expected to read the documents and check the technical terms before class (About 15 minutes).	履修上の注意点 Notice for Students	Students can explain the contents of the lectures in one's own words.

Genetics and Ethics Exercise

専攻分野 Major Field	Genetic counseling	学年 Grade	1st year	期 間 Semester	1st semester
授業形態 Style	Lecture, seminar	単位 Credits	1	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese		
担当教員名 Instructor	SATO Tsutomu				
科目概要 Course Aims	Discuss and learn concepts about genetic medicine and ethics. Also, while developing the ability to discover ethical problems related to a wide range of medical treatments, not limited to genetic medicine, we will learn support methods for solving those problems. Learn how to understand and support others' views of life and life and death.				
到達目標 Objectives	Examines and identifies psychological, social, ethical, and legal issues related to genetic counseling that may affect client decision-making and clinical practice. (H1) Understand the client's concerns regarding the protection and utilization of genetic/genomic information.				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1	guidance	SATO Tsutomu
2	Genetic and assisted reproductive medicine laws and ethics I Understand the health care system for the practice of genetic counseling.	SATO Tsutomu
3	Genetic and assisted reproductive medicine laws and ethics II Analyze ethical and moral dilemmas that arise in the practice of genetic counseling based on bioethical principles.	SATO Tsutomu
4	Genetic and assisted reproductive medicine laws and ethics III Accurate and wide-ranging information on healthcare systems and social resources provided by national and local governments can be collected and tailored to clients.	SATO Tsutomu
5	Genetic and assisted reproductive medicine laws and ethics IV Factors influencing the learning process can be assessed based on the client's comprehension, motivation, emotional state, and religious and cultural beliefs.	SATO Tsutomu
6	International Code of Ethics (Helsinki Declaration, Belmont Report, CIOMS, etc.) I	SATO Tsutomu
7	International Code of Ethics (Helsinki Declaration, Belmont Report, CIOMS, etc.) II	SATO Tsutomu
8	International Code of Ethics (Helsinki Declaration, Belmont Report, CIOMS, etc.) III	SATO Tsutomu
9	Domestic administrative ethics guidelines I Factors influencing genetic counseling can be assessed based on the client's condition, needs, lifestyle, socioeconomic background, age, gender, and religious and cultural background.	SATO Tsutomu
10	Domestic administrative ethics guidelines II Practice the conduct of ethical research.	SATO Tsutomu
11	Domestic administrative ethics guidelines III Understand the importance of medical information and manage and utilize it appropriately.	SATO Tsutomu
12	Domestic academic ethics guidelines I Explain the basics of social security and healthcare systems, as well as social resources.	SATO Tsutomu

13	Domestic academic ethics guidelines II Explain situations that may result in a conflict of interest (COI)		SATO Tsutomu
14	Domestic academic ethics guidelines III Able to conduct business in compliance with laws and ethical codes of related organizations.		SATO Tsutomu
15	Summary		SATO Tsutomu
評価法・基準 Grading Policies	Evaluate based on achievement of achievement goals by reports and oral questions.		
教科書 Textbook		教材・参考書 Reference Book	
オフィス アワー Office Hour	After each lecture.	連絡先 Contact	
準備学習 Preparation of study	Students are expected to read the documents and check the technical terms before class.	履修上の注意点 Notice for Students	Lecture contents must be summarized

Genetic Counseling

専攻分野 Major Field	Genetic counseling	学年 Grade	1st year	期　間 Semester	1st semester 2nd semester
授業形態 Style	lecture, seminar	単位 Credits	1	時間数 Hours	15
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese		
担当教員名 Instructor	OHYE Tamae, NISHIZAWA Haruki, ISHIHARA Naoko, MIZUNO Seiji, UENO Sayaka				
科目概要 Course Aims	Understand genetic counseling in general, understand the characteristics of genetic counseling in each area, and link the fundamentals of genetic medicine and genetic testing with the clinical practice of genetic medicine.				
到達目標 Objectives	To understand the history of genetic counseling, the current situation in other countries and Japan, the role of certified genetic counselors, genetic counseling methods, psychological methods, etc. from the literature.				
回数 Chapters	授業計画（各回のテーマ） Course Schedule (topic for each time)				担当教員 Instructor
1	Definition of genetic counseling				OHYE Tamae
2	History of genetic counseling				OHYE Tamae
3	Current situation in other countries and Japan				OHYE Tamae
4	Genetic counseling method (chromosome disease)				MIZUNO Seiji
5	Genetic counseling method (recessive genetic disease)				UENO Sayaka
6	Genetic counseling method (dominant genetic disease)				UENO Sayaka
7	Genetic counseling method (pre-onset diagnosis)				ISHIHARA Naoko
8	Genetic counseling method (prenatal diagnosis)				NISHIZAWA Haruki
評価法・基準 Grading Policies	Evaluate based on achievement of achievement goals by reports and oral questions. Feedback on your question-and-answer session will be provided by each instructor.				
教科書 Textbook		教材・参考書 Reference Book			
オフィス アワー Office Hour	After each lecture.	連絡先 Contact			
準備学習 Preparation of study	Students are expected to read the documents and check the technical terms before class.	履修上の注意点 Notice for Students	Lecture contents must be summarized		

Genetic Counseling Exercise

専攻分野 Major Field	Genetic counseling	学年 Grade	1st ・ 2nd year	期 間 Semester	1st year:2nd semester 2nd year:1st semester 2nd semester
授業形態 Style	lecture, seminar	単位 Credits	2	時間数 Hours	60
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese		
担当教員名 Instructor	OHYE Tamae, FUJIE Rieko				
科目概要 Course Aims	Acquire genetic counseling techniques. After acquiring basic knowledge and skills of genetic counseling through lectures, role-plays will be conducted on simulated cases to acquire the necessary skills and deepen understanding of how to support the resolution of actual genetic problems.				
到達目標 Objectives	To acquire genetic counseling skills through role-plays of various simulated cases.				
回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)				担当教員 Instructor
1	Orientation				OHYE Tamae
2	Counseling theory				OHYE Tamae
3-22	Role play (psychological practice techniques, coordination and participation for best genetic care, information organization, consultation support, educational support, communication skills and issues to meet various needs, educational support and awareness raising, supervision)				OHYE Tamae
23-30	Role play (acquisition of a reflective attitude, lifelong learning and self-learning tools for evidence-based practice)				FUJIE Rieko
評価法・基準 Grading Policies	Exercises to evaluate achievement level and role play test. Feedback on your question-and-answer session will be provided by each instructor.				
教科書 Textbook	Standard Textbook for Genetic Counseling Communication Theory for Genetic Counseling	教材・参考書 Reference Book			
オフィス アワー Office Hour	After each teacher's lecture.	連絡先 Contact			
準備学習 Preparation of study	Students are expected to read the documents and check the technical terms before class.	履修上の注意点 Notice for Students	Lecture contents must be summarized		

Clinical Practice of Genetic Counseling

専攻分野 Major Field	Genetic counseling	学年 Grade	1st ・ 2nd year	期 間 Semester	1st year:2nd semester 2nd year:1st semester
授業形態 Style	practice	単位 Credits	6	時間数 Hours	180
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese		
担当教員名 Instructor	OHYE Tamae, NISHIZAWA Haruki, ISHIHARA Naoko, MIYAMURA Hironori				
科目概要 Course Aims	Genetic counseling requires understanding of the individual coping style, as well as providing genetic information tailored to the client's genetic context. By attending onsite at multiple facilities in each field where genetic counseling is being conducted, students will experience genetic counseling, meet a large number of clients with various diseases, and deepen their thoughts. The case will then be reviewed under the guidance of a clinical geneticist and a certified genetic counselor.				
到達目標 Objectives	By attending genetic counseling, we can explain the flow and problems.				
回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)				担当教員 Instructor
1st year:2nd semester (120 hours:60 chapters)					
1-40	Attendance for genetic counseling				OHYE Tamae NISHIZAWA Haruki ISHIHARA Naoko MIYAMURA Hironori
2nd year:1st semester (60 hours:30 chapters)					
41-60	Attendance for genetic counseling				OHYE Tamae NISHIZAWA Haruki ISHIHARA Naoko MIYAMURA Hironori
評価法・基準 Grading Policies	Evaluate based on achievement of achievement goals by reports and oral questions. Feedback on your question-and-answer session will be provided by each instructor.				
教科書 Textbook		教材・参考書 Reference Book			
オフィス アワー Office Hour	After each lecture.	連絡先 Contact			
準備学習 Preparation of study	Students are expected to read the documents and check the technical terms before class.	履修上の注意点 Notice for Students	Lecture contents must be summarized.		

Graduate Thesis of Genetic Counseling

専攻分野 Major Field	Genetic counseling	学年 Grade	1st ・ 2nd year	期 間 Semester	1st year: 2nd semester 2nd year: full year
授業形態 Style	Practice, seminar	単位 Credits	10	時間数 Hours	300
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese		
担当教員名 Instructor	OHYE Tamae				
科目概要 Course Aims	To educate and enlighten the general public and medical community by identifying problems related to genetics and genetic medicine among medical professionals and the general public, accumulating evidence for solutions, and disseminating the evidence to society in an easy-to-understand manner. The students will learn the process of genetic counseling research by conducting a series of studies, including research design, ethical review, investigation, and analysis. In the process, students will learn how to effectively communicate with medical professionals and the general public, as well as the significance and importance of educational activities. Through the master's research, students will develop the qualities needed to become certified genetic counselors with the ability to think critically and insightfully. （OHYE Tamae） 1. Study on support for patients with hereditary diseases and their families 2. Study on coping with secondary findings found by accident by comprehensive inspection method 3. Study on how to deal with secondary findings that are found by chance by exhaustive testing methods				
到達目標 Objectives	Completion of master's thesis				
回数 Chapters	授業計画（各回のテーマ） Course Schedule (topic for each time)			担当教員 Instructor	
1st year: 2nd semester (60 hours:30 chapters)					
1-30	Preparation of master's thesis plan and Data collection			OHYE Tamae	
2nd year:1st semester (120 hours:60 chapters)					
31-90	Data collection and Data analysis for master's thesis			OHYE Tamae	
2nd year: 2nd semester (120 hours:60 chapters)					
101-150	Writing a master's thesis			OHYE Tamae	
評価法・基準 Grading Policies	Evaluate based on achievement of achievement goals by reports and oral questions.				
教科書 Textbook		教材・参考書 Reference Book			
オフィス アワー Office Hour	After each lecture.	連絡先 Contact			
準備学習 Preparation of study	Students are expected to read the documents and check the technical terms before class.	履修上の注意点 Notice for Students	Lecture contents must be summarized.		

Assisted Reproductive Medicine Seminar

専攻分野 Major Field	Assisted reproductive medicine	学年 Grade	1st year	期 間 Semester	1st semester
授業形態 Style	Lecture	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese (partly in English)		
担当教員名 Instructor	NISHIO Eiji, NAGAO Shizuko, YAMAMOTO Yasuko, YOSHIMURA Aya, KUGITA Masanori, KUMAMOTO Kanako, ASANO Yukiko				
科目概要 Course Aims	This course deals with basic knowledge enhanced on reproductive biology; biology, cell biology, reproductive science, embryology, developmental engineering, immunology, endocrinology, and animal reproduction. In addition, students will be given the necessary knowledge for the work of embryo cultivators by lectures on the fields related to assisted reproductive medicine such as obstetrics and gynecology, urology, etc. and topics.				
到達目標 Objectives	The goals of this course are to - be able to explain reproductive biology - be able to explain preparation of culture medium - be able to explain culture of germ cells (oocyte, sperm, and embryo) - be able to explain insemination operation (in vitro fertilization (IVF), intra-cytoplasmic sperm injection (ICSI)) - be able to explain cryopreservation - be able to explain recordkeeping management - be able to explain culture management of fertilized oocytes and embryos (early embryos) - be able to explain arrangement and management of culture rooms				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1	Introduction of Obstetrics-and-gynecology and urology.	NISHIO Eiji
2	The actual condition of the declining birth rate and the infertility treatment.	ASANO Yukiko
3	The formation and maturation of the ovum and the spermatozoon. The mechanism of the ovulation.	ASANO Yukiko
4	The fertilization, the embryogenesis and implantation.	ASANO Yukiko
5	The assisted reproductive technology and ethics.	YAMAMOTO Yasuko
6	History of developmental engineering and reproductive engineering	NAGAO Shizuko
7	Disease models related Reproduction	NAGAO Shizuko
8	How to make transgenic animals and knockout animals	YOSHIMURA Aya
9	Arrangement, management, equipment, apparatus in culture room How to culture of germ cells Kind of culture medium	NAGAO Shizuko
10	Recordkeeping management Culture management of fertilized oocytes and embryos (early embryos)	NAGAO Shizuko
11	Differentiation from stem cells (ES cells, iPS cells) to germ cells	YOSHIMURA Aya
12	Culture methods of germ cells and embryos (including their history)	KUGITA Masanori
13	Insemination operation (in vitro fertilization, intra-cytoplasmic sperm injection), evaluation method of embryos	KUMAMOTO Kanako
14	Cryopreservation of germ cells and embryos	YOSHIMURA Aya

15	Related techniques in reproductive engineering (nuclear transfer, cytoplasmic transplantation)		YOSHIMURA Aya
評価法・基準 Grading Policies	Comprehensive assessment of teacher discussions, interviews, and attendance: 100% Feedback: provide a model answer in timely tasks.		
教科書 Textbook	Handouts	教材・参考書 Reference Book	It isn't designated in particular. Recommended reference books and scientific papers are introduced in the lecture.
オフィス アワー Office Hour	Anytime by e-mail	連絡先 Contact	
準備学習 Preparation of study	Students are expected to read handouts for 45 minutes before the class and understand technical terms. Students are expected to review the lecture for 45 minutes after the class and prepare for oral examinations.	履修上の注意点 Notice for Students	Students should have enthusiasm and keep a positive attitude.

Assisted Reproductive Medicine Exercise I

専攻分野 Major Field	Assisted reproductive medicine	学年 Grade	1st year	期 間 Semester	1st year: full year
授業形態 Style	Practice	単位 Credits	4	時間数 Hours	120
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese (partly in English)		
担当教員名 Instructor	NAGAO Shizuko, KUMAMOTO Kanako, YOSHIMURA Aya, KUGITA Masanori				
科目概要 Course Aims	This course deals with basic techniques of assisted reproductive medicine using laboratory mice; superovulation treatment, in vitro fertilization (IVF), fertilized oocyte (embryo) transfer, culture of germ cells, cryopreservation of germ cells and embryos, nuclear transfer, cytoplasmic transplantation, intra-cytoplasmic sperm injection (ICSI).				
到達目標 Objectives	The goals of this course are to - be able to basic technology of assisted reproductive medicine can be implemented using laboratory animals. - be able to carry on superovulation treatment, in vitro fertilization (IVF), and fertilized oocyte (embryo) transfer. - be able to culture germ cells. - be able to cryopreserve germ cells and embryos - be able to perform nuclear transfer, egg cytoplasmic replacement and intra-cytoplasmic sperm injection (ICSI)				
回数 Chapters	授業計画（各回のテーマ） Course Schedule (topic for each time)				担当教員 Instructor
1st year:1st semester (60 hours:30 chapters)					
1-6	Preparation for practice in reproductive engineering				NAGAO Shizuko KUMAMOTO Kanako
7-12	In vitro fertilization (IVF) Culture of early embryos - 1				NAGAO Shizuko KUMAMOTO Kanako
13-18	In vitro fertilization (IVF) Culture of early embryos - 2				NAGAO Shizuko KUMAMOTO Kanako
19-24	Cryopreservation of germ cells and embryos - 1				NAGAO Shizuko KUMAMOTO Kanako
25-30	Intra-Cytoplasmic Sperm Injection (ICSI) - 1				NAGAO Shizuko KUMAMOTO Kanako
1st year: 2nd semester (60 hours:30 chapters)					
31-36	Intra-Cytoplasmic Sperm Injection (ICSI) - 2				NAGAO Shizuko YOSHIMURA AYA
37-42	Cryopreservation of germ cells and embryos - 2				NAGAO Shizuko YOSHIMURA AYA
43-48	Fertilized oocyte (embryo) transfer				NAGAO Shizuko YOSHIMURA AYA
49-54	Genome editing and germ cells				NAGAO Shizuko YOSHIMURA AYA KUGITA Masanori
55-60	Genome editing and pronuclear injection				NAGAO Shizuko YOSHIMURA AYA KUGITA Masanori

評価法・基準 Grading Policies	Attendance and attitude in class:50%, Reports:50% Create reports for lectures and practical training to measure the level of understanding of the goals. After the oral examination, give a model answer and commentary and give feedback.		
教科書 Textbook	Handouts	教材・参考書 Reference Book	None
オフィス アワー Office Hour	Anytime by email	連絡先 Contact	
準備学習 Preparation of study	Students are expected to read handouts for 45 minutes before the class and understand technical terms. Students are expected to review the lecture for 45 minutes after the class and prepare for oral examinations.	履修上の注意点 Notice for Students	Students should have enthusiasm and keep a positive attitude.

Assisted Reproductive Medicine Exercise II

専攻分野 Major Field	Assisted reproductive medicine	学年 Grade	2nd year	期 間 Semester	2nd year: full year
授業形態 Style	Practice	単位 Credits	4	時間数 Hours	120
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese (partly in English)		
担当教員名 Instructor	NISHIO Eiji, NAGAO Shizuko, OIKAWA Shota				
科目概要 Course Aims	The embryologist's skill requires not only technique but the transdisciplinary knowledge used as backing. Reproductive biology-related the biology and the cell biology, the genesiology, the embryology, the development engineering, the immunology and the endocrinology, and animal reproduction study are indispensable. Students of a master's program must read carefully the scientific paper which summarizes the knowledge relevant to the reproductive medicine, and explain it at the journal club.				
到達目標 Objectives	The goals of this course are to - be able to understand and explain transdisciplinary and social meaning of the research. - be able to consider how to advance the research. - be able to perform the conference presentation of the results of research.				
回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)				担当教員 Instructor
2nd year: 1st semester (60 hours:30 chapters)					
1-30	Collect and read the original paper relevant to the assisted reproductive technology: ART carefully, and achieve the following learning aims. The learning aims are to - be able to understand transdisciplinary and social meaning of the research. - be able to consider how to advance the research.				NISHIO Eiji NAGAO Shizuko OIKAWA Shota
2nd year: 2nd semester (60 hours:30 chapters)					
31-60	Select and analyze the original paper relevant to the assisted reproductive technology: ART carefully, and achieve the following learning aims. The learning aims are to - be able to understand transdisciplinary and social meaning of the research. - be able to consider how to advance the research. - be able to perform the conference presentation of the result of research. As described above, the taking lectures student aims at the embryologist which can find out and consider various problems.				NISHIO Eiji NAGAO Shizuko OIKAWA Shota
評価法・基準 Grading Policies	Comprehensive assessment of instructor discussions, interviews, and attendance: 100% Feedback: provide a model answer in timely tasks.				
教科書 Textbook	Literature and prints will be distributed.	教材・参考書 Reference Book	Do not specify in particular.		
オフィスアワー Office Hour	Anytime by e-mail	連絡先 Contact			
準備学習 Preparation of study	For about 60 minutes before class, students carefully read the paper or source material relevant to the subject which the instructor presents.	履修上の注意点 Notice for Students	Students should have enthusiasm and keep a positive attitude.		

Graduate Thesis of Assisted Reproductive Medicine

専攻分野 Major Field	Assisted reproductive medicine	学年 Grade	2nd year	期 間 Semester	2nd year: full year
授業形態 Style	Experiment and Seminar	単位 Credits	10	時間数 Hours	300
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese (partly in English)		
担当教員名 Instructor	NISHIO Eiji				
科目概要 Course Aims	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. （NISHIO Eiji） 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.				
到達目標 Objectives	When the first half year is finished, acquisition of clinical practical required for taking an examination of embryologist qualification authorization examination is the aim.				
回数 Chapters	授業計画（各回のテーマ） Course Schedule (topic for each time)			担当教員 Instructor	
2nd year: 1st semester (150 hours:75 chapters) 2nd year: 2nd semester (150 hours:75 chapters)					
1-150	A clinical training is performed at clinical practice registration facilities of in-vitro fertilization and embryo transfer of a Japan Society of Obstetrics and Gynecology. (Mainly, Fujita University hospital). As work experiences, the human gamete, the fertilized egg and the embryo handling, facility management, such as creation of the medium, preparation of the instrument, and the maintenance of egg collection room. Students of master course write down the three experienced cases detailedly in paper form and publish them. The learning aims are to be able to be master clinical practice required for the qualification authorization examination. Furthermore, students of master course make paper about the three cases which carried out embryo manipulation themselves and give a lecture on the contents.			NISHIO Eiji	
評価法・基準 Grading Policies	When this latter half year is finished, acquisition of clinical practical required for taking an examination of embryologist qualification authorization examination is the aim. In addition, take charge of practical yourself and prepare the three completed cases in paper form. Furthermore, graduate students of master course take charge of practical yourself and prepare the three completed cases in paper form. We evaluate these overall: 100%. Feedback: provide a model answer in timely tasks.				
教科書 Textbook	Recommended reference books and scientific papers are introduced in the lecture.	教材・参考書 Reference Book	Recommended reference books and scientific papers are introduced in the lecture.		
オフィス アワー Office Hour	Anytime by e-mail	連絡先 Contact			

準備学習 Preparation of study	Students of master course regard considering the germ cell as one organism. Students are also expected to carefully read handouts for 45 minutes before the experiment and perform image training.	履修上の注意点 Notice for Students	In the process in which students of master course students experience the job of the actual embryologist, they learn the high sense of ethics and dignity to the assisted reproductive technology.

3. **Radiological Sciences**

Radiological Sciences Seminar

専攻分野 Major Field	Radiological Sciences	学年 Grade	1st year	期 間 Semester	full year
授業形態 Style	lecture, seminar	単位 Credits	4	時間数 Hours	60
授業方法 Class Methods	remote class	使用言語 Language	Japanese		
担当教員名 Instructor	KOBAYASHI Shigeki, MINAMI Kazuyuki, TAKATSU Yasuo, SHIRAKAWA Seiji, SHIIBA Takuro, KOBAYASHI Masanao, MUTO Koichi, KASAI Satoshi, YOKOYAMA Sumi				
科目概要 Course Aims	Various modalities in the field of radiology are being digitized, and optimal data acquisition and information processing technology are important. In this course, students will deepen their knowledge and comprehensive understanding of the theory of information processing of digital medical images such as computed tomography (CT), magnetic resonance imaging (MRI), and nuclear medicine imaging (RI) and their clinical applications using the latest specialized books and academic materials in Japan and overseas. In addition, focusing on radiation protection in radiation equipment, students will acquire specialized knowledge on radiation protection from the latest technical books and academic materials in Japan and overseas, such as the principles and theoretical systems of protection, the theory and practice of radiation effects, radiation management, and the actual conditions of radiation accidents.				
到達目標 Objectives	KOBAYASHI S.: Describe the latest information about diagnostic imaging equipment. MINAMI: Be able to explain radiation safety management from multiple perspectives. TAKATSU: To understand the methods for evaluating MR images. SHIIBA: Students learn radiomics methods in the molecular imaging field. MUTO: Describe DICOM and IHE in the field of radiology. KASAI:				
回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)				担当教員 Instructor
1-3	The latest information about diagnostic imaging equipment using Radiology.				KOBAYASHI Shigeki
4-6	Radiation accidents and safety management				MINAMI Kazuyuki
7-9	Image evaluation using magnetic resonance imaging				TAKATSU Yasuo
10-13	Image processing in nuclear medicine				SHIRAKAWA Seiji
14-17	Fundamentals and clinical applications of radiomics in nuclear medicine and MRI fields.				SHIIBA Takuro
18-21	Radiation disaster medicine				KOBAYASHI Masanao
22	Interoperability and Standardization in Medical Information				MUTO Koichi
23	The Latest on DICOM				MUTO Koichi
24	The Latest on IHE				MUTO Koichi
25	Study and Theory of Data Science and Artificial Intelligence				KASAI Satoshi
26	The Latest Research and Trends in Deep Learning				KASAI Satoshi
27	The Discussion of study on the Improvement of Artificial Intelligence and the Trend of Development on Clinical Assistance				KASAI Satoshi
28-30	General Principles of Radiation Protection				YOKOYAMA Sumi
評価法・基準 Grading Policies	MINAMI: Evaluation will be based on the assignment report (100%). TAKATSU: Evaluation will be based on the assignment report (100%). SHIIBA: Evaluation is made based on the submitted assignments. MUTO: Evaluation will be based on the assignment report (100%).				

	KASAI: Evaluation will be based on the assignment report (100%).		
教科書 Textbook	MINAMI: Materials will be distributed as appropriate. TAKATSU: Materials will be distributed as appropriate. SHIIBA: Materials will be distributed. MUTO: Handout materials as appropriate. KASAI:	教材・参考書 Reference Book	
オフィス アワー Office Hour	KOBAYASHI Shigeki：18:00-19:00, Monday at 403, building 7 MINAMI：16:30-18:00, Wednesday at 501, building 6 TAKATSU：17:30-19:00, Monday at 401, building 7 SHIRAKAWA：17:00-19:00, Friday at 506, building 6 SHIIBA：17:00-18:00, Wednesday at 405-3, building 7 MUTO：16:20-18:00, Thursday at 506-2, building 6 KOBAYASHI Masanao：17:00-19:00, Tuesday at 403, building 7 KASAI：10:40-15:00, Monday to Thursday at 208, building 7 YOKOYAMA： online for 1 hour after class	連絡先 Contact	
準備学習 Preparation of study	MUTO: Search Internet resources to learn about DICOM and IHE.	履修上の注意点 Notice for Students	

Radiological Sciences Exercise

専攻分野 Major Field	Radiological Sciences	学年 Grade	1st ・ 2nd year	期 間 Semester	1st year: full year 2nd year: 1st semester
授業形態 Style	practice, seminar	単位 Credits	6	時間数 Hours	180
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese		
担当教員名 Instructor	KOBAYASHI Shigeki, MINAMI Kazuyuki, TAKATSU Yasuo, SHIRAKAWA Seiji, SHIIBA Takuro, MUTO Koichi, KOBAYASHI Masanao, KASAI Satoshi,				
科目概要 Course Aims	For better understanding of the content of the lectures on previous advanced radiological sciences, students will read related original papers and explanatory papers. Conduct exercises incorporating experimental methods so that students can understand the principles, methods, and applications of various diagnostic modalities, medical informatics, radiation safety management, etc. In this course, students will engage in seminars under the guidance of the faculty member of their choice.				
到達目標 Objectives	1. To read through an original paper in English in a related field 2. To deepen your understanding of specific theories, techniques, analytical methods, and more. 3. To handle related machines and become familiar with usage.				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1-90	(KOBAYASHI Shigeki) Students will read papers on photon counting technology or AI technology for smart hospitalization, and acquire skills related to image analysis or AI program implementation. (MINAMI Kazuyuki) Subscribe to explanatory papers on radiation exposure simulations using Monte Carlo calculation codes and study the outline and techniques. (TAKATSU Yasuo) Students will survey articles on magnetic resonance imaging to understand previous studies and learn how to analyze them. (SHIRAKAWA Seiji) This exercise subscribes to the latest image processing and image reconstruction method in nuclear medicine and understands the contents through programming. (SHIIBA Takuro) Students will read articles on neuroimaging and radiomics analysis to deepen their understanding of the principles behind the analysis methods. In addition, students will learn programming techniques necessary for analysis using sample images. (MUTO Koichi) Subscribe to the DICOM Standards and the Technical Framework for the Radiation Domain to gain a better understanding of the standards. Analyze DICOM data with a binary editor or program. Develop a DICOM-compliant medical information system using open-source software. (KOBAYASHI Masanao) Subscribe to recommendations of the International Commission on Radiological Protection, etc., and understand international trends in radiation exposure.	KOBAYASHI Shigeki MINAMI Kazuyuki TAKATSU Yasuo SHIRAKAWA Seiji SHIIBA Takuro MUTO Koichi KOBAYASHI Masanao KASAI Satoshi

	（KASAI Satoshi） Investigate research papers on generative AI using medical image to understand the latest research in the field.		
評価法・基準 Grading Policies	Attitude (50%), Preparation and presentation of materials (50%) Discussions are held during the lecture to measure the achievement of goals.		
教科書 Textbook	Distribute prints as needed.	教材・参考書 Reference Book	None
オフィス アワー Office Hour	KOBAYASHI Shigeki : 18:00-19:00, Monday at 403, building 7 MINAMI : 16:30-18:00, Wednesday at 501, building 6 TAKATSU : 17:30-19:00, Monday at 401, building 7 SHIRAKAWA : 17:00-19:00, Friday at 506, building 6 SHIIBA : 17:00-18:00, Wednesday at 405-3, building 7 MUTO : 16:20-18:00, Thursday at 506-2, building 6 KOBAYASHI Masanao : 17:00-19:00, Tuesday at 403, building 7 KASAI : 10:40-15:00, Monday to Thursday at 208, building 7	連絡先 Contact	
準備学習 Preparation of study	Prepare using teaching materials, reference books, etc. as appropriate.	履修上の注意点 Notice for Students	To demonstrate autonomy and aggressiveness.

Graduate Thesis of Radiological Sciences

専攻分野 Major Field	Radiological Sciences	学年 Grade	1st ・ 2nd year	期 間 Semester	1st year: full year 2st year: full year
授業形態 Style	practice, seminar	単位 Credits	12	時間数 Hours	360
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese		
担当教員名 Instructor	KOBAYASHI Shigeki, MINAMI Kazuyuki, TAKATSU Yasuo, SHIRAKAWA Seiji, SHIIBA Takuro, MUTO Koichi, KOBAYASHI Masanao, KASAI Satoshi				
科目概要 Course Aims	***KOBAYASHI Shigeki*** To promote research that contributes to the creation of next-generation medical care forms. 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. ***MINAMI Kazuyuki*** In this laboratory, we will conduct research on measurement and simulation of exposure dose in the field of nuclear medicine. 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 ***TAKATSU Yasuo*** 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. 1. Analysis of clinical images using Magnetic Resonance Imaging. 2. Investigation of imaging methods and clinical evaluation in Magnetic Resonance Imaging ***SHIRAKAWA Seiji*** 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. 1. Monte Carlo simulation-based SPECT reconstruction 2. Study on image processing using deep learning ***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 ***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				

<table>
<tr><td>科目概要
Course Aims</td><td colspan="3">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

KASAI Satoshi
1. Research on AI-assisted surgical planning for glioma using preoperative brain MRI images.
2. Study on extracting diseases without morphological abnormalities from chest X-ray images using AI.
3. Research on AI-based breast cancer risk estimation.
4. Study on fetal anomaly monitoring through automated analysis of fetal heart rate and contraction charts.
5. Research on generative AI and explainable AI using natural language and medical image.</td></tr>
<tr><td>到達目標
Objectives</td><td colspan="3">1. Decide on your own research topics and research related literature.
2. Determine the framework of research promotion, acquire experiments, research methods, and conduct research.
3. Experimental and theoretical considerations are conducted.
4. To write a master's thesis</td></tr>
<tr><td>回数
Chapters</td><td colspan="3">授業計画（各回のテーマ）
Course Schedule (topic for each time)</td></tr>
<tr><td colspan="4">1st year: 1st semester (90hours:45 chapters)</td></tr>
<tr><td>1-45</td><td colspan="3">1. Search literature on issues and problems of interest.
2. Narrow down the problems in the task.</td></tr>
<tr><td colspan="4">1st year: 2nd semester (90 hours:45 chapters)</td></tr>
<tr><td>46-90</td><td colspan="3">1. Make up a large framework for the task.
2. Investigate the experimental methods and methods used and master them.
3. Start experiments and surveys at an early stage and conduct theoretical development.</td></tr>
<tr><td colspan="4">2nd year: 1st semester (90 hours:45 chapters)</td></tr>
<tr><td>91-135</td><td colspan="3">1. Verify the progress of research.
2. Furthermore, comprehensively promote research.</td></tr>
<tr><td colspan="4">2nd year: 2nd semester (90 hours:45 chapters)</td></tr>
<tr><td>136-180</td><td colspan="3">1. Individual consideration is carried out on the results obtained by experiments, etc.
2. Consider and examine the research in general.
3. Write a master's thesis</td></tr>
<tr><td>評価法・基準
Grading Policies</td><td colspan="3">Attitude (20%), Research Plan and Implementation (40%), Paper Writing (40%)</td></tr>
<tr><td>教科書
Textbook</td><td></td><td>教材・参考書
Reference Book</td><td></td></tr>
<tr><td>オフィス アワー
Office Hour</td><td>KOBAYASHI Shigeki：18:00-19:00, Monday at 403, building 7
MINAMI：16:30-18:00, Wednesday at 501, building 6
TAKATSU：17:30-19:00, Monday at 401, building 7</td><td>連絡先
Contact</td><td></td></tr>
</table>

	SHIRAKAWA : 17:00-19:00, Friday at 506, building 6 SHIIBA : 17:00-18:00, Wednesday at 405-3, building 7 MUTO : 16:20-18:00, Thursday at 506, building 6 KOBAYASHI Masanao : 17:00-19:00, Tuesday at 403, building 7 KASAI : 10:40-15:00, Monday to Thursday at 208, building 7		
準備学習 Preparation of study	Prepare using teaching materials, reference books, etc. as appropriate.	履修上の注意点 Notice for Students	To demonstrate the spirit of inquiry, positivity, and autonomy.

Medical Physics Seminar

専攻分野 Major Field	Medical Physics	学年 Grade	1st year	期　間 Semester	1st semester
授業形態 Style	lecture, seminar	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese		
担当教員名 Instructor	ASADA Yasuki、HAYASHI Naoki, MATSUBARA Hiroaki, KUNITOMO Hiroshi, YASUI Keisuke				
科目概要 Course Aims	Medical physics is not only one of scientific subjects to take the contribution to medicine from the science and technology aspects, but also it is the field of indispensable arts and sciences in the medical use of the safety radiation. By this subject, students understand the significance of learning medical physics and, with the goal of getting development of the new technique or knowledge, perform the study that students did mainly on the physics in the medical radiation sciences domain and learn the way of the study.				
到達目標 Objectives	The goals of this course are to - be able to explain physical characteristics of X-ray in diagnostic - be able to explain physical characteristics of high energy X-ray, electron beam and particle beam - be able to explain difference in influence on human body by the kind of the radiation - be able to feed basic skills necessary to understand radiation medical care physically				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1	International trend of new topics and research in diagnostic medical physics (As the reference, AAPM Task Group Reports and IAEA TRS will be used for this seminar)	ASADA Yasuki
2-3	Dose evaluation in general radiography and mammography	ASADA Yasuki
4	International trend of new topics and research in radiation oncology medical physics (As the reference, AAPM Task Group Reports and IAEA TRS will be used for this seminar)	HAYASHI Naoki
5-6	Clinical implementation of data science in high precision radiation therapy	HAYASHI Naoki
7	International trend of new topics and research in therapeutic physics and engineering (As the reference, AAPM Task Group Reports and IAEA TRS will be used for this seminar)	MATSUBARA Hiroaki
8-9	Impact of particle beam and secondary radiation for human body and clinical instruments	MATSUBARA Hiroaki
10	International trend of new topics and research in diagnostic medical physics (As the reference, AAPM Task Group Reports and IAEA TRS will be used for this seminar)	KUNITOMO Hiroshi
11-12	Physical properties in clinical images in general radiography, mammography, and angiography	KUNITOMO Hiroshi
13	International trend of new topics and research in radiation biology and physics (As the reference, AAPM Task Group Reports and IAEA TRS will be used for this seminar)	YASUI Keisuke

14-15	Radiation biology and dose-rate response in ultra-high dose-rate irradiation		YASUI Keisuke
評価法・基準 Grading Policies	• Your overall grade in the class will be decided based on the presentation and short reports. • Feedback on your presentation will be provided by each instructor.		
教科書 Textbook	Regimen will be provided in the class.	教材・参考書 Reference Book	IAEA TRS reports, AAPM TG reports, ICRU reports, ICRP reports
オフィス アワー Office Hours	ASADA Yasuki: 18:00-21:00, Monday-Friday at 408, building 7 HAYASHI Naoki: 18:00-21:00, Monday-Friday at 301, building 7 MATSUBARA Hiroaki: 12:00-18:00 Monday-Friday at 205, building 7 KUNITOMO Hiroshi: 16:00-17:00 Tuesday at 408, building 7 YASUI Keisuke: 12:00-18:00 Monday-Friday at 310, building 7	連絡先 Contact	
準備学習 Preparation of study	Students are expected to read the documents and check the technical terms for 30 minutes before class.	履修上の注意点 Notice for Students	If you have a seminar in a hospital, behave appropriately.

Science and Technology in Medicine Seminar

専攻分野 Major Field	Medical Physics	学年 Grade	1st year	期 間 Semester	2nd semester
授業形態 Style	lecture, seminar	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese		
担当教員名 Instructor	HAYASHI Naoki, MATSUBARA Hiroaki, YASUI Keisuke				
科目概要 Course Aims	The latest medical technology in radiology is achieved by combining the results of medical research with various other research fields, including science and engineering. A medical physicist is a person who takes a leading role in solving physical and technical problems in radiology. This course aims to teach students the mathematical analysis and physical theory used in data science and high-precision radiotherapy in medicine. By using examples of real medical applications, students will acquire the necessary knowledge to become medical physicists.				
到達目標 Objectives	1. The first objective is to comprehend the application of science and engineering in the field of medicine. 2. The second objective is to develop the ability to identify physical and technological problems in healthcare. 3. The third objective is to gain an understanding of the use of data science in medicine and be able to explain it. 4. The fourth objective is to acquire knowledge of electrical engineering and quantum mechanics used in radiology. 5. The final objective is to acquire knowledge of instrumentation engineering and material engineering utilized in particle therapy.				
回数 Chapters	授業計画（各回のテーマ） Course Schedule			担当教員 Instructor	
1-5	Knowledge and examples of mathematical analysis and physics engineering are utilized in the field of radiotherapy			HAYASHI Naoki	
6-10	Knowledge and examples of electrical engineering and quantum engineering utilized in radiation medicine			MATSUBARA Hiroaki	
11-15	Knowledge and examples of instrumentation and materials engineering utilized in particle therapy			YASUI Keisuke	
評価法 基準 Grading Policies	●Your overall grade in the class will be decided based on the presentation and short reports. ●Feedback on your presentation will be provided by each instructor.				
教科書 Textbook	The regimen will be provided in the class.	教材・参考書 Reference Book	IAEA TRS reports, AAPM TG reports, ICRU reports, ICRP reports		
オフィス アワー Office Hours	HAYASHI Naoki: 18:00-21:00, Monday-Friday at 301, building 7 MATSUBARA Hiroaki: 12:00-18:00 Monday-Friday at 205, building 7 YASUI Keisuke: 12:00-18:00 Monday-Friday at 310, building 7	連絡先 Contact			
準備学習 Preparation of study	Students are expected to read the documents and check the technical terms for 30 minutes before class.	履修上の注意点 Notice for Students	If you have a seminar in a hospital, behave appropriately.		

Medical Physics Exercise

専攻分野 Major Field	Medical Physics	学年 Grade	1st ・ 2nd year	期 間 Semester	1st year: full year 2nd year: 1st semester
授業形態 Style	lecture, seminar	単位 Credits	4	時間数 Hours	120
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese		
担当教員名 Instructor	ASADA Yasuki、HAYASHI Naoki, MATSUBARA Hiroaki, KUNITOMO Hiroshi, YASUI Keisuke				
科目概要 Course Aims	Medical physics is not only one of scientific subjects to take the contribution to medicine from the science and technology aspects, but also it is the field of indispensable arts and sciences in the medical use of the safety radiation. By this subject, students understand the significance of learning medical physics and, with the goal of getting development of the new technique or knowledge, perform the study that students did mainly on the physics in the medical radiation sciences domain and learn the way of the study.				
到達目標 Objectives	The goals of this course are to - be able to carry out the radiation measurement that understood a characteristic of the measuring equipment - be able to evaluate internal absorbed dose and medical exposure based on result of measurement - be able to draw up the radiotherapy plan for the assumed disease - be able to carry out the quantitative inspection of the radiotherapy plan drawn up				
回数 Chapters	授業計画（各回のテーマ） Course Schedule (topic for each time)				
1st year:1st semester (30 hours:15 chapters),2nd semester (60 hours:30 chapters)					
1-30	1.About medical physics in radiology (a study domain and the prospect) 2.Students read the original papers of the associated field and get ability to comprehend understanding contents deeply and an article in English				
31-45	3.Students search for a doctoral dissertation, the master's thesis of the associated field and read deeply them and deepen understanding				
2nd year:1st semester (30 hours:15 chapters)					
1-6	1.Utility of computer for diagnostic X-ray and radiation therapy equipment				
7-14	2.Quality control of diagnostic X-ray and radiation therapy equipment				
15	3.Summary				
評価法・基準 Grading Policies	• Your overall grade in the class will be decided based on the presentation and short reports. • Feedback on your presentation and your program will be provided by each instructor.				
教科書 Textbook	The physics of radiation therapy (Faiz Khan) ICRP reports	教材・参考書 Reference Book	ICRU reports Guideline for radiotherapy planning 2020		

オフィス アワー Office Hour	ASADA Yasuki: 18:00-21:00, Monday-Friday at 408, building 7 HAYASHI Naoki: 18:00-21:00, Monday-Friday at 301, building 7 MATSUBARA Hiroaki: 12:00-18:00 Monday-Friday at 205, building 7 KUNITOMO Hiroshi: 16:00-17:00 Tuesday at 408, building 7 YASUI Keisuke: 12:00-18:00 Monday-Friday at 310, building 7	連絡先 Contact	
準備学習 Preparation of study	Students are expected to read the documents and check the technical terms for 30 minutes before class.	履修上の注意点 Notice for Students	We respect your independence and aggressiveness.

Hospital Training of Medical Physics

専攻分野 Major Field	Medical Physics	学年 Grade	1st year 2nd year	期　間 Semester	1st year: full year 2nd year: 1st semester
授業形態 Style	Clinical practice	単位 Credits	4	時間数 Hours	120
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese		
担当教員名 Instructor	HAYASHI Naoki, YASUI Keisuke, HAYASHI Shinya, SAITO Yasunori				
科目概要 Course Aims	A medical physicist is required the skills regarding radiotherapy treatment planning, quality assurance, radiation dosimetry etc. These procedures are based on basic subjects such as radiation physics, radiation dosimetry, radiation oncology, radiation biology and so on. In this training, students learn the skills through actual clinical practice. Especially, this subject treats the contents on medical physics ground in radiotherapy.				
到達目標 Objectives	The goals of this subject are that students will. − Be able to measure the absorption dose in therapeutic beams. − Be able to design the radiotherapy planning in several sites for patients with cancer. − Be able to evaluate the quality of radiation therapy. − Be able to carry out optimal investigation from the aspect of medical physics.				
回数 Chapters	授業計画（各回のテーマ） Course Schedule				
1st year:1st semester (30 hours:15 chapters)					
1-5	1. Understand the role of medical physics in radiation therapy. 2. Recognize the integration between radiation oncology and medical physics through conference participation.				
6-15	3.Familiarize oneself with radiation therapy planning guidelines.				
1st year: 2nd semester (50 hours:25 chapters)					
16-20	4. Gain insight into case-specific radiotherapy planning via conference attendance. 5. Learn and apply task shifting/sharing practices.				
21-40	6. Adhere to radiotherapy treatment planning guidelines and develop practical plans.				
2nd year:1st semester (40 hours:20 chapters)					
41-50	7. Appreciate the significance of high-precision radiotherapy through conference discussions.				
51-60	8. Learn and practice the validation of high-precision radiotherapy treatment plans.				
評価法・基準 Grading Policies	●Participation attitude of hospital training and case conference: 70% ●Contents and description of session report: 30%				
教科書 Textbook	Specific regimen will be provided.	教材・参考書 Reference Book	AAPM reports, ICRU reports IAEA technical report series, Guideline for radiotherapy planning 2020		

オフィス アワー Office Hour	HAYASHI Naoki: 18:00-21:00, Monday-Friday at 301, building 7 YASUI Keisuke: 12:00-18:00 Monday-Friday at 310, building 7 HAYASHI Shinya: except clinical SAITO Yasunori : 9 :00-17 :00 Monday-Friday	連絡先 Contact	
準備学習 Preparation of study	Students are expected to read the documents and check the technical terms for 30 minutes before class.	履修上の注意点 Notice for Students	We respect your independence and aggressiveness.

Graduate Thesis of Medical Physics

専攻分野 Major Field	Medical Physics	学年 Grade	1st ・ 2nd year	期 間 Semester	1st year: full year 2st year: full year
授業形態 Style	research, seminar	単位 Credits	10	時間数 Hours	300
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese		
担当教員名 Instructor	ASADA Yasuki、HAYASHI Naoki, MATSUBARA Hiroaki, KUNITOMO Hiroshi, YASUI Keisuke				
科目概要 Course Aims	Medical physics is the 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's degree including the outcome in master course term. ***ASADA Yasuki*** 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 ***HAYASHI Naoki*** 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 ***MATSUBARA Hiroaki*** 1. Study of malfunctions in cardiac implantable electronic devices caused by diagnostic and therapeutic radiation 2. Medical physics particularly based on nuclear physics ***KUNITOMO Hiroshi*** My laboratory focuses on 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 ***YASUI Keisuke*** 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.				
到達目標 Objectives	The goals of this course are to - be able to make study design for the research in medical physics - be able to make the manuscript regarding outcome in research by yourself.				
回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)				
1st year:1st semester (30 hours:15 chapters)					
1-15	1.Research of innovation in diagnostic X-ray domain and radiation therapy				

1st year: 2nd semester (60 hours:30 chapters)			
1-14	1. Collection of previous studies and basic data on study theme		
15-30	2. Based experiment and analysis		
2nd year:1st semester (90 hours:45 chapters)			
1-45	1. Planning of experiment on study theme		
2nd year:2nd semester (120 hours:60 chapters)			
1-28	1. Planning of study and experiment		
29-42	2. Experiment and analysis of data		
43-49	3. Presentation on associated congress		
50-60	4. Writing of master's thesis		
評価法･基準 Grading Policies	• Your overall grade is comprehensively evaluated based on attendance attitude, submitted conference papers, conference presentations, and master's thesis. • Feedback on your presentation at the group meeting or conference will be provided by each instructor.		
教科書 Textbook		教材･参考書 Reference Book	
オフィス アワー Office Hour	ASADA Yasuki: 18:00-21:00, Monday-Friday at 408, building 7 HAYASHI Naoki: 18:00-21:00, Monday-Friday at 301, building 7 MATSUBARA Hiroaki: 12:00-18:00 Monday-Friday at 205, building 7 KUNITOMO Hiroshi: 16:00-17:00 Tuesday at 408, building 7 YASUI Keisuke: 12:00-18:00 Monday-Friday at 310, building 7	連絡先 Contact	
準備学習 Preparation of study	Students are expected to read the documents and check the technical terms for 30 minutes before class.	履修上の注意点 Notice for Students	We respect your independence and aggressiveness.

4. Biomedical Engineering

Biomedical Engineering Seminar Ⅰ

専攻分野 Major Field	Biomedical Engineering	学年 Grade	1st year	期 間 Semester	1st semester
授業形態 Style	Lectures and seminars	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese		
担当教員名 Instructor	HIBIYA Makoto, IHIRA Masaru, OHASHI Atsushi, HORI Hideo, KAWAGUCHI Kazunori				
科目概要 Course Aims	Students will learn about the characteristics and operational issues of medical devices, especially devices that substitute biological functions such as artificial heart-lung machines, artificial kidneys, blood purification devices, and ventilators, as well as the pathological conditions of various diseases and their interrelationships. In addition, students will learn techniques to conduct empirical and epidemiological studies, knowledge and techniques to practice advanced medical treatment, simulations, basic technologies required for the improvement of current devices and the design and development of new artificial organs, and specific issues related to regenerative medicine.				
到達目標 Objectives	1. Explain human characteristics to others in a logical manner using case studies of accidents related to the operation of artificial heart-lung machines. (DP1,2). 2. Explain to others the PCI evaluation method and type 4 myocardial infarction and INOCA, MINOCA. (DP1,2). 3. Explain to others the pathogenesis of renal failure and refractory ascites and the indications for blood purification therapy. (DP1,2). 4. Explain the basics of the three elements of regenerative medicine to others (DP1,2). 5. Explain to others how to process data from sensors including IR sensors (DP1,2)				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1-3	The practice of handling and operating medical devices is determined by human judgment. In medical practice using devices that substitute biological functions, errors in judgment can lead to medical accidents. The analysis of such human errors can be useful during research and development. We will discuss actual medical accidents, especially those caused by artificial heart-lung machines, and consider human characteristics through the analysis of such accidents.	HIBIYA Makoto
4-6	Percutaneous coronary angioplasty (PCI) has become the treatment of choice for angina pectoris and myocardial infarction. On the other hand, there is a lack of markers to indicate myocardial damage after PCI and its prognosis. Recently, micro-RNAs, which regulate gene expression, have attracted attention as a biomarker for the prognosis of post-PCI restenosis and stent restenosis. In this lecture, the significance of miRNAs and their measurement methods will be outlined.	IHIRA Masaru
7-9	We will discuss the latest cleansing techniques for renal failure and refractory ascites and the relationship between inflammatory responses and oxidative stress.	OHASHI Atsushi
10-12	In regenerative medicine, cells, scaffolds, and trophic factors are key elements in the creation of tissue substitutes. The fundamentals of these three elements will be outlined.	HORI Hideo
13-15	An overview of the principles and measurement of eye tracking using infrared (IR). An overview of gaze dispersion in response to cognitive load during memory retrieval.	KAWAGUCHI Kazunori

評価法・基準 Grading Policies	Evaluation method: Class notes (30%, rubric indicated), group work and group discussion (group work may be based on paper abstracts) (70%). Criteria: Evaluation of objectives 1) - 5). Feedback: The teachers will provide instruction on the results of the group work and group discussion.		
教科書 Textbook	Not specified Materials distributed by the instructor	教材・参考書 Reference Book	
オフィス アワー Office Hour	HIBIYA: Mon・Tue 8:30-9:00 Build.6-5F- 505 IHIRA ： as needed, Build.7-6F-603 OHASHI : as needed, Build.7-6F- 603 HORI: Bldg. No.7-6F-603, Wed., Thu., Friday 8:30-9:00 KAWAGUCHI: Bldg. No.7-6F-601, 16:00-18:00	連絡先 Contact	
準備学習 Preparation of study		履修上の注意点 Notice for Students	

Biomedical Engineering Seminar Ⅱ

専攻分野 Major Field	Biomedical Engineering	学年 Grade	1st year	期 間 Semester	2nd semester
授業形態 Style	Lectures and seminars	単位 Credits	2	時間数 Hours	30
授業方法 Class Methods	remote class	使用言語 Language	Japanese		
担当教員名 Instructor	ITO Hiroyasu, MIURA Yasuo, FUJIGAKI Hidetsugu, UMEZAWA Eizou, HATTORI Hidekazu, MIZUTANI Kenmei, HIRANO Harutoyo				
科目概要 Course Aims	Recently, Information processing technology and robot technology, represented by data science and artificial intelligence, have made remarkable progress, and their application to medicine is also progressing. In this course, lectures will be given on the basics of testing and treatment techniques using biomedical engineering technology, as well as examples of their application in clinical practice and animal experiments.				
到達目標 Objectives	1) Understand and be able to explain efforts toward automation of clinical testing. 2) Be able to understand and explain the latest blood transfusion and cell therapy. 3) Understand and be able to explain new testing methods using biological samples. 4) Be able to understand and explain the latest analysis technologies such as the use of AI.				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1	Automatic PCR testing system	ITO Hiroyasu
2	Automatic blood sampling device	ITO Hiroyasu
3	Automatic microbial testing system	ITO Hiroyasu
4	Blood transfusion and organ transplantation	MIURA Yasuo
5	Cutting-edge cell therapy	MIURA Yasuo
6	High-sensitivity measurement of biomarkers in biological samples	FUJIGAKI Hidetsugu
7	Identification of biomarkers by metabolomic analysis	FUJIGAKI Hidetsugu
8-9	Advanced MRI techniques and image analysis	UMEZAWA Eizou
10-11	The Performance Evaluation and Utilization of CAD using Artificial Intelligence	HATTORI Hidekazu
12-13	To understand basic analytical methods for changes occurring in the brain, focusing on protein dynamics.	MIZUTANI Kenmei
14-15	Overview of basic methods and research cases for the representation of human physiology in mathematical and engineering models.	HIRANO Harutoyo

評価法・基準 Grading Policies	Evaluation method: Comprehensive evaluation is made based on the attitude of participation in the class, the content of discussion (80%), and assignment reports (20%). Standard: Create and submit reports as needed to check the achievement of the target. Feedback: After the assignment report, give a model explanation.		
教科書 Textbook	Textbooks are not specified or used. Materials will be distributed as needed.	教材・参考書 Reference Book	Each faculty member will introduce.

オフィス アワー Office Hour	ITO: E-mail me if you have any questions. MIURA: Feel free to contact me via email FUJIGAKI: After class or make an appointment by email UMEZAWA: as needed, 501-1, building 6. HATTORI: Bldg.No.3-2F-205, Thu, Friday 16:00-17:00 MIZUTANI: Bldg.No.6-4F-402, Tue, 17:00-19:00 HIRANO: as needed, Build.7-4F-409	連絡先 Contact	
準備学習 Preparation of study	Preparatory study requires basic study according to each theme. Please collect information using technical books and the Internet for at least 30 minutes.	履修上の注意点 Notice for Students	Some faculty members are required to submit reports.

Biomedical Engineering Exercise

専攻分野 Major Field	Biomedical Engineering	学年 Grade	1st ・2nd year	期 間 Semester	1st year: full year 2nd year:1st semester
授業形態 Style	Experiment / Exercise / Seminar	単位 Credits	6	時間数 Hours	180
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese		
担当教員名 Instructor	HIBIYA Makoto, IHIRA Masaru, OHASHI Atushi, HORI Hideo, ITO Hiroyasu, MIURA Yasuo, FUJIGAKI Hidetsugu, UMEZAWA Eizou, HATTORI Hidekazu, MIZUTANI Kenmei, HIRANO Harutoyo				
科目概要 Course Aims	Students will learn various techniques for measurement, control, and data analysis related to advanced medical technologies for animals and the human body, as well as treatment technologies using artificial organs, and conduct experiments and exercises with a view to clinical applications through the integration of these techniques. In this course, students will work on assignments given by a teacher of their choice.				
到達目標 Objectives	1) Be able to design methods using knowledge and technology of medical and engineering evaluation to solve problems. (DP1) 2) Cultivate the ability to think in order to develop research, to set research questions, and to conduct evaluation. (DP1,2) 3) To be able to select and analyze analytical techniques for the set research questions. (DP1,3) 4) Be able to explain the evaluation techniques and analysis methods used to solve the problem. (DP3)				

回数 Chapters	授業計画(各回のテーマ) Course Schedule (topic for each time)	担当教員 Instructor
1-90	(HIBIYA Makoto) Efforts to maintain and improve the quality of extracorporeal circulation are being made both domestically and internationally by extracting and accumulating necessary data from records of extracorporeal circulation practices and analyzing them. The extraction and accumulation of this data has been changing from a situation where it relies on human operators to one where digital information can be obtained by means of A/D conversion, etc., added to the equipment. In addition, while accurate information is necessary for analysis, the current human recordings are prone to errors. This seminar will provide knowledge and techniques to optimize the human-machine interface and to obtain data. (IHIRA Masaru) First, we will understand the function of miRNA, which is essential for miRNA research. Learn the prognosis of heart failure, cardiac catheterization by PCI, and its use as a biomarker. In addition, students will learn analysis methods by miRNA databases and pathway analysis. (OHASHI Atushi) Reading papers on the biocompatibility of contact between purification device materials and blood components, and on the evolution of blood purification and apheresis therapy techniques. Exercises on mathematical analysis of mass balance when separating pathogenic substances contained in blood and ascitic fluid using semipermeable membranes and adsorption principles. (HORI Hideo) Learn about regenerative medicine using biomaterials.	Each instructor

	(ITO Hiroyasu) Reading the latest papers on the mechanisms of host immune responses to cancer and cancer immunotherapy. Learning basic immunological analysis methods such as ELISA and ELISPOT methods, as well as cell culture and methods for producing various tumor-bearing mouse models. (MIURA Yasuo) We will delve into blood transfusion testing, including blood typing and irregular antibody screening. Additionally, we will explore Luminex testing, with a particular emphasis on HLA testing. (FUJIGAKI Hidetsugu) Learning biochemical and immunological analysis methods to measure biomarkers in biological samples (UMEZAWA Eizou) Literature survey on MR imaging and exercise on MR imaging analysis (HATTORI Hidekazu) Conducting exercises on ensuring the safety of iodine contrast agent usage. (MIZUTANI Kenmei) Exercises will be conducted on the identification of the site of neuroplasticity and neural projection involved in the recovery of paralysis using an animal model of cerebral infarction. (HIRANO Harutoyo) Exercises and journal club on control systems and signal processing methods for representing living organisms in mathematical and engineering models.	Each instructor
評価法・基準 Grading Policies	Evaluate understanding of each of the achievement objectives based on oral examinations or reports given in class (100%). Reports will be evaluated using a rubric. Feedback will be given after the oral examinations, and reports will be corrected.	
教科書 Textbook		教材・参考書 Reference Book
オフィス アワー Office Hour	HIBIYA: Mon・Tue 8:30-9:00 Build.7-6F- 601 IHIRA：as needed, Build.7-6F-603 ITO: E-mail me if you have any questions. MIURA: Feel free to contact me via email FUJIGAKI: After class or make an appointment by email UMEZAWA: as needed, Build. 6-5F-501-1 HATTORI: Bldg.No.3-2F-205, Thu, Friday 16:00-17:00 MIZUTANI: Bldg.No.6-4F-402, Tue, 17:00-19:00 OHASHI：as needed, Build.7-6F- 603 HIRANO: as needed, Build.7-4F- 409 HORI: Bldg. No.7-6F-603, Wed,Thu, Friday 8:30-9:00	連絡先 Contact
準備学習 Preparation of study		履修上の注意点 Notice for Students

Graduate Thesis of Biomedical Engineering

専攻分野 Major Field	Biomedical Engineering	学年 Grade	1st ・2nd year	期 間 Semester	1st year: 2nd semester 2nd year: full year
授業形態 Style	Research / Seminar	単位 Credits	12	時間数 Hours	360
授業方法 Class Methods	face-to-face class	使用言語 Language	Japanese		
担当教員名 Instructor	HIBIYA Makoto, IHIRA Masaru, ITO Hiroyasu, MIURA Yasuo, FUJIGAKI Hidetsugu, UMEZAWA Eizou, HATTORI Hidekazu, MIZUTANI Kenmei, OHASHI Atushi, HIRANO Harutoyo, HORI Hideo				
科目概要 Course Aims	HIBIYA Makoto 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 IHIRA Masaru 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 ITO Hiroyasu We use immunological approaches to analyze the pathophysiology of cancer and develop new treatments for cancer using small animal models and human specimens. 1. Development of new cancer immunotherapy targeting immune checkpoint molecules 2. Development of cancer vaccine therapy using tumor-bearing animal models MIURA Yasuo ● Development of Safe Blood Transfusion Practices ● Pioneering the Basis for Cutting-edge Cell Therapy FUJIGAKI Hidetsugu To develop companion diagnostics for predicting drug efficacy and side effects, we develop diagnostic agents targeting metabolism of amino acids and therapeutic drugs. We also try to develop novel therapeutics for several diseases such as psychiatric disorders and cancer using metabolic enzyme inhibitors. 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 UMEZAWA Eizou Water molecules in living systems move around randomly in diffusion motion. Diffusion MRI uses statistical properties of the diffusion to obtain information about tissue microstructure and function. We study diffusion MRI using physics, mathematics, and mathematical data science. 1.Study on diffusion MRI 2.Study on the mathematical and physical foundation of MRI, and new MRI imaging and analysis methods based on it.				

	HATTORI Hidekazu The following studies focus on the effective utilization of artificial intelligence for medical information within the field of radiology: 1.The first is a study on the automatic detection of lesions in chest radiographs using deep learning. This research has the potential to change the way lung lesions are detected and operated. 2.The second is conducting research to ensure the safety of the use of contrast agents. This study is aimed at detecting imaging findings related to the side effects of contrast media. MIZUTANI Kenmei Research on paralysis recovery by stroke rehabilitation, elucidation of molecular mechanisms in the brain, and development of drug combination therapy 1. Analysis of plasticity change in the brain 2.Identification of functional molecules by proteome analysis and elucidation of molecular mechanisms of paralysis recovery 3.Development of drug therapy OHASHI Atsushi 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 HIRANO Harutoyo 1. Research on the effects of low doses of radiation on vascular function 2. Research on the estimation of early arterial stiffness using machine learning. 3. Measurement of autonomic response to stimulation based on vascular viscoelasticity. HORI Hideo Creation of Novel Regenerative Therapy Using Interaction between Polymeric Materials and Cells Study on kidney regeneration therapy using mesenchymal stem cells activated by polymeric material powder Study on kidney regeneration therapy using mesenchymal stem cells activated by polymeric powder Study on regenerative therapy using fiber materials
到達目標 Objectives	1. Be able to search for, collect, and describe articles related to the research theme. (DP1) 2. Be able to determine a research theme and to formulate a research plan. (DP1,3) 3. Acquire the skills and techniques necessary to conduct research and to promote research. (DP2,3) 4. Analyze, discuss, and evaluate research results, and explain them systematically (DP1,2,3) (DP1,2,3). 5. Be able to write a master's thesis. (DP3)
回数 Chapters	授業計画（各回のテーマ） Course Schedule (topic for each time)
1-60	Identify each student's research theme and prepare a research plan. Collect and read articles related to the research theme. Acquire the techniques and methods necessary to conduct research. Conduct analysis using the acquired techniques and methods.
61-120	Collect and closely read articles related to the research topic. Conduct analysis using the acquired techniques and methods. Check the progress of the research and evaluate its possibility of implementation. Present research at academic conferences.

121-180	Present research at conferences, etc. Summarize research results. Prepare and report a master's thesis.		
評価法・基準 Grading Policies	Three faculty members will evaluate the thesis, which is the result of research based on the objectives, by oral examination. (100%)		
教科書 Textbook		教材・参考書 Reference Book	Refer to the special lecture or exercise
オフィスアワー Office hour	HIBIYA: Mon・Tue 8:30-9:00 Build.7-6F- 601 IHIRA：as needed, Build.7-6F-603 ITO: E-mail me if you have any questions. MIURA: Feel free to contact me via email FUJIGAKI: After class or make an appointment by email UMEZAWA: as needed, Build. 6-5F-501-1 HATTORI: Bldg.No.3-2F-205, Thu, Friday 16:00-17:00 MIZUTANI: Bldg.No.6-4F-402, Tue, 17:00-19:00 OHASHI：as needed, Build.7-6F- 603 HIRANO: as needed, Build.7-4F-409 HORI: Bldg. No.7-6F-603, Wed, Thu, Friday 8:30-9:00	連絡先 Contact	
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