

Academic Year 2015

**The Graduate School of Medical Sciences
Kumamoto University
(Doctoral Course)**

Syllabus

**The Graduate School of Medical Sciences
Kumamoto University**

URL: <http://www.medphas.kumamoto-u.ac.jp/en/medgrad/index.html>

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The objective and principle of the Graduate School of Medical Sciences, Kumamoto University

The objective and principle of the Graduate School of Medical Sciences, Kumamoto University is to educate students with knowledge demanded to medical doctors who are leading medical professionals with research oriented abilities and strong problem solving abilities, and bioscientists who are capable of carrying out their own research at a international level in the area of their expertise, respectively.

Doctoral Course Curriculum Policy for the Graduate School of Medical Sciences, Kumamoto University

Our curriculum focuses on developing knowledge and skills as described below, through research guidance that includes omnibus-style lectures, course work, and the collaboration of multiple teaching fields. We do this to produce world-class researchers and educators who will be active in medical and life science fields, clinicians with strongly driven research aspirations, and other research-focused medical professionals.

1. Sophisticated and interdisciplinary knowledge needed to solve multidisciplinary problems relating to advanced medical and life sciences
2. A solid ability to pursue advanced world-class research in medical and life science fields
3. Advanced medical knowledge and clinical techniques needed to promote advanced medical care and lead medical technology innovation inside and outside Japan

Aspects of the new curriculum

The education at graduate schools of medicine in Japan so far has aimed to foster educators and researchers through medical research. In recent years, however, the research environment has changed, and lifestyle-related diseases have become larger clinical concern in comparison with acute diseases. In addition, the post-genome research has also been shifting from basic science to disease-related research.

In order to meet these changes, we set a second objective and principle for the Graduate School of Medical Sciences, Kumamoto University in order to educate “research-oriented medical professionals”. In accordance with this idea, we have developed new educational programs which enable students to acquire interdisciplinary and extensive medical knowledge and cutting-edge clinical skills, while cultivating a research-oriented mindset.

At the same time, we have revised our existing curriculum significantly so that students can, through tutorials, acquire not only extensive medical knowledge but also advanced research skills.

We have also restructured our four-major system into a single major system (medical major). While the former four-major system segmented basic, clinical and social medicine, the new system includes the joint supervision of research among multiple fields. These reforms to the educational system and its programs are the most ambitious ones since the Graduate School of Medical Sciences, Kumamoto University, was established in 1955. We are confident that our new programs are highly innovative in accordance with the national standards.

With these reforms, we will satisfy the needs to foster research-oriented clinical doctors as well as educators and researchers at an international level. With the enthusiastic support of young medical students from across Japan, we are committed to becoming one of the best institutions of medicine, well-suited to the needs of the new era.

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1. Notandum for course registration

- 1) **General Education Programs:** There are compulsory and elective subjects offered in our graduate course curriculum, as described on page 3. Please note that students must obtain 30 designated credits during the four years in this graduate school. Otherwise, their academic work shall not be deemed complete, even if their research and Thesis are completed. Students are requested to contact their academic supervisors for advice in order to decide which elective subjects to take. An application form attached (page 4~10) should be submitted to the Student Affairs Section, (Kyoumu-Tanto) at this graduate school office by May 18 (Mon).

However, an application form for the “Educational course for researchers on translational research for eradication of AIDS; Translational research course” and “Educational course for research frontiers on AIDS; Research frontiers course” should be submitted to the Student Affairs Section, (Kyoumu-Tanto) at this graduate school office by April 10 (Fri).

Applicants who have been approved as long-term students are allowed to take courses that include lecture courses, seminars, practice, etc. These courses must be completed within the approved time frame, which should not exceed eight years. However, each lecture course must be completed within one year. Such applicants must notify the Student Affairs Section.

- 2) **SOSEKI Registration:** Students’ academic achievement information is to be managed by SOSEKI (Kumamoto University School Affairs Information System). After submitting the above-mentioned application, students should register their compulsory subjects and elective subjects listed in their application via a web browser of SOSEKI by May 18 (Mon).

- 3) **Special Courses or Programs:** In addition to the basic curricula on page 3, the following courses are available: A course for Translational Researchers of AIDS Control, A course for Advanced Researchers of AIDS, A course for Researchers of Developmental Biology and Regenerative Medicine, and Experts of Clinical Metabolic Informatics, and HIGO course. Be sure to consult with your academic supervisors before choosing your courses. For students who are taking the AIDS course, the leading graduate education HIGO program, and the Shibasaburo program for under graduate medical students and junior resident, there are a number of supplementary materials that will guide you in this process; please ask the Student Affairs Section.

- 4) **The grade when you take lecture subjects :** Students are supposed to take lecture subjects in the 1st grade, but adult graduate students can take those subjects in the 2nd grade or after in the 2nd grade.

- 5) **How to take “Riron” subjects:** Lecture-style “Riron” classes will be held in 90-minute sessions as indicated on page 11 and attendance will be taken. Lectures of all subjects will be given from Monday, June 1, 2015 to Thursday, March 24, 2016. Lectures are held during the daytime and the nighttime and are scheduled as follows: the 1st period is 8:45~10:15, the 2nd period is 10:30~12:00, the 3rd period is 13:15~14:45, the 4th period is 15:00~16:30, the 5th period is 16:45~18:15, and the 6th period is 18:30~20:00. If there are any students who can’t understand Japanese, the lectures will be given in English (or it may be a combination of English and Japanese). Different class dates and times will be arranged separately when the scheduled date falls on public holidays and soon.

For some of the lecture courses, **remote teaching such as e-learning** (page 12) will be given to students who work or live in remote locations. Please ask the course director for details.

Deadline of taking lectures by using an e-learning system will be informed by e-mail or a homepage of Graduate School of Medical Sciences. So, please be sure to check your e-mail.

In some cases, **classes may be changed to a seminar or event held on and off campus**. The details of these events will be announced to students who want to take the “Riron”, no later than two weeks before they are to be held, through e-mail, bulletin boards, and the website for the Graduate School of Medical Sciences. Students are required to ask the Student Affairs Section, Graduate School of Medical Sciences or their professors in advance for more information, such as how to submit proof of attendance and how students will be evaluated.

- 6) **Lecture Room:** Lectures offered by several instructors (omnibus classes) will be given in the lecture room 2 on the 3rd floor of the Medical Education & Library Building. The location of the lecture room is shown on the campus map (p.189). Refer to it in advance or ask your academic advisor, if necessary.

7) Lectures Series “Medical Experiment Course”:

The elective subjects, “Medical Experiment Course” (page 69) requires students to attend more than 8 lectures a year for credit. Attendance will be taken in all of these courses. Please note that lectures are held from April 6 (Mon) to April 16 (Thu) (from 1st to 4th period).

However, the lecture on April 9(Thu) will not be held because of the health examination.

8) D1 Medical and Life Science Seminar and D2 Learning from Experienced Doctors:

D1 “Medical and Life Science Seminar” (page 59) and D2 “Learning from Experienced Doctors” (page 60), require students to attend more than 15 lectures for credit before completion of their Thesis research. Write 2 essays based on 2 talks chosen from more than 15 lectures. Length of the essays should be 250-500 words. Attendance will be taken in all of these courses. Send each essay to the supervisor (inviter of the talker) of the talk within one month by E-mail (not by hard copy or any other digital media). The file of the essay should be included in the E-mail both in an attached file and in the text. A carbon copy E-mail should be also sent to the Student Affairs Section (iyg-igaku@jimu.kumamoto-u.ac.jp). D1 “Medical and Life Science Seminar” and D2 “Learning from Experienced Doctors” will be given in principle from 17:30 on Wednesdays of the month at the lecture room 2 on the 3rd floor of the Medical Education & Library Building. However, the date, time or place of these lectures may change due to the instructor’s and lecturer’s schedules. Please check the details beforehand with the seminar guide leaflet distributed to each Department you belong to.

9) D4 Translational Research (TR) Seminar: This course, offered from 2014, is the subject using the selected 5 seminars of “D2 Learning from Experienced Doctors Seminar” and the selected seminars of “HIGO Business Seminar Series.”

Write 1 essay based on 1 talk chosen from the seminar “D4: Translational Research Seminar”. Length of the essay should be 250-500 words. “D4: Translational Research Seminar” requires students to attend more than 8 lectures for credit before completion of their Thesis research. Send the essay to Medical Faculty Educational Affairs Planning Section within one month by E-mail (not by hard copy or any other digital media). The file of the essay should be included in the E-mail both in an attached file and in the text. (iyg-igaku@jimu.kumamoto-u.ac.jp). Attendance will be taken in every talk by signing your name at the entrance of the lecture room

10) Research Conducting Program “Practice (Jissen)” I, II & Clinical Research Conducting Program “Practice (Jissen)” III:

Research conducting programs in compulsory and elective compulsory subjects described on page 3 should be selected with reference to the syllabus. These subjects are comprised of the Journal club, learning of experimental planning and technique, practical experiments for the PhD Thesis research including interpretation and criticism of the results obtained, acquiring skills of scientific presentation and discussion etc, as executed in the Departments, to which students are assigned. The clinical research conducting subjects are mainly conducted through clinical training.

If your Permanent Department* and Present Department* are different, you can choose “Practice(Jissen) I” from Permanent Department, and “Practice(Jissen) II” from Present Department.

For example if your Permanent Department is “Orthopaedic and Neuro-Musculoskeletal Surgery,” and your Present Department is “Molecular Genetics”, you can choose “Orthopaedic and Neuro-Musculoskeletal System “Jissen” I” and “Molecular Genetics“Jissen” II”.

*Permanent Department: A department which is registered on school.

*Present Department: A department where you are temporarily in. (Some students are temporarily transferred from a department in the field of Clinical Medicine to a department in the field of Basic Medicine because of some reasons such as research and experiment.)

11) Assessment of Academic Grades: Each course director in charge of a particular subject of the Lecture Series “Riron” is responsible for the assessment of academic grades for the corresponding “Riron” subject. If there is a disagreement between the director and instructors of the class in regards to their information and instructions, please be aware that information provided by the chief instructor prevails over that of any other instructors. Submit all assignments (e.g., paper summaries and reports) directly to your directors/instructors, not to clerical members at the graduate school office. Assignments may be submitted via e-mail; in this case, be sure to keep a transmission record.

12) E-mail address: Announcements of change of lectures, e-learning, seminar, economic support, and other information will be mainly informed by e-mail, a homepage of Graduate School of Medical Sciences and a bulletin board. Please be sure to send your e-mail address to Student Affairs Section (iyg-igaku@jimu.kumamoto-u.ac.jp) by e-mail with your name and student number by April 7(Tue). If you change your e-mail address, please let us know your new e-mail address as soon as possible.

2. Registration Application (See page 4)

<To be submitted to Student Affairs Section **by May 18 (Mon)**>

<An application form for the “AIDS” course should be submitted to the Student Affairs Section **by April 10 (Fri).**>

Choose the subjects you are to take from the list in section 3: “Lecture course/subject and credit”, and fill out the application. Refer to the syllabus for the content of each subject. “Field Name” means the fields of education provided in Practice (Jissen) I. Be sure to consult your academic supervisor before deciding on your subjects.

3. Lecture course/subject and credit

1) Curriculum outline

Subjects	Credits	Subjects	Credits
Compulsory subject		Elective Subject	
1.Lecture		(Chose 8 credits from below)	
A1 Medical Informatics & Medical Ethics (p.22)	2	B1 Pathophysiology and structural biochemistry of biomolecules (p.24)	2
2.Research Conducting Program		B2 Cell Biology (p.26)	2
Departmental Course “Practice (Jissen)” I (p.73~)	10	B3 Hematopoietic & Immune Systems (p.28)	2
Elective compulsory subject I (Choose one from below)		B4 Infection & Immune Control (p.30)	2
Course work		B5 Human Brain Functional Science (p.32)	2
1. Medical experiment course (p.69)	2	B6 Neuroscience (p.34)	2
2. Practicum on multidisciplinary cancer therapeutics, palliative care ※Note	2	B7 Developmental & Regenerative Medicine (p.36)	2
Elective compulsory subject II (Choose one from below)		B8 Environmental & Sociomedical Sciences (p.38)	2
Research Conducting subject		C1 Current Theory of Medical Diagnosis (p.40)	2
1.Departmental Course “Practice (Jissen)” II (p.73~)	8	C2 Advanced Therapeutics (p.42)	2
Clinical conducting subject		C3 Metabolic & Circulatory Regulations (p.44)	2
2. Departmental Course “Practice (Jissen)” III (p.164~)	8	C4 Reproductive & Developmental Medicine (p.46)	2
		C5 Advances in Oncologic Medicine I (p.48)	2
		C6 The Forefront of Clinical Oncology (p.50)	2
		C7 Restorative Medicine (p.52)	2
		C8 Cancer Therapeutics (p.54)	2
		C9 Palliative Care (p.56)	2
		C10 The Theory of Clinical Research (p.57)	2
		D1 Medical and Life Science Seminar (p.59)	2
		D2 Learning from Experienced Doctors Seminar (p.60)	2
		D3 Medicine and Life Science Training (p.62)	2
		D4 Translational Research Seminar (p.65)	1

※D3“Medicine and Life Science Training” : A student’s oral or poster presentation as a lead presenter at an academic conference is admitted as the credits. Please check page 62.

※Classes may be changed to a seminar or event held on and off campus. If you take these classes, please submit the certificate of attendance which you write your information when you attend the seminar.

The certificate of attendance will be given by Student Affairs Section or academic supervisor who organizes the seminar.

※Those who can take the “Practicum on multidisciplinary cancer therapeutics, palliative care” are limited to students who have the licenses of Doctor, Dentist, Nurse, Radiation technologist, Clinical laboratory technologist and Clinical engineering technologists.

※ It is possible to take the courses of “Graduate General Education Courses.” You can include 2 credits as upper limit in the completion requirement (elective) “Graduate General Education Courses” please look at the syllabus on Moodle (e-Learning System) system.

2) Requirements

Compulsory subject	12 credits	
Elective compulsory subject I	2 credits	
Elective compulsory subject II	8 credits	
Elective subject	8 credits	or more
Total	30 credits	or more

Note: A maximum of 12 credits can be transferred from a master’s degree at the Graduate School of Medical Sciences at Kumamoto University. Regarding the students who would like to transfer the credits, please offer to the Student Affairs Section by April 10 (Fri).

Fill out the application on the next page and submit it to the Student Affairs Section. It should be also input to SOSEKI (Kumamoto University School Affairs Information System) by May 18 (Mon).

(The students who take the “AIDS” course must input to SOSEKI by April 10 (Fri).)

(Doctoral course) Registration Application
[A model of taking classes in medical basic science]

Dean, The Graduate School of Medical Sciences () year/month/day

Year entered :
 Name :
 Student number :
 E-mail address :

Here, I would like to register for the following subjects.

Department	Immunogenetics	Supervisor	Yasuharu Nishimura stamp
Course	None		

【Compulsory subjects】

Subjects	Credit	Opening	Instructor	Other
Immunogenetics “Jissen” I	10	1-4 grade	Yasuharu Nishimura	Choose from their own field
Medical Informatics and Medical Ethics	2	1-4 grade*	Koichiro Usuku	
Total	12			

【Elective Compulsory subject I】 Course work subject

Subjects	Credit	Opening	Instructor	Other
Medical Experiment Course	2	1-4 grade*		
Total	2			

【Elective Compulsory subjects II】 Instructive subjects

Subjects	Credit	Opening	Instructor	Other
Immunogenetics “Jissen II”	8	1-4 grade	Yasuharu Nishimura	Choose from their own field
Total	8			

【Elective subjects】 More than 8 unit

Subjects	Credit	Opening	Instructor	Other
B2: Cell Biology	2	1-4 grade*	Kazuhito Tomizawa	Choose from elective subjects
B4: Infection and Immune Control	2	1-4 grade*	Syuzo Matsushita	Choose from elective subjects
D1: Medicine and Life Science Seminar	2	1-4 grade*		Choose from elective subjects
D3 Medicine and Life Science Training	2	1-4 grade*		Choose from elective subjects
Total	8			

Need to take 30 or more credits from the subjects opened in your school years.

*Taking these courses in the first year is recommended. However, students can take these in their second, third, or fourth academic year. Students are required to write down their academic year in which they plan to take them.

[How to take credits in The Course of Developmental Biology and Regenerative Medicine]

1. Special lectures and practice opened for “The Course of Developmental Biology and Regenerative Medicine”

Table 1: The Course of Developmental Biology and Regenerative Medicine (All lectures are given in English)

Subjects	Credit	Opening	Contents
Special lectures "Tokuron" on Developmental Biology and Regenerative Medicine I	2	1	Lectures on fundamental sciences underlying basis of regenerative medicine such as developmental biology and stem cell biology
Developmental Biology and Regenerative Medicine II	2	1-3	Lectures on applied biomedical sciences such as transplantation and reconstructive surgery
Transplantation Immunology	2	1	Lectures on basic and clinical immunology for medical transplantation
Bioethics	2	1-3	Lectures on bioethics, medical ethics and research ethics
Practices "Enshuu" on Developmental Biology and Regenerative Medicine I	2	2-3	Project-based learning aimed at enhancement of the ability on approaching solution of problems in regenerative medicine
Developmental Biology and Regenerative Medicine II	2	1-4	Lectures from researchers committed to cutting-edge research in the field of developmental and regenerative medicine
Developmental Biology and Regenerative Medicine III	2	1-4	Presentation of students' own research achievements in domestic and/or international conferences
Practical Training "Jisshuu" on Developmental Biology and Regenerative Medicine	2	1	Training of practical procedures for important experimental methods related to developmental and regenerative medicine

2. Planning of taking classes.

Table 1: The Course of Developmental Biology and Regenerative Medicine.

(Use a form in Page 9 for registration.)

Category	Subjects		Credit
Compulsory	Lecture	Special Lecture “Tokuron” on Developmental Biology and Regenerative Medicine I	2
		Special Lecture "Tokuron" on Developmental Biology and Regenerative Medicine II	2
		Special Lecture “Tokuron” on Transplantation Immunology	2
		Special Lecture “Tokuron” on Bioethics	2
	Research	Jissen I(*1)	10
Elective	Lecture	Lecture courses and subjects in page 4	Need to take 12 or more credits (*2)
	Practice	D1 Medicine and Life Science Seminar	
		Practice "Enshuu" on Developmental Biology and Regenerative MedicineI	
		Practice "Enshuu" on Developmental Biology and Regenerative MedicineII	
		Practice "Enshuu" on Developmental Biology and Regenerative MedicineIII	
	Laboratory practice	Practical Training "Jisshuu" on Developmental Biology and Regenerative Medicine	
Research	Jissen II (*1)	8	
Need to take 30 or more credits.			

*1 In the Course of Developmental Biology and Regenerative Medicine, there are no Practice (Jissen) I and II specific to the course as research conducting programs to assist in a student’s Thesis research. Thus, the students are allowed to take the course in any area, and they can take any ‘Practice (Jissen) II’ to enrich a graduate student’s research path. However, this subject ‘Practice (Jissen) II’ should not be counted in the 30 credits required for graduation.

*2 Select more than 6 subjects (12 credits) in total, from Practice "Enshuu" on Developmental Biology and Regenerative Medicine II and III, Practical Training "Jisshuu" on Developmental Biology and Regenerative Medicine, lecture courses of ‘Riron’ which are open to all the students, and Medicine and Life Science Seminar.

(Doctoral course) Registration Application
[The Course of Developmental Biology and Regenerative Medicine]

() year/month/day

Dean, The Graduate School of Medical Sciences

Year entered :

Name :

Student number :

E-mail address :

Here, I would like to register for the following subjects.

Department		Supervisor	<input type="text" value="stamp"/>
Course	The Course of Developmental Biology and Regenerative Medicine		

【Compulsory subjects】

Subjects	Credit	Opening	Instructor	Other
Special Lecture "Tokuron" on Developmental Biology and Regenerative Medicine I	2	1 grade	Minetaro Ogawa	
Special Lecture "Tokuron" on Developmental Biology and Regenerative Medicine II	2	1-3 grade	Takaaki Ito	
Special Lecture "Tokuron" on Transplantation Immunology	2	1 grade	Yasuharu Nishimura	
Special Lecture "Tokuron" on Bioethics	2	1-3 grade	Yasuhiro Kadooka	
"Jissen" I	10	1-4 grade		
Total	18			

【Elective Compulsory subjects】 (12 credits or more)

Subjects	Credit	Opening	Instructor	Other
	2			
	2			
	2			
	2			
	2			
	2			
Total				

【Elective subjects】 Mentoring Subject

Subjects	Credit	Opening	Instructor	Other
"Jissen" II	8	1-4 grade		
Total	8			

Note:

- 1) Need to take 30 or more credits from the subjects opened in your school years. Credit of JissenII will not be included in the above credits.

(Doctoral course) Registration Application

[A Model of taking classes in The Course of Developmental Biology and Regenerative Medicine]

() year/month/day

Dean, The Graduate School of Medical Sciences

Year entered :

Name :

Student number :

E-mail address :

Here, I would like to register for the following subjects.

Department	Cell Differentiation	Supervisor	Minetaro Ogawa	<input type="text" value="stamp"/>
Course	The Course of Developmental Biology and Regenerative Medicine			

【Compulsory subjects】

Subjects	Credit	Opening	Instructor	Other
Special Lecture "Tokuron" on Developmental Biology and Regenerative Medicine I	2	1 grade	Minetaro Ogawa	
Special Lecture "Tokuron" on Developmental Biology and Regenerative Medicine II	2	1-3 grade * 1	Takaaki Ito	
Special Lecture "Tokuron" on Transplantation Immunology	2	1 grade	Yasuharu Nishimura	
Special Lecture "Tokuron" on Bioethics	2	1-3 grade * 1	Yoshihiro Kadooka	
Cell Differentiation "Jissen" I	10	1-4 grade	Minetaro Ogawa	Choose from your own field
Total	18			

【Elective Compulsory subjects】 (12 credits or more)

Subjects	Credit	Opening	Instructor	Other
Practice "Enshuu" on Developmental Biology and Regenerative Medicine I	2	2-3 grade * 2	Minetaro Ogawa	Choose from elective subjects
Practice "Enshuu" on Developmental Biology and Regenerative Medicine II	2	1-4 grade * 2	Minetaro Ogawa	Choose from elective subjects
Practice "Enshuu" on Developmental Biology and Regenerative Medicine III	2	1-4 grade * 2	Minetaro Ogawa	Choose from elective subjects
Practical Training "Jisshuu" on Developmental Biology and Regenerative Medicine	2	1 grade	Minetaro Ogawa	Choose from elective subjects
B7 : Developmental and Regenerative Medicine	2	1-4 grade * 2	Ryuichi Nishinakamura	Choose from elective subjects
D1: Medicine and Life Science Seminar	2	1-4 grade * 2		Choose from elective subjects
Total	12			

【Elective subjects】 Mentoring Subject

Subjects	Credit	Opening	Instructor	Other
Cell Differentiation "Jissen" II	8	1-4 grade	Minetaro Ogawa	*3
Total	8			

Note: Need to take 30 or more credits from the subjects opened in your school years. Credit of JissenII will not be included in the above credits.

*1 These subjects require more than one year to be completed, thus cannot be completed in one year. Students taking these subjects must register carefully. The registration process is different from the items on *2.

*2 Taking these subjects in the early academic years is recommended. However, students can take them at any time during their academic path. (Students are allowed to take 'Practice (Enshuu)' or 'Seminar' subjects for more than one year in order to earn credits by attending a certain number of lectures.) Students are required to write down the academic year in which they plan to take them. (Note: As for the subjects of 'Practice (Enshuu)' and 'Seminar', please write '1~4' in each "Academic year" column.)

*3 For students who have completed the master's course at the Graduate School of Medical Sciences at Kumamoto University, the total 8 credits for Medical Science Training and Medical Science Practicum will be transferred.

6. How to participate in lectures through e-learning

1) How to access the e-learning system (Moodle)

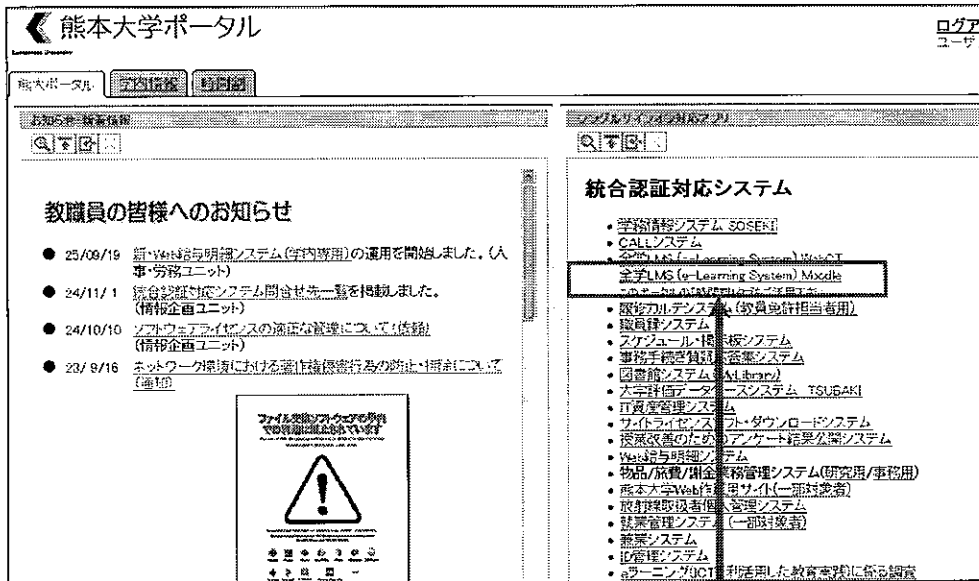
1. Access Kumamoto University's Portal website (<http://uportal.kumamoto-u.ac.jp/>), and log on to Kumamoto University Portal's Site by entering your Kumadai ID and password. Your Student number and password are written on the back of your Student ID.

2. You can check your "kumadai ID" entering your Student number and password, and then click the "submit".

Your User ID and password are written on the back of your Student ID.

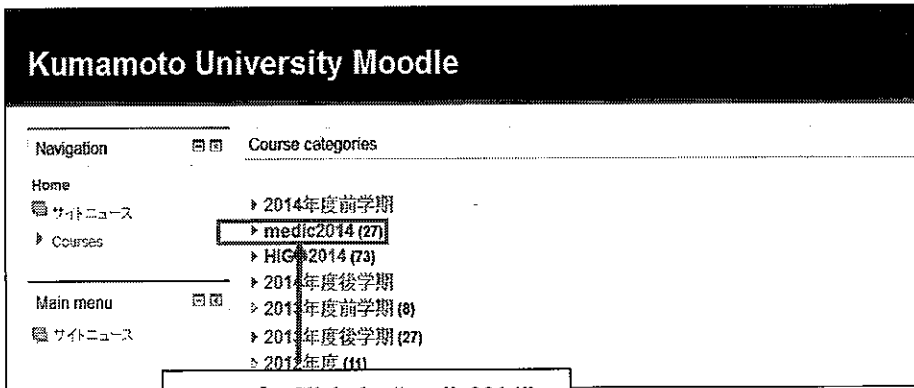
3. Check student number, and then click the "LOGIN". Your Student number is written on the back of your Student

4. If you successfully log in the system, please click the "全学 LMS(e-Learning System)Moodle".

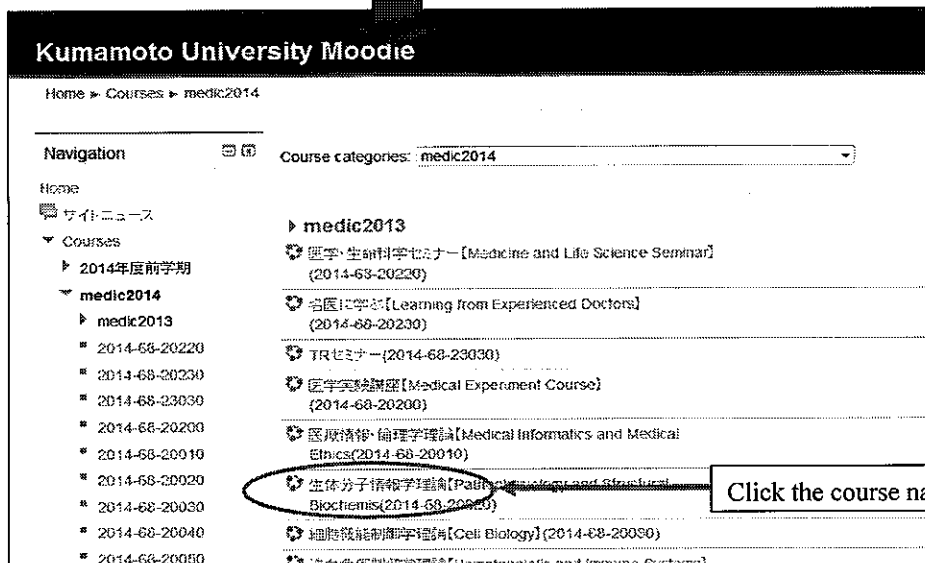


Click

5. Home shows the list of courses you have registered for through SOSEKI. By clicking the course name, you may access to the top page, which displays the list of lectures held in the course. When you click on the "How to change your language", you can change the language into English.



example: Click the "medic2014"



Click the course name

6. From each lecture page, you are able to learn the contents through the lecture videos and handout materials; and then, take tests to determine your understanding. If you pass the tests, your lecture participation would be completed. After taking tests, you may confirm and study again the part of insufficient understanding and take test up to a ceiling of twice.

生体分子情報学理論 [Pathophysiology and Structural Biochemis(2014-68-20020)]

マイホーム ▶ 2014-68-20020

活動

管理

ナビゲーション

マイホーム

- ▶ サイトホーム
- ▶ サイトページ
- ▶ マイプロフィール
- ▼ 現在のコース
 - ▶ 2014-68-20020
 - ▶ 参加者
 - ▶ バッジ
 - ▶ 一般
 - ▶ 科目概要 / Subject outline
 - ▶ [eE-J-0] 第1回 心血管病のメカニズム...
 - ▶ [eE-0] [eJ-0] 第2回 心血管病...
 - ▶ [eE-J-0] 第3回 心血管病のメカニズム...

ニュースフォーラム

科目概要 / Subject outline

As Pathophysiology and Structural Biochemistry of Biomolecules
生体分子情報学理論

Lecture Series "Riron": B1 Pathophysiology and structural biochemistry of biomolecules

科目主任教員 : 先山 賢慶 (kumitsus@numa.ncl.u.ac.jp)

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公開期間: 2014.6.1-2014.12.31(コンテンツによっては別経路で設定されています)

授業の目標

(1) 高血圧、心肥大、動脈硬化等の循環器疾患の機序及び薬物療法について理解することを目的とする。
 (2) 人体における基本的な糖・脂質代謝動態とその調節制御機構、糖尿病やメタボリックシンドローム、脂質代謝異常との関連などについて理解する。
 (3) ATPase、特にAAAファミリータンパク質の分子基盤、多様な細胞機能及び各種疾患における役割について理解する。
 (4) タンパク質に与えられた固有の特異性は、そのタンパク質の特定の構造基盤の上に構築されている。本授業では、タンパク質の三次元構造の概略と構築原理に基づいて、その機能発現の作動原理を理解させることを目標とする。
 (5) 薬理情報分析学では、機能性糖質と生体脂質・タンパク質との相互作用およびその生命科学領域への応用について理解することを目的とする。



生体分子情報学理論 [Pathophysiology and Structural Biochemis(2014-68-20020)]

マイホーム ▶ 2014-68-20020 ▶ [eE-0] [eJ-0] 第4回 糖・脂質...

活動

管理

ナビゲーション

マイホーム

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- ▶ サイトページ
- ▶ マイプロフィール
- ▼ 現在のコース
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 - ▶ [eE-J-0] 第3回 心血管病のメカニズム...

ニュースフォーラム

◀ [eE-J-0] 第3回 心血管病のメカニズム (3)

[eE-0] [eJ-0] 第4回 糖・脂質代謝 [eE-0] [eJ-0] 第5回 糖・脂質代謝の病態生理 (2) の病態生理 (1)

Title: Pathophysiology of glucose/ lipid metabolism (1)
 担当教員 : 山縣 和也 (Kazuya YAMAGATA)
 日時: 6月24日(火)4時限
 制限(完全に表示/ダウンロード不可): 2014年06月1日から2014年12月31日まで利用できます。
 糖・脂質代謝の病態生理 (1) Pathophysiology of glucose/ lipid metabolism (1)

The handout materials

Lecture (shooting: 2010)

- 1. Introduction
- 2. Insulin Action(1)
- 3. Insulin Action(2)

In English

The lecture videos

講義 (2009年度)

- 1. はじめに
- 2. 血糖値のコントロール
- 3. 糖尿病について (1): 1型糖尿病

In Japanese

Test

第4回 理解度テスト 4th Test (Yamagata)

The test

制限: 2014年06月1日から2014年12月31日 23:59まで利用できます。

※Notice) Regarding the students who would like to take “D1 Medicine and Life science Seminar” and “D2 Learning from Experienced Doctors” by using the e-learning system, please check the procedure for taking these subjects in the e-learning contents of “D1 Medicine and Life science Seminar” and “D2 Learning from Experienced Doctors”.

2) Classification of e-learning

Please note that the lectures by e-learning are classified into 6 types: eE-O, eE-L, eJ-O, eJ-L, eEJ-O and eEJ-L. These marks are written in the pages of the lecture schedule of each subject.

1. Classified according to the language used in the lecture.
eE: e-learning content in English
eJ: e-learning content in Japanese
eEJ: e-learning content in both Japanese and English
2. Classification according to the use of e-learning for the lecture.
-O: Lecture only by e-learning; no face-to-face class will be conducted.
-L: In principle, a face-to-face lecture; if unable to attend the lecture, a student may participate in the lecture through e-learning as supplementary lecture.
3. Regarding a lecture with e-learning content prepared only in Japanese (eJ-O or eJ-L), if an international student, who cannot understand Japanese, has registered for such lecture, the face-to-face lecture will be conducted in English (+ Japanese). This lecture may be recorded to be used for an e-learning content as eE or eEJ in future.
4. Example of e-learning classification:
eJ-L means “students are requested to attend the face-to-face lecture in principle, but if unable to do so, they can participate in the e-learning lecture prepared in Japanese language as supplementary lecture”. If an international student, who cannot understand Japanese, has registered for the course, a face-to-face lecture will be conducted in English (+Japanese).

7. Screening criterion of a thesis and assessment criterion for the final examination

【Doctoral Course】

The application for academic degree entails thesis submission and at least one relevant paper as described below. For an applicant who has obtained designated school credits and has submitted a thesis, a thesis screening and final examination will be given.

Screening criterion of a thesis

- 1) The thesis should sufficiently dissert the research background, including the documented facts, which serve as a background of the research. The objectives and fundamental strategy of the research, detailed experimental methodology, result of experiments and its interpretation, should also be included. In addition, an in-depth discussion including bibliographic consideration, and the colligation concerning the significance of the research should be included as well. A copy or translation of a previous paper will not be accepted.
- 2) The thesis should be prepared in accordance with the required documentation methodology.

Criterion for approving relevant papers

- 1) Relevant papers should be written in a English and appear in one of the “Journals written in English for academic degree application” designated by the Graduate School of Medical Sciences.
- 2) Relevant papers should be related to the thesis research.
- 3) The applicant for an academic degree must be the first author of the relevant paper. When the paper is a joint work between the applicant and another researcher on an equal contribution basis, it must be clearly stated that both of them are regarded as the first co-authors (with equal contribution). However, except in the case of the next section, only one first co-author can use the paper for academic degree credit.
- 4) The relevant paper includes the paper in format of ‘Short communication’.
- 5) The relevant papers should state ‘Kumamoto University’ as the degree applicants’ home university.
- 6) Co-authors of the relevant papers, including researchers from the Graduate School of Medical Sciences, should be included in the acknowledgement.
- 7) The degree applicants who choose a thesis such as short communication must submit a pre-publication paper in advance to Student Affairs Section, Graduate School of Medical Sciences. The contents of the paper should be preliminary reviewed and approved by the Graduate School’s Education Board.

Criterion for registration of “Journals written in English for academic degree application”

- 1) For foreign academic journals written in English, they should have a peer-review system and release the names of the editorial board members.
- 2) For domestic journals written in English, they should stipulate submission written in English, have a peer-review system and release the names of the editorial board members.
- 3) Online-format journals are acceptable so long as the conditions mentioned above are satisfied.

Assessment criterion for the final examination

The final exam is an oral examination (public presentation) and an assessment is made by the following criterion:

- 1) The examinee fully comprehends the content of his/her research and is able to explain it in detail.
- 2) The examinee is able to logically analyze the issues raised in his/her research.
- 3) The examinee is able to dissert the future prospect of his/her research.
- 4) The examinee has advanced knowledge in the field of his/her research.
- 5) The examinee has basic knowledge about fields related to his/her research

Early Completion System

Students who have completed all of their credit requirements and finished their Thesis ahead of time can obtain their doctoral degree if they are approved at the “Doctoral Degree Committee in the Early Completion System”.

The period that students can complete the Graduate School of Medical Sciences by Early Completion System is as follows.

- 1) March of the 3rd grade (In the case of the students enrolled in October, September of the 3rd grade)
- 2) June of the 4th grade (In the case of the students enrolled in October, December of the 4th grade)
- 3) September of the 4th grade (In the case of the students enrolled in October, March of the 4th grade)
- 4) December of the 4th grade (In the case of the students enrolled in October, June of the 4th grade)

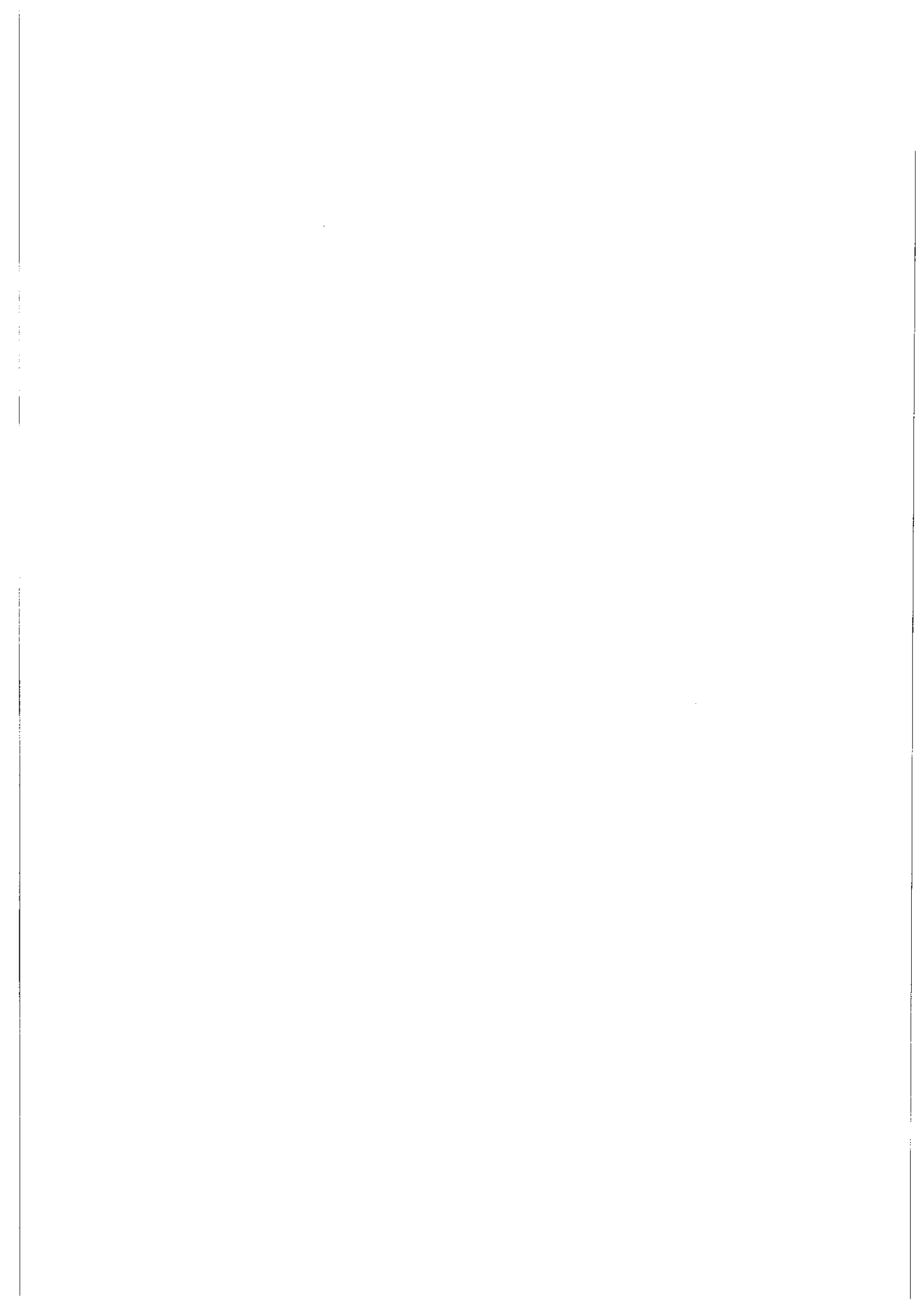
The requirements for the aforementioned relevant papers are as follows: 1) They should be written in English and published in one of the “Journals written in English for academic degree application” designated by the faculty of Medical Sciences. 2) They must be written based on published papers which meet either requirement ① or ② listed below. Even if the papers are just on the passing line of IF, they can pass based on the synthetic judgment of the applicant’s presentations and the answers to the questions.

① At least one of your papers should have been published as a first author in an academic journal whose IF is 5.0 or higher, or in an academic journal whose IF places in the top 10% of its particular field of research. (As for the details of IF and search strategies concerning these academic journals, please refer the Medical Faculty Educational Affairs Planning Section or the Website for the Graduate School of Medical Sciences, which is listed below as a link). However, any papers that have more than one first author will be evaluated with the IF number divided by the number of co-first-authors. Some co-first-authors are given the possibility to apply for doctoral degrees when they write a Thesis using the aforementioned paper as a relevant paper from a different view point. In the case of short communication, the decision for acceptance as a relevant paper is made after its content is reviewed.

② Two or more papers should have been published as a first author in an academic journal whose IF is 2.5 or higher, or in an academic journal whose IF places in the top 40% of its particular field of research. Alternatively, the sum of IF from two or more of these papers published as a first author should be 5.0 or higher. Candidates must have at least one paper published as a single first author, and the only one co-first-author paper is accepted. Any papers that have more than one first author will be evaluated with the IF number divided by the number of co-first-authors. In addition, some co-first-authors are given the possibility to apply for doctoral degrees when they write a Thesis using the aforementioned paper as a relevant paper from a different view point. In the case of short communication, the decision for acceptance as a relevant paper is made after its content is reviewed.

Guidelines for the degree review and details on how to apply for early graduation can be viewed in the department newsletter on the Website for the Graduate School of Medical Sciences (<http://www.medphas.kumamoto-u.ac.jp/medgrad/keijiban/gakuitansyuku.html>).

The website also provides detailed information on the IF of each scholarly journal, as well as the IF percentile analysis data.



8. Compulsory subjects and Elective subjects

A1 ▪ B1 ~ B8 ▪ C1 ~ C10
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Lecture Series "Riron": A1 Medical Informatics and Medical Ethics

Subject Code 20010

(Required : 2 credits)

Course Director: Koichiro Usuku (Medical Information Sciences TEL:373-5739) space-usk@fc.kuh.kumamoto-u.ac.jp
Instructors: Shunji Kasaoka (Emergency and General Medicine TEL:373-5769) kasaoka@fc.kuh.kumamoto-u.ac.jp
Yasuhiro Kadooka (Medical Ethics TEL: 373-5534) y-kad@kumamoto-u.ac.jp

【Objectives】

Medical Informatics and Medical Ethics aims at proper management of health information and ethical problems arose from medical practice. In this course, you learn basic concepts used in this field, including electronic health records, protection of computer-processed personal data, health care system in Japan and other countries, evaluation of medical care and DPC, problems of abortion, euthanasia and death with dignity, informed consent, principle of ethics. This course serves as introductory for all students as you obtain essential knowledge on medical informatics and medical ethics, and emergency/general medicine.

【Content Description】

In order to explain basic principles of medical informatics and medical ethics, it is discussed how the problems are managed. Basic concepts are introduced. More specifically, you are expected to understand the followings: (1) electronic health records; (2) protection of computer-processed personal data; (3) information literacy; (4) ethical issues at the beginning of life; (5) ethical issues at the end of life; (6) informed consent, privacy and principle of ethics, (7) research, high technology medicine and ELSIs, (8) emergency medical service system and disaster medicine; (9) primary care and general medicine.

Participants are requested to learn medical ethics through e-learning system offered by the project of Collaborative Institutional Training Initiative (CITI) Japan, or submit a short comment on some lectures, which will be helpful to provide positive feed back to the next session.

【Keywords】

Personal health record, information literacy and information ethics, information communication technology, electronic health record, bioethics, clinical ethics, end-of-life, brain death and organ transplantation, ELSIs, clinical guide line, evidence based medicine, emergency medicine, general medicine.

【Class Style】 PowerPoint and/or OHP will be used in the lectures, and active participation in the discussion is encouraged. Extra classes or video lectures are considered for those who are regularly absent for unavoidable reasons.

【Textbooks】 Textbooks are not specified, and handouts will be distributed.

【Recommended Readings】 Provided in the lectures.

【Office Hour】 If you have any questions on topics or schedule of the classes, please contact the instructors listed above.

【Evaluation for Grades and Credits】 Grading will be based on active class participation, paper summaries, and the final report. Grading will be based on the student's understanding of the course subject matter. The students' understanding will be evaluated on the basis of papers and questions related to the topics dealt with in class to be scored from grade 1 to 5. Final grades will be based on the average score of the papers and quizzes as well as participation in class discussions.

【Learning Before classes】 It is recommended for you to read a syllabus and indicated text books in advance.

【Learning After classes】 It is recommended for you to review the handout materials distributed in the lectures and your notebooks well. If you want to ask any questions to the lecturers, "Office Hour" is available for you. It is also recommended to review the lectures by using e-learning contents if available.

【Lecture Schedule】 Please also refer to the timetable shown in the Section 5.

Session	Date & time	Instructors	Topics
1 .eJ-L	Jun 1 (Mon) 5th period	Koichiro Usuku	Introduction and orientation of this course
2 .eEJ-0	Jun 8 (Mon) 5th period	CITI Japan	Responsible attitude of research, etc.
3 .eEJ-0	Jun 15 (Mon) 4th period	CITI Japan	Misappropriation, Conflict of Interest, etc.
4 .eEJ-0	Jun 22 (Mon) 4th period	CITI Japan	Peer Review, etc.
5 .eEJ-0	Jun 29 (Mon) 4th period	CITI Japan	Handling of Public Funds, etc.
6 .eEJ-0	Jul 6 (Mon) 4th period	CITI Japan	Personal Information, Informed Consent, etc.
7 .eJ-L	Jul 13 (Mon) 4th period	Koichiro Usuku	Health care system in Japan and in the world
8 .eEJ-0	Jul 27 (Mon) 4th period	Koichiro Usuku	Clinical research using patients records, etc.
9 .eE-0	Aug 3 (Mon) 4th period	Koichiro Usuku	Future prospects of Electronic medical records
	eJ-0		Clinical research and data ware house
1 0 .eE-0	Aug 10 (Mon) 4th period	Shunji Kasaoka	Emergency Medical Service System
1 1 .eEJ-L	Aug 17 (Mon) 4th period	Shunji Kasaoka	Post-Cardiac Arrest Syndrome
1 3 .eJ-L	Aug 24 (Mon) 4th period	Shunji Kasaoka	General Medicine
1 2 .eJ-L	Aug 31 (Mon) 4th period	Yasuhiro Kadooka	Step up Lecture for Research Ethics (1)
1 4 .eJ-L	Sep 7 (Mon) 4th period	Yasuhiro Kadooka	Step up Lecture for Research Ethics (2)
1 5 .	Sep 14 (Mon) 4th period	Yasuhiro Kadooka	Step up Lecture for Research Ethics (3)

4th period : 15:00~16:30

5th period : 16:45~18:15

6th period : 18:30~20:00

Lecture Series "Riron": B1 Pathophysiology and structural biochemistry of biomolecules

Subject Code 20020

(Elective: 2 credits)

Course Director: Shokei Kim-Mitsuyama (Pharmacology and Molecular Therapeutics TEL: 373-5082)

mitsuyam@gpo.kumamoto-u.ac.jp

Instructors: Hoichi Yorinaka (Pharmacology and Molecular Therapeutics TEL: 373-5082)

laizf@kumamoto-u.ac.jp

Kazuya Yamagata (Medical Biochemistry TEL: 373-5070)

k-yamaga@kumamoto-u.ac.jp

Teru Ogura (Molecular Cell Biology TEL: 373-6578)

ogura@gpo.kumamoto-u.ac.jp

Kunitoshi Yamanaka (Molecular Cell Biology TEL: 373-6579)

yamanaka@gpo.kumamoto-u.ac.jp

Chiaki Setoyama (Molecular Enzymology TEL: 373-5064)

setoyama@gpo.kumamoto-u.ac.jp

Hisayuki Nomiyama (Molecular Enzymology TEL: 373-5065)

nomiyama@gpo.kumamoto-u.ac.jp

Tetsumi Irie (Clinical Chemistry and Informatics TEL: 371-4552)

tirie@gpo.kumamoto-u.ac.jp

【Objectives】

(1) To understand the pathophysiology of hypertension, cardiac hypertrophy, and atherosclerosis, and the therapeutic strategy of these cardiovascular diseases. (2) To understand the basic knowledge of glucose/lipid metabolism and its dysregulation in diabetes mellitus, metabolic syndrome, and lipid metabolism disorder. (3) Molecular basis, various cellular functions, and roles of ATPases, especially AAA family proteins, in human diseases will be learnt. (4) To understand the functions and role of chemokine. (5) You will be able to understand the molecular interaction of functional carbohydrates with lipids and proteins, and to apply them to the field of life sciences.

【Content Description】

(1) Oxidative stress plays a key role in the pathophysiology of cardiovascular diseases and the mechanism for the pharmacological action of cardiovascular drugs. You will learn the mechanism for the regulation of oxidative stress and its signaling cascades. (2) You will learn fundamental metabolic pathways under normal conditions and its relationship to pathology. (3) Proteins are biopolymers containing functional motifs and domains. Molecular chaperones and ATP-dependent proteases are related to life of proteins and consist of several different types of ATPases. Their functions will be discussed from the point of view of ATPases. In particular, common molecular basis and various cellular functions of AAA family proteins will be discussed. In addition, human genetic diseases and developmental disorders of model animals caused by mutations in AAA family proteins will be described. (4) The structures and functions of chemokine involved in biological defense or process of organic formation are discussed. (5) The usefulness of carbohydrates in the fields of therapeutics and laboratory medicine will be discussed: Phosphoenolpyruvate is able to facilitate the healing of diabetic skin ulcers and cyclodextrins can recognize atherogenic lipoprotein cholesterol in serum.

【Keywords】

cardiovascular diseases, pharmacological action, diabetes mellitus, metabolic syndrome, insulin resistance, proteins, molecular chaperones, Drug Delivery System (DDS), Multifunctional materials, Glycolytic intermediate, cyclic oligosaccharides (cyclodextrins), Atherogenic lipoproteins

【Class Style】 PowerPoint will be used in the lectures, and active participation in the discussion is encouraged.

【Textbooks】 Textbooks are not specified, and handouts will be distributed in some classes.

【Recommended Readings】

- "Harper's Illustrated Biochemistry" by Robert K. Murray, Daryl K. Granner, Victor W. Rodwell, The McGraw-Hill Companies, 2006
- "Handbook of Lipoprotein Testing" by Nader Rifal et al., AACC Press, 2000

【Office Hour】 If you have any questions on topics or schedule of the classes, please contact the instructors listed above.

【Evaluation for Grades and Credits】 Grading will be based on the student's understanding of the course subject matter with active class participation, paper summaries, and the final report. The students' understanding will be evaluated on the basis of papers.

【Learning Before classes】 It is recommended for you to read a syllabus and indicated text books in advance.

【Learning After classes】 It is recommended for you to review the handout materials distributed in the lectures and your notebooks well. If you want to ask any questions to the lecturers, "Office Hour" is available for you. It is also recommended to review the lectures by using e-learning contents if available.

【Lecture Schedule】 Please also refer to the timetable shown in the Section 5.

The sessions marked with "e" are under preparation of e-learning contents. In some cases, the session that is not marked with "e" will be done by utilizing e-learning system, as soon as the e-learning contents are ready for use. Therefore, you must check the updated syllabus cited on the home page of the Graduate School of Medical Sciences, Kumamoto University to check the current status of the session before you take a session. If you cannot obtain enough information from the home page, please make contact with the instructors of the sessions.

Session	Date & time	Instructors	Topics
1 . eEJ-0 Jun 2 (Tue)	5th period	Shokei Kim-Mitsuyama	Pathophysiology of cardiovascular diseases (1)
2 . eEJ-0 Jun 9 (Tue)	5th period	Hoichi Yorinaka	Pathophysiology of cardiovascular diseases (2)
3 . eEJ-0 Jun 16 (Tue)	4th period	Shokei Kim-Mitsuyama	Pathophysiology of cardiovascular diseases (3)
4 . eEJ-0 Jun 23 (Tue)	4th period	Kazuya Yamagata	Pathophysiology of glucose/lipid metabolism (1)
5 . eEJ-0 Jun 30 (Tue)	4th period	Kazuya Yamagata	Pathophysiology of glucose/lipid metabolism (2)
6 . eEJ-0 Jul 7 (Tue)	4th period	Kazuya Yamagata	Pathophysiology of glucose/lipid metabolism (3)
7 . eEJ-0 Jul 14 (Tue)	4th period	Teru Ogura	ATPases related to life of proteins
8 . eEJ-0 Jul 21 (Tue)	4th period	Kunitoshi Yamanaka	Various functions of AAA proteins
9 . eEJ-0 Jul 28 (Tue)	4th period	Teru Ogura	Human diseases caused by AAA proteins
1 0 . Aug 11 (Tue)	4th period	Kazuya Yamagata	Pathophysiology of glucose/lipid metabolism (4)
1 1 . Aug 18 (Tue)	4th period	Hisayuki Nomiyama	Gene organization, physiological function and evolution of chemokine family (1)
1 2 . Aug 25 (Tue)	4th period	Hisayuki Nomiyama	Gene organization, physiological function and evolution of chemokine family (2)
1 3 . Sep 1 (Tue)	4th period	Tetsumi Irie	Application of functional carbohydrates to the field of life sciences
1 4 . Sep 8 (Tue)	4th period	Tetsumi Irie	Specific cells and biomolecules that are responsible for the wound healing
1 5 . Sep 15 (Tue)	4th period	Tetsumi Irie	Failure of lipid metabolism and the laboratory medicine

Lecture Series“Riron”: B2 Cell Biology**Subjective Code 20030
(Elective: 2 credits)**

Course Director: Kazuhito Tomizawa (Molecular Physiology TEL: 373-5050) tomikt@kumamoto-u.ac.jp
Instructors: Fan-Yan Wei (Molecular Physiology TEL: 373-5051) fywei@kumamoto-u.ac.jp
Noriko Saitoh (Medical Cell Biology TEL: 373-6802) norikos@kumamoto-u.ac.jp
Masatoshi Esaki (Molecular Cell Biology TEL:373-6581) esaki@kumamoto-u.ac.jp
Hiroyuki Nakanishi (Molecular Pharmacology TEL:373-5074) hnakanis@gpo.kumamoto-u.ac.jp
Mitsuyoshi Nakao (Medical Cell Biology TEL: 373-6800) mnakao@gpo.kumamoto-u.ac.jp
Satoshi Tateishi (Cell Maintenance TEL: 373-6602) tate@gpo.kumamoto-u.ac.jp

【Objectives】

Cell Biology aims at understanding the following topics:(1) Intracellular signaling pathway such as protein phosphorylation in the pathogenesis of disease; (2) Chemical modifications of RNA; (3) Regularory mechanisms of cytoskeletons, subcellular organelle, nucleus and membranes in cell functions such as cell motility; (4) The molecular basis of epigenetic cell regulation in development and human diseases; and (5) Cell cycle, Mitosis and Meiosis, and DNA repair and recombination.

【Conent Description】

You learn basic concepts and techniques in the filed of Cell Biology. Especilally, you are expected to understand the followings: (1) Cell homeostasis: Regulation in physiology and pathophysiology such as diabetes and neurodegeneration; (2) Molecular regulatory mechanism of cellularfunctions by RNA modifications; (3) Cytoskeletons and organelle play essential roles in varions cell functions such as cell motility, shape change, adhesion, and polarization. In these functions, membrane deformity is coupled to cytoskeleton reorganization. You are expected to understand the molecular mechanisms by which cytoskeletons and subcellular organelle are regulated and how cytoskeletons are coupled to the plasma membrane; (4) Basically, somatic cells in our body have identical genome, but each of these cells has a distinct morphology and function probably due to different use of gene information. The term epigenetic is defined as “heritable changes in gene expression that occur without a change in DNA sequence”. This is involved in determining cell identity in development, regeneration, aging and cancer. Students will learn the medical science-oriented epigenetics, especially mechanism of epigenetic regulation, involvement in human diseases, and new technologies for medical diagnosis and therapy; and (5) Cell cycle is regulated to maintain genomic DNA. Mitosis is a cell division in which the genomic DNA is replicated and distributed into the daughter cells. During meiosis, haploid gametes are produced with hereditary diversity. Genes are constantly damaged by endogenous or environmental factor, overall genomic structures and sequences are maintained by various DNA repair mechanisms.

【Key words】 Hormone, cytokine; intracellular singal transduction, cell adhesion, cell cycle, nuclear structure, epigenetics, cell divison, development and regeneration, cancer, homologous chromosomes, excision repair

【Class Styles】 PowerPoint and/or OHP will be used in the lecture, and active participation in the discussion is encouraged. Extra classes or video lecutures are considered for those who are regularoty absent for unavoidable reasons

【Text】 Textbooks are not specified, and handouts will be distributed.

【Recommended Readings】

- 「Pathophysiology of Disease: An Introduction to Clinical Medicine, 6th Edition」 edited by Stephan J. McPhee and William F. Ganong, The McGraw-Hill Companies (2009)
- 「Developmental Biology, 10th Edition」 edited by Scott F Bilbert. Sinauer Associates Inc. (2013)
- 「Essential Cell Biology, 4th edition」 edited by Bruce Alberts et al. Garland Science, (2013)
- 「EPIGENETICS」 edited by David Allis et al. Cold Spring Harbor Laboratory Press (2007)

【Office Hour】 If you have any questions on topics or schedules of the classes, please contact the instructors listed above.

【Evaluation for Grades and Credits】 Grading will be based on the student's understanding of the course subject matter. The students' understanding will be evaluated on the basis of papers and quizzes related to the topics dealt with in class to be scored from 0 to 100. Final grades will be based on the average score of the papers and quizzes as well as participation in class discussions.

【 Learning Before classes】 It is recommended for you to read a syllabus and indicated text books in advance

【 Learning After classes】 It is recommended for you to review the handout materials distributed in the lectures and your notebooks well. If you want to ask any questions to the lecturers, "Office Hour" is available for you. It is also recommended to review the lectures by using e-learning contents if available.

【Lecture Schedule】 Please also refer to the timetable shown in the Section 5

Session	Date & time	Instructors	Topics
1. eE-O, eJ-O	Jun 4 (Thu) 4th period	Kazuhito Tomizawa	Regulation in physiology and pathophysiology
2. eE-O, eJ-O	Jun 11 (Thu) 4th period	Kazuhito Tomizawa	Regulation by protein phosphorylation
3. eE-O, eJ-O	Jun 18 (Thu) 4th period	Kazuhito Tomizawa	Regulation by protein transduction
4. E-L	Jun 25 (Thu) 4th period	Fan-Yan Wei	Chemical modifications of RNA
5. eE-O, eJ-O	Jul 2 (Thu) 4th period	Noriko Saitoh	Structure and functions of the nucleus
6. eE-L	Jul 9 (Thu) 4th period	Masatoshi Esaki	Organelle biogenesis
7. eE-O	Jul 16 (Thu) 4th period	Hiroyuki Nakanishi	Regulatory mechanism of cytoskeletons I
8. eE-O	Jul 23 (Thu) 4th period	Hiroyuki Nakanishi	Regulatory mechanism of cytoskeletons II
9. eE-O	Jul 30 (Thu) 4th period	Hiroyuki Nakanishi	Cooperation of cytoskeletons and membranes
10. eJ-L*	Aug 20 (Thu) 4th period	Mitsuyoshi Nakao	Medical epigenetics I
11. eJ-L*	Aug 27 (Thu) 4th period	Mitsuyoshi Nakao	Medical epigenetics II
12. eJ-L*	Sep 3 (Thu) 4th period	Mitsuyoshi Nakao	Medical epigenetics III
13. eEJ-O	Sep 10 (Thu) 4th period	Satoshi Tateishi	Cell cycle
14. eEJ-O	Sep 24 (Thu) 4th period	Satoshi Tateishi	Mitosis and Meiosis
15. eEJ-O	Oct 1 (Thu) 4th period	Satoshi Tateishi	DNA repair and recombination

*The main contents of the lectures #10 to #12 are provided with 'eE' in the lecture "Tokuron" #14 and #15 on the Course of Developmental Biology and Regenerative Medicine.

Course Director:	Seiji Okada	(AIDS III TEL: 373-6522)	okadas@kumamoto-u.ac.jp
Instructors:	Minetaro Ogawa	(Cell Differentiation TEL: 373-6591)	ogawamin@kumamoto-u.ac.jp
	Shinya Suzu	(AIDS IV TEL: 373-6525)	ssuzu06@kumamoto-u.ac.jp
	Hitoshi Takizawa	(IRCMS-I TEL: 373-6879)	Hirtoshit@kumamoto-u.ac.jp
	Yorifumi Sato	(AIDS XIII TEL: 373-6830)	y-satou@kumamoto-u.ac.jp
	Goro Sashida	(IRCMS-II TEL: 373-6847)	sashidag@kumamoto-u.ac.jp
	Yasuharu Nishimura	(Immunogenetics TEL: 373-5310)	mxnishim@gpo.kumamoto-u.ac.jp
	Kazuhiko Maeda	(Immunology TEL: 373-5135)	kazmaeda@kumamoto-u.ac.jp
	Satoru Senju	(Immunogenetics TEL: 373-5310)	senjusat@gpo.kumamoto-u.ac.jp

【Objectives】

The aims of this lecture series are to understand the followings: (1) The mechanisms how the homeostasis of hematopoietic system is maintained as a stem cell system, (2) The origin of hematopoietic system and the mechanisms of development of hematopoietic stem cells, (3) The animal model bearing human hematopoietic system and applications of this animal model, (4) Aging and tumorigenesis of hematopoietic system, (5) Cell-cell interaction in the immune system, (6) The mechanism of antigen-recognition and the immune response

【Content Description】

Blood cells such as erythrocytes, platelets, granulocytes, macrophages, and lymphocytes are originated from hematopoietic stem cells in bone marrow. The hematopoietic system produces different types of blood cells with different life span. However, the total number of each type of blood cells is maintained in a certain range. This system is supported by the self-renewal ability and pluripotency of the hematopoietic stem cells, one of the best characterized stem cell system. In the lectures, we will explain the characteristics of hematopoietic stem cells, the methodology to identify and isolate hematopoietic stem cells, the mechanism maintaining hematopoietic stem cells in undifferentiated state, and genes and soluble factors involved in the differentiation of the hematopoietic stem cells to blood cells. We will also discuss the origin and the mechanism of development of hematopoietic stem cells in ontogeny, and the application of the humanized mice, in which human hematopoietic and immune system are reconstituted, to the development of vaccines, and aging and tumorigenesis of hematopoietic and immune system.

Our bodies are continuously exposed to pathogenic microbes, foreign materials, and toxins, and the immune system plays the central role in protection of our bodies from them. Immune system protects our bodies in an antigen-specific manner. It does not react to components derived from self-tissues, while it attacks and excludes invading foreign substances. In the lectures, we will explain the cells, tissues, and organs of immune system and introduce the mechanisms of antigen recognition by immune system, activation of immune cells, and exclusion of foreign substances. We will also discuss the mechanism of production of immunoglobulin by B cells and immune response of T cells involved in exclusion of infectious microorganisms and cancer cells.

We will lecture on the hematopoiesis and immunity, at the levels of cells, tissues and organs, and the contents of the lecture include the results of our recent research.

【Keywords】 hematopoietic stem cells, self-renewality, pluripotency, bone marrow niche, cell fate decision, embryonic hematopoiesis, humanized hematopoiesis model animals, aging, tumorigenesis, antigens, innate immunity, acquired immunity, immune cells, immune molecules, antigen-specific recognition, immune response, immunological tolerance

【Class Style】 PowerPoint and/or OHP will be used in the lectures, and active participation in the discussion is encouraged. Extra classes or video lectures are considered for those who are regularly absent for unavoidable reasons.

【Textbooks】 Textbooks are not specified, and handouts will be distributed.

【Recommended Readings】

- "Hematopoiesis: A Developmental Approach" edited by Leonard I. Zon, Oxford University Press, Oxford and New York, 2001.
- "The Immune System" by Peter Parham. Garland Publishing Inc. New York and London, 2007
- "Janeway's Immunobiology Seventh Edition" by Kenneth Murphy, Paul Travers, Mark Walport. Garland Science, Taylor & Francis Group LLC. New York and Abingdon, 2008.

【Office Hour】 If you have any questions on topics or specific fields, please contact the instructors listed above by telephone or e-mail, or by visiting them in their laboratories.

【Evaluation for Grades and Credits】 Achievement of the Objectives will be evaluated by active class participation and the reports, of which the theme will be specified after the lectures. Grading will be based on the student's understanding of the course subject matter. The students' understanding will be evaluated on the basis of the reports and brief examinations. Final grades will be based on the average of the best 10 scores of the reports and brief examinations as well as the participation in class discussions.

【Learning after classes】 It is recommended for you to review the handout materials distributed in the lectures and your not books well. If you want to ask any questions to the lecturers, "Office Hour" is available for you. It is also recommended to review the lectures by using e-learning contents if available.

【Lecture Schedule】 Please also refer to the timetable shown in Section 5.

The sessions marked with "e" are under preparation of e-learning contents. In some cases, the session that is not marked with "e" will be done by utilizing e-learning system, as soon as the e-learning contents are ready for use. Therefore, you must check the updated syllabus cited on the home page of the Graduate School of Medical Sciences, Kumamoto University to check the current status of the session before you take a session. If you cannot obtain enough information from the home page, please make contact with the instructors of the sessions.

There are six types of e-learning, those marked with "eE0", "eEL", "eJ0", "eJL", "eEJ-0" and "eEJ-L". To know the meanings of these six markings and to learn how to use e-learning system, please see the section explaining about the e-learning system in this syllabus.

Session	Date & time	Instructors	Topics
1.	Jun. 05 (Fri) 5th period	Minetaro Ogawa	Ontogeny of hematopoietic system-1
2.	Jun. 12 (Fri) 5th period	Minetaro Ogawa	Ontogeny of hematopoietic system-2
3.	Jun. 19 (Fri) 4th period	Minetaro Ogawa	Ontogeny of hematopoietic system-3
4. eJ-L eE-L	Jun. 26 (Fri) 4th period	Seiji Okada	Differentiation of immune cells
5. eJ-L eE-L	Jul. 03 (Fri) 4th period	Seiji Okada	Humanized mice
6.	Jul. 10 (Fri) 4th period	Shinya Suzu	Regulation of hematopoiesis
7.	Jul. 17 (Fri) 4th period	Hitoshi Takizawa	Role of inflammation on hematopoiesis
8.	Jul. 24 (Fri) 4th period	Yorifumi Sato	T-cell and retroviral infection
9.	Jul.31 (Fri) 4th period	Goro Sashida	Molecular mechanism of myeloid malignancies
10. eE-0	Aug.21 (Fri) 4th period	Kazuhiko Maeda	B cell development-1
11.	Aug.28 (Fri) 4th period	Kazuhiko Maeda	B cell development-2
12.	Sep. 04 (Fri) 4th period	Kazuhiko Maeda	B cell development-3
13. eJ-0 eE-0 eEJ-0	Sep. 11 (Fri) 4th period	Yasuharu Nishimura	Antigen presentation to T cells
14. eJ-0 eE-0	Sep. 25 (Fri) 4th period	Yasuharu Nishimura	T cell-mediated anti-tumor immunity
15. eJ-L	Oct. 02 (Fri) 4th period	Satoru Senju	iPS cell-based immune cell therapy

Lecture Series "Riron": B4 Infection and Immune Control

Subject code 20050

(Elective: 2 credits)

Course director:	Shuzo Matsushita	(AIDS Research II	TEL: 373-6536)	shuzo@kumamoto-u.ac.jp
	Tomohiro Sawa	(Microbiology	TEL:373-5320)	sawat@kumamoto-u.ac.jp
Instructors :	Yosuke Maeda	(Medical Virology	TEL: 373-5129)	ymaeda@kumamoto-u.ac.jp
	Masafumi Takiguchi	(AIDS Research I	TEL: 373-6531)	masafumi@kumamoto-u.ac.jp
	Takamasa Ueno	(AIDS Research V	TEL: 373-6826)	uenotaka@kumamoto-u.ac.jp
	Hiroaki Mitsuya	(Hematology	TEL: 373-5156)	hmitsuya@gpo.kumamoto-u.ac.jp
	Tatsuya Kawaguchi	(Hematology	TEL: 373-5156)	tatsu@kumamoto-u.ac.jp
	Yasuo Ariumi	(AIDS Research VII	TEL: 373-6834)	ariumi@kumamoto-u.ac.jp
	Toshikazu Miyakawa	(Hematology	TEL: 373-5156)	tosimomo@gpo.kumamoto-u.ac.jp

【Objectives】

The aim of this lecture series "Infection and Immune Control" is to learn following topics important for basic and clinical research of infectious diseases. (1) interaction between pathogen and host response, (2) molecular pathogenesis of viral infection, (3) immune control and vaccine development, (4) management of nosocomial/opportunistic infection, (5) diagnosis and treatment of emerging/re-emerging infectious diseases, (6) development of antiviral therapy based on the research in the life cycle of HIV-1, (7) Pathogenesis and treatment of HIV-1 infection.

【Content Description】

It would not be an overstatement if we say the history of mankind has been a long history of fight against infectious diseases. Researches on infectious diseases have been contributed enormously to the health and longevity of the life in developed nations at present. Among them, development of the vaccine for the various infections, development of the antibiotics for bacterial infections and development of the anti-viral agents against chronic virus infection which had been difficult to manage have given a big impact to our society. These accomplishments have been based on accumulation of basic knowledge about the pathogenic agents themselves and elucidation of specific lifecycle of them. The up-to-date research results including the lecturers' own will be presented focusing on the following topics, the pathogenesis and the host response, life cycle of the virus and development of the effective anti-virus agents, and the development strategy of the vaccine that overcomes the escape from the immune response.

【Keywords】

pathogens, pathogenesis of viral infection, human immunodeficiency virus (HIV), cellular immunity, humoral immunity, natural immunity, host factors, anti-virus medicine, vaccine development, emerging/re-emerging infectious diseases, nosocomial/opportunistic infection.

【Class Style】

PowerPoint and/or OHP will be used in the lectures, and active participation in the discussion is encouraged. Extra classes or video lectures are considered for those who are regularly absent for unavoidable reasons. (Before starting this course students will be informed of the individual lecture style of instructors in detail.

【Textbooks】 Textbooks are not specified, and handouts will be distributed.

【Recommended Readings】 "Atlas of AIDS" edited by Gerald L. Mandell and Donna Mildvan. Current Medicine, Inc. Philadelphia, 2001. "Infectious Diseases and Medical Microbiology" 2nd Edition, Abraham I. Braude et al., W.B. Saunders Company

【Office Hour】 If you have any questions on topics or schedule of the classes, please contact the instructors listed above.

【Evaluation for Grades and Credits】 This class consisted of a series of omnibus lectures by five groups of lecturers who are individually responsible for three successive lectures listed in the following table of schedule. Evaluation will be done by each group based on active class participation including those who are taking e-learning class, examination test and/or report for subjects prepared by the chief of the group. In order to get credits students have to take more than 2/3 lectures to get scores at least from 3 groups in 5. Grading will be based on averaging three higher scores among ones obtained by the student. The chief of individual lecture group are indicated with * mark in the following table.

【Learning before classes】 It is recommended for you to read a syllabus and indicated text books in advance

【Learning after classes】 It is recommended for you to review the handout materials distributed in the lectures and your notebooks well. If you want to ask any questions to the lecturers, "Office Hour" is available for you. It is also recommended to review the lectures by using e-learning contents if available.

【Lecture Schedule】 Please also refer to the timetable shown in the Section 5.

The sessions marked with "e" are under preparation of e-learning contents. In some cases, the session that is not marked with "e" will be done by utilizing e-learning system, as soon as the e-learning contents are ready for use.

Therefore, you must check the updated syllabus cited on the home page of the Graduate School of Medical Sciences, Kumamoto University to check the current status of the session before you take a session. If you cannot obtain enough information from the home page, please make contact with the instructors of the sessions.

There are six types of e-learning, those marked with "eE0", "eEL", "eJ0", "eJL", "eEJ-0" and "eEJ-L". To know the meanings of these six markings and to learn how to use e-learning system, please see the section explaining about the e-learning system in this syllabus.

Session	Date & time	Instructors	Topics
1. eJ-0	June 1 (Mon)	6th period Tomohiro Sawa	Infection and host response 1
2. eJ-L	June 8 (Mon)	6th period *Tomohiro Sawa	Infection and pathogenic organisms
3. eJ-0	June 15 (Mon)	5th period Tomohiro Sawa	Infection and host response 2
4.	June 22 (Mon)	5th period Yosuke Maeda	Molecular pathogenesis of viral infection I
5. eE-L	June 29 (Mon)	5th period *Yosuke Maeda	Molecular pathogenesis of viral infection II
6. eE-L	July 6 (Mon)	5th period Yosuke Maeda	Molecular pathogenesis of viral infection III
7. eE-0	July 13 (Mon)	5th period Masafumi Takiguchi	Infection and host immune response
8.	July 27 (Mon)	5th period *Takamasa Ueno	Cellular immune response against HIV-1
9.	Aug. 3 (Mon)	5th period Takamasa Ueno	Vaccine development against infectious diseases
10.	Aug. 10 (Mon)	5th period Tatsuya Kawaguchi	Nosocomial/opportunistic infection
11.	Aug. 17 (Mon)	5th period Toshikazu Miyakawa	Emerging/re-emerging infectious diseases
12.	Aug. 24 (Mon)	5th period *Hiroaki Mitsuya	Antiviral therapy against HIV-1 infection/AIDS
13.	Aug. 31 (Mon)	5th period Yasuo Ariumi	Host factors in infection
14.	Sep. 7 (Mon)	5th period *Shuzo Matsushita	Pathogenesis and treatment of HIV-1 infection
15. eE-0 eJ-0	Sep. 14 (Mon)	5th period Shuzo Matsushita	Humoral immune response against HIV-1

Lecture Series "Riron": B5 Human brain functional Science

Subject Code 20060

(Elective: 2 credits)

Course Director: Nobuaki Tamamaki (Morph. Neural Sci TEL: 373-5298) tamamaki@kumamoto-u.ac.jp

Instructors: Kenji Shimamura (Brain Morphogenesis TEL: 373-6583) simamura@kumamoto-u.ac.jp

Wen-Jie Song (Sensory Cognitive Physiol. TEL: 373-5056) song@kumamoto-u.ac.jp

Manabu Ikeda (Psych. Neuropathobio. TEL: 373-5184) mikeda@kumamoto-u.ac.jp

Noboru Fujise (Psych. Neuropathobio. TEL: 373-5184) nfujise@kumamoto-u.ac.jp

【Objectives】

A highly complex structure, human brain has been developed from simple central nervous system (CNS) that detects environmental information and uses the information directly for its body response. Human brain achieved memory, cognition, spirit and identity in its structure by increasing number of neurons and number of subtypes of neurons. In this lecture series, 'Human brain functional Science', we will try to show you how mental activity appears from 'gene expression', neuron electrical activity, information convergence and divergence in the neuronal circuit. We will inspect hypotheses proposed on the mechanisms to produce brain function. Finally we will speculate the intrinsic brain mechanisms by using mental disorders as clues.

【Content Description】

We will show you and discuss with you on the points: molecular mechanisms of induction of neural plate and regionalization. Molecular mechanisms of differentiation and process of morphogenesis will be shown into detail. You will learn how environmental information is conveyed to human brain region and used for information processing and cognition. You will also learn neuronal basis for mental activity.

【Keywords】

Keywords will be given in the lectures and the web-CT videos. Please write down all the keywords and show them to us in your reports to prove your attendance to the lectures or learning from the videos.

【Class Style】

PowerPoint and/or OHP will be used in the lectures, and active participation in the discussion is encouraged. Extra classes or video lectures are considered for those who are regularly absent for unavoidable reasons.

【Textbooks】 Textbooks are not specified, and handouts will be distributed.

【Recommended Readings】

【Office Hour】

If you have any questions on topics or schedule of the classes, please contact the instructors listed above.

【Evaluation for Grades and Credits】

Grading will be based on active class participation, paper summaries, and the final report.

【Learning Before classes】 It is recommended for you to read a syllabus and indicated text books in advance.

【Learning After classes】 It is recommended for you to review the handout materials distributed in the lectures and your notebooks well. If you want to ask any questions to the lecturers, "Office Hour" is available for you. It is also recommended to review the lectures by using e-learning contents if available.

【Lecture Schedule】 Please also refer to the timetable shown in the Section 5.

Session	Date & time	Instructors	Topics
1.	eE-0, eJ-0 Jun 2 (Tue)	6th period Kenji Shimamura	Neural induction
2.	eE-0, eJ-0 Jun 9 (Tue)	6th period Kenji Shimamura	Regionalization of brain
3.	eE-0, eJ-0 Jun 16 (Tue)	5th period Kenji Shimamura	Morphogenesis in individual region
4.	eE-0, eJ-0 Jun 23 (Tue)	5th period Nobuaki Tamamaki	Structure of neurons
5.	eE-0, eJ-0 Jun 30 (Tue)	5th period Wen-Jie Song	Action potential
6.	eE-0, eJ-0 Jul 7 (Tue)	5th period Wen-Jie Song	Synapse and synaptic transmission
7.	eE-0, eJ-0 Jul 14 (Tue)	5th period Wen-Jie Song	Neurotransmitter
8.	eE-0, eJ-0 Jul 21 (Tue)	5th period Wen-Jie Song	Synaptic plasticity
9.	eE-0, eJ-0 Jul 28 (Tue)	5th period Nobuaki Tamamaki	Modulation of neural activity by amine
10.	eE-0, eJ-0 Aug 11 (Tue)	5th period Nobuaki Tamamaki	Neuronal network in the neocortex
11.	eE-0, eJ-0 Aug 18 (Tue)	5th period Nobuaki Tamamaki	Mental activity raised from circuit mechanisms
12.	eJ-0 Aug 25 (Tue)	5th period Manabu Ikeda	Multiple approaches to mental disorder
13.	eE-0, eJ-0 Sep 1 (Tue)	5th period Noboru Fujise	Neurotransmitter and mental symptom
14.	eJ-0 Sep 8 (Tue)	5th period Manabu Ikeda	Neural basis of mental disorder
15.	eJ-0 Sep 15 (Tue)	5th period Manabu Ikeda	Neural basis of dementia

Lecture Series "Riron": B6 Neuroscience**Subject Code 20070****(Elective: 2 credits)**

Course Director: Takaichi Fukuda (Anatomy and Neurobiology TEL: 373-5038) tfukuda@kumamoto-u.ac.jp
 Instructors: Kunimasa Ohta (Developmental Neurobiology TEL: 373-5293) ohta9203@gpo.kumamoto-u.ac.jp
 Yasuhiro Indo (Pediatrics TEL: 373-5191) yindo@kumamoto-u.ac.jp
 Keishi Makino (Neurosurgery TEL: 373-5219) kmakino@fc.kuh.kumamoto-u.ac.jp
 Toshihiro Inoue (Ophthalmology and Visual Science TEL: 373-5247) noel@da2.so-net.ne.jp
 Yasuhiro Ito (Ophthalmology and Visual Science TEL: 373-5247) ito@fc.kuh.kumamoto-u.ac.jp
 Ryosei Minoda (Otolaryngology-Head and Neck Surgery TEL: 373-5253) minoda@gpo.kumamoto-u.ac.jp
 Yasushi Maeda (Neurology TEL: 373-5283) yasushim@kumamoto-u.ac.jp
 Takumi Era (Cell Modulation TEL: 373-6589) tera@kumamoto-u.ac.jp

【Objectives】

In this course, students learn basic knowledge on molecular basis of nervous system development, its deformity, various diseases and treatments on the sensory input (vision, hearing, pain) and output (motor) of the central nervous system. Furthermore recent treatments of gene therapy and neural transplantation will be shown. The topics on the higher brain functions of memory, learning and recognition will not be included in this course.

【Content Description】

- Asymmetric cell division, stem cell, cell lineage and cell fate
- Eye morphogenesis
- Axon guidance and neural migration
- Nerve growth factor (NGF)
- Synapse and gap junction
- Deformity of central nervous system
- Glaucoma
- Retinal disease
- Hearing impairment and the treatment
- Regenerative medicine for Neurodegenerative diseases
- Parkinson's Disease, Gene Therapy Treatment

【Keywords】

Content Description, cerebrum, receptor tyrosine kinase for NGF, synapse, congenital insensitivity to pain with anhidrosis, nociceptor, sympathetic neuron, intractable neural diseases, gene therapy, neural transplantation, deformity, hearing difficulty

【Class Style】 PowerPoint and/or OHP will be used in the lectures, and active participation in the discussion is encouraged. Reports and e-mail discussion are considered for those who are regularly absent for unavoidable reasons.

【Textbooks】 Textbooks are not specified, and handouts will be distributed.

【Recommended Readings】

- Neuroscience: Exploring the Brain: Mark F Bear et al. (2007)

【Office Hour】 If you have any questions on topics or schedule of the classes, please contact the instructors listed above.

【Evaluation for Grades and Credits】

Grading will be based on the student's understanding of the course subject matter. The students' understanding will be evaluated on the basis of papers and quizzes related to the topics dealt with in class to be scored from 0 to 100.

Final grades will be based on the average score of the papers and quizzes as well as participation in class discussions

【 Learning Before classes】 Prepare for the class by reading the related books.

【 Learning After classes】

【Lecture Schedule】 Please also refer to the timetable shown in the Section 5.

Session	Date & time	Instructors	Topics	
1.	eE-0 June 3 (Wed)	4th period	Kunimasa Ohta	Molecular mechanism of axon circuit formation
2.	eE-0 June 10 (Wed)	4th period	Kunimasa Ohta	Identification of axonal guidance molecules
3.	eE-0 June 17 (Wed)	4th period	Kunimasa Ohta	Eye formation and neural stem cell
4.	eE-0 June 24 (Wed)	4th period	Kunimasa Ohta	Finding of signaling molecule Tsukushi
5.	eE-0 July 1 (Wed)	4th period	Takaichi Fukuda	Structure and dchemical and chemical and electrical synapses
6.	eE-0July 8(Wed)	4th period	Takumi Era	Development and differentiation of neural crest cell, pluripotency
7.	eE-0July 15 (Wed)	4th period	Takumi Era	New medical application to diseases of the nervous system using stem cell
8.	eE-0 July 22 (Wed)	4th period	Yasuhiro Indo	Nerve growth factor and apoptosis
9.	eE-0 July 29 (Wed)	4th period	Yasuhiro Indo	Identification of the gene responsible for congenital insensitivity to pain with anhidrosis
10.	eJ-0 Aug 19 (Wed)	4th period	Keishi Makino	Deformity of central nervous system
11.	eE-L Aug 26 (Wed)	4th period	Yasuhiro Ito	Retinal disease
12.	eE-0 Sep 2 (Wed)	4th period	Toshihiro Inoue	Glaucoma
13.	eE-0 Sep 9 (Wed)	4th period	Ryosei Minoda	Hearing impairment and the treatment
14.	Sep 16 (Wed)	4th period	Yasushi Maeda	Regenerative medicine for neurodegenerative diseases
15.	Sep 30 (Wed)	4th period	Yasushi Maeda	Novel therapies for Parkinson's disease

Lecture Series "Riron": B7 Developmental and Regenerative Medicine**Subject Code 20080****(Elective: 2 credits)**

Course Director: Ryuichi Nishinakamura (Kidney Development TEL: 373-6615) ryuichi@kumamoto-u.ac.jp

Instructors:

Takaichi Fukuda (Anatomy TEL: 373-5038)	tfukuda@kumamoto-u.ac.jp
Katsushi Kawai (Anatomy TEL: 373-5039)	kawai@kumamoto-u.ac.jp
Masatake Araki (Bioinformatics TEL: 373-6501)	maraki@gpo.kumamoto-u.ac.jp
Naomi Nakagata (Reproductive Engineering TEL: 373-6570)	nakagata@gpo.kumamoto-u.ac.jp
Satomi Tanaka (Kidney Development TEL: 373-6617)	stanaka@kumamoto-u.ac.jp
To be announced (Stem Cell Biology TEL: 373-6807)	
Takumi Era (Cell Modulation TEL: 373-6589)	tera@kumamoto-u.ac.jp

【Objectives】

Developmental and regenerative medicine aims at curing diseases by revealing molecular mechanisms of organ development. In this course, you learn basic concepts and techniques used in this field, including knockout mice, which have now become essential for any area of research. This course serves as introductory for those in the Developmental and Regenerative Researcher Program, and will also be useful for those in other programs, as you obtain essential knowledge on genetic engineering techniques.

【Content Description】

In order to explain basic principles of genetic engineering techniques, it is discussed how the molecular mechanisms of organ development have been revealed by using these techniques. Trials for regenerating organs based on these findings are also introduced. More specifically, you are expected to understand the followings: (1) Establishment and application of stem cells including ES and iPS cells; (2) Reproductive engineering including in vitro fertilization, freezing of embryos and sperms, embryo transfer, intracytoplasmic sperm injection, and nuclear transfer; (3) Methods to generate transgenic and knockout mice; (4) Comprehensive mutagenesis projects in mice and how to use the resources; (5) Gene modification using Cre-loxP technology; (6) Anatomy of each organ in the aspects of ontogeny and phylogeny; (7) Axis formation and patterning at the initial stages of development; (8) Molecular mechanisms of organ development including the liver, pancreas and kidney; (9) Trials for regenerating organs.

【Keywords】 ES cells, iPS cells, stem cells, reproductive engineering, knockout mouse, transgenic mouse, gene trap, Cre-loxP, ontogeny, phylogeny, pattern formation, liver development, pancreas development, kidney development

【Class Style】 PowerPoint and/or OHP will be used in the lectures, and active participation in the discussion is encouraged. Extra classes or video lectures are considered for those who are regularly absent for unavoidable reasons.

【Textbooks】 Textbooks are not specified, and handouts will be distributed.

【Recommended Readings】

- "Essential Developmental Biology, 3rd edition" by Slack JMW., Blackwell Publishing, 2012.
- "Manipulating the Mouse Embryo: A Laboratory Manual, 3rd edition" by Nagy A., Gertsenstein M., Vintersten K., Behringer R., Cold Spring Harbor Laboratory Press, 2002.
- "Larsen's Human Embryology, 4th edition" by Shoenwolf GC, Bleyl SB, Brauer PR, Francis-West PH. Churchill Livingstone, 2009.

【Office Hour】 If you have any questions on topics or schedule of the classes, please contact the instructors listed above.

【Evaluation for Grades and Credits】

The students' understanding will be evaluated on the basis of papers and quizzes related to the topics dealt with in class to be scored from 0 to 100. Final grades will be based on the average score of the papers and quizzes, as well as the final report and active participation in class discussions.

【 Learning Before classes】 Students should read the indicated textbooks in advance.

【 Learning After classes】 Students should review their notes and the handout materials distributed in the lectures, as well as the e-learning contents if available. If there are questions regarding the lectures, please contact or consult with the lecturer(s) during office hours or specified consultation hours.

【Lecture Schedule】 Please also refer to the timetable shown in the Section 5.

The sessions marked with “e” are under preparation of e-learning contents. In some cases, the session that is not marked with “e” will be done by utilizing e-learning system, as soon as the e-learning contents are ready for use. Therefore, you must check the updated syllabus cited on the home page of the Graduate School of Medical Sciences, Kumamoto University to check the current status of the session before you take a session. If you cannot obtain enough information from the home page, please make contact with the instructors of the sessions.

There are six types of e-learning, those marked with “eE0”, “eEL”, “eJ0”, “eJL”, “eEJ-0” and “eEJ-L”. To know the meanings of these six markings and to learn how to use e-learning system, please see the section explaining about the e-learning system in this syllabus.

Session	Date & time	Instructors	Topics
1 . eE-0	Jun 4 (Thu) 5th period	Ryuichi Nishinakamura	Developmental and regenerative medicine
2 . eJ-0	Jun 11 (Thu) 5th period	Masatake Araki	Transgenic mouse, Knockout mouse
eE-0			
3 . eJ-0	Jun 18 (Thu) 5th period	Masatake Araki	Exchangeable gene trap system
eE-0			
4 . eE-0	Jun 25 (Thu) 5th period	Masatake Araki	Resources of genetically engineered mice
5 . eJ-0	Jul 2 (Thu) 5th period	Naomi Nakagata	Reproductive engineering I
eE-0			
6 . eJ-0	Jul 9 (Thu) 5th period	Naomi Nakagata	Reproductive engineering II
eE-0			
7 . eE-0	Jul 16 (Thu) 5th period	Takumi Era	iPS cells, their applications for the medicine
8 . eE-0	Jul 23 (Thu) 5th period	Takaichi Fukuda	Ontogeny and phylogeny
9 . eE-0	Jul 30 (Thu) 5th period	Katsushi Kawai	Anatomy of digestive tracts and lung
1 0 . eE-0	Aug 20 (Thu) 5th period	Takaichi Fukuda	Anatomy of cardiac and urogenital systems
1 1 . eE-0	Aug 27 (Thu) 5th period	Takumi Era	Mesoderm induction from ES cells
1 2 . eE-0	Sep 3 (Thu) 5th period	Ryuichi Nishinakamura	Kidney development
1 3 . eE-L	Sep 10 (Thu) 5th period	To be announced	Embryonic stem cells I
1 4 . eE-L	Sep 24 (Thu) 5th period	To be announced	Embryonic stem cells II
1 5 . eE-L	Oct 1 (Thu) 5th period	Satomi Tanaka	Early-stage embryos and germ cells

(Elective: 2 credits)

Course director: Yoko Nishitani (Forensic Medicine TEL: 373-5123)

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【Objectives】

Social Medicine is an important field of medical science in studying various aspects of the interaction between medicine and society in the human life cycle. The health of the humans is regulated in the ecosystem, and, as the medical social application, it is also supported by the comprehensive health and welfare system. In this course, students are expected to understand the relationship between the environment and health, the concept of total medical care service including disease prevention & health promotion, and individuals' basic human rights. Students will also comprehensively learn the role of medicine and law in maintaining social safety.

【Content Description】

The purpose of this course is to develop the logic of the broad field of Social Medicine from the viewpoints of preventive and environmental medicine (hygiene), public health, health medicine, forensic medicine and neuropsychiatry. Specifically, there will be practical lectures in the Department of preventive and environmental medicine (hygiene) on the structure of the environment, the relationship between people and the environment, environmental indices and evaluation, and the setting and maintenance of environmental standards, and lectures in the Department of Public Health on the concept of health and the construction of a healthy society based on preventive medicine and epidemiology. In the Department of Forensic Medicine, there will be general lectures on the purposes of forensic medicine and the professional practice of forensic medicine, as well as the causes of the death and its classification from the medical, legal and social perspectives, and forensic medicine's contribution to society. In the Department of Clinical Behavioral Medicine, students will learn about the epidemiology of mental diseases and the relationship between life-events, social support, personality, recognition pattern, nurture experience and mental disease or the causes of outbreaks of mental disease, and life stage and life cycle.

【 Keywords 】 Human-environmental interaction, Occupational disease, Dose-response & effect relationship, Public health, Health promotion, Medical statistics, Epidemiology, Forensic medicine, Medical laws, Individual death.

【Class Style】 PowerPoint and/or OHP will be used in the lectures, and active participation in the discussion is encouraged. Extra classes or video lectures are considered for those who are regularly absent for unavoidable reasons.

【Textbooks】 Textbooks are not specified, and handouts will be distributed.

【Recommended Readings】

- "Public Health & Preventive Medicine" by Maxy-Rosenan-Last: (14 edit) Appleton & Lange, 1998,
- "Forensic Pathology" by Bernard Knight, 2nded., Arnold, London, Sydney and Auckland, 1996.

【Office Hour】 If you have any questions on topics or schedule of the classes, please contact the instructors listed above.

【Evaluation for Grades and Credits】 Grading will be based on active class participation, paper summaries, and the final report. Grading will be based on the student's understanding of the course subject matter. The students' understanding will be evaluated on the basis of papers and quizzes related to the topics dealt with in class to be scored from 0 to 100.

Final grades will be based on the average score of the papers and quizzes as well as participation in class discussions

【Learning before classes】 It is recommended for you to read a syllabus and indicated text books in advance.

【Learning after classes】 It is recommended for you to review the handout materials distributed in the lectures and your notebooks well. If you want to ask any questions to the lecturers, "Office Hour" is available for you. It is also recommended to review the lectures by using e-learning contents if available.

【Lecture Schedule】

Session	Date & time	Instructors	Topics
1 .eJ-L	Jun 5 (Fri) 6th period	Takahiko Katoh	Meaning of social medicine
2 .	Jun 12 (Fri) 6th period	Aya Hisada	Environmental Toxicology
3 .	Jun 19(Fri) 5th period	Hisamitsu Omori	Medical Screening
4 .	Jun 26 (Fri) 5th period	Hirofumi Soejima/ Hideki Kishikawa	Mechanism of aging
5 .	Jul 3 (Fri) 5th period	Hirofumi Soejima	Aging and blood coagulation
6 .	Jul 10 (Fri) 5th period	Hirofumi Soejima	Aging and life style
7 . eJ-L	Jul 17 (Fri) 5th period	Yoko Nishitani	Definition and purpose of forensic medicine
8 . eJ-L	Jul 24 (Fri) 5th period	Yoko Nishitani	Forensic medicine & forensic science
9 . eJ-L	Jul 31 (Fri) 5th period	Yoko Nishitani	Social aspect of human death (1)
1 0 . eJ-L	Aug 21 (Fri) 5th period	Yoko Nishitani	Social aspect of human death (2)
1 1 .	Aug 28 (Fri) 5th period	Changnian Wei	Environment-human system
1 2 .	Sep 4 (Fri) 5th period	Changnian Wei	Environmental indices and evaluation
1 3 .	Sep 11 (Fri) 5th period	Changnian Wei	Health promotion
1 4 .	Sep 25 (Fri) 5th period	Wataru Miyazaki	Endocrine system and disrupting chemicals
1 5 .	Oct 2 (Fri) 5th period	Takao Kitano	Life style and health risk

Course director: Hirotaka Matsui (Diagnostic Medicine Phone:373-5890)

Instructors : Takaaki Ito (Pathology and Experimental Medicine Phone: 373-5086)
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Motohiro Takeya (Cell Pathology Phone:373-5095) takeya@kumamoto-u.ac.jp
Takahisa Imamura (Molecular Pathology Phone:373-5306) taka@kumamoto-u.ac.jp
Hirofumi Jono (Clinical Pharmaceutical Sciences Phone: 373-5823)
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Yasuyuki Yamashita (Diagnostic Radiology Phone:373-5261) yama@kumamoto-u.ac.jp
Akihiro Kojima (Isotope Science Phone:373-6508) akojima@kumamoto-u.ac.jp

【Objectives】

During having the lecture series "Current Theory of Medical Diagnosis", you can learn 1) characteristics of cancer cells at the points of differentiation, morphology and biological activities including cancer cell invasion, 2) significance of apoptosis in host defense and cell differentiation, 3) macrophage dynamics in human disease, 4) development of integrated laboratory science and disease analyses methods, 5) methods and investigative application of radiological image diagnosis, and 6) introduction of RI tracer methods and RI molecular imaging.

【Content Description】

The lecture series "Current Theory of Medical Diagnosis" afford fundamental and current general views of modern medical diagnostic techniques and their application in practical medicine and medical research. For understanding some aspects of pathological diagnosis, morphological techniques and their application for cancer diagnosis are introduced, and analytical methods of cancer cell differentiation, proliferation and invasion activities are shown. Blood coagulation is associated with inflammatory and immune reactions and bio-defense. Proteases from bacteria and leukocytes are pathogenic. Macrophage is a unique cell population in the human and animals, and you can learn all about macrophages in disease processes and investigative methods for this cell population. In the lecture on Laboratory Medicine, we will focus on a history by which somatic gene mutations involved in the development of hematological malignancies and on the significance to detect these mutations at a high sensitivity/accuracy. Moreover, we will introduce pathogenetical data obtained by virtue of molecular biology and genomics/proteomics approaches, and ways how to search biomarkers for cancer and inflammation conditions and how to find effective molecular targets for therapy. In the lecture on Diagnostic Radiology, detailed implication of CT and MRI images and application for researches using these images are presented. In the lecture on Isotope Science, principles of RI tracer methods detecting RI distribution in the body and for functional analyses of biological activities are presented. In addition, outline of RI molecular imaging is also explained.

【Key Words】

pathological diagnosis, molecular diagnosis, neoplasm, cancer invasion, immunostain, basement membrane, extracellular matrix, coagulation, protease, pathogenicity, macrophage, phagocytic cell, red blood cell, leukocyte chemotaxis, forefront of modern medicine, real time PCR, proteome, SELDI-TOF-MS, cell signal transduction, image diagnosis, CT, MRI, radioisotope (RI) tracer method, RI molecular imaging,(SPECT, PET).

【Textbook】 not specified.

【Class style】 PowerPoint files will be used for giving the lectures, and active participation in the discussion is encouraged. Extra classes or video lectures will be considered for those who are regularly absent for unavoidable reasons.

【Recommended Readings】 Special issue of Cell Technology “Revenge of RI” (Shujunsha, 2007) for the lecture of Isotope Science.

【Office Hour】 If you have any questions on topics or schedule of the classes, please contact the instructors listed above.

【Evaluation for Grades and Credits】 Grading will be based on active class participation, paper summaries and the final reports. Even if your attendance in this lecture course is very low or none, the students can gain the credit of this course by e-learning system (now in construction), or supplement class (on March 26; needs appointments with Prof. Ando) Grading will be based on the student's understanding of the course subject matter. The students' understanding will be evaluated on the basis of papers and quizzes related to the topics dealt with in class to be scored from 0 to 100.

Final grades will be based on the average score of the papers and quizzes as well as participation in class discussions

【Learning Before classes】 It is recommended for you to read a syllabus and indicated text books in advance.

【Learning After classes】 It is recommended for you to review the handout materials distributed in the lectures and your notebooks well. If you want to ask any questions to the lecturers, "Office Hour" is available for you. It is also recommended to review the lectures by using e-learning contents if available.

【Lecture Schedule】 Please also refer to the timetable shown in the Section 5.

The sessions marked with “e” are under preparation of e-learning contents. In some cases, the session that is not marked with “e” will be done by utilizing e-learning system, as soon as the e-learning contents are ready for use. Therefore, you must check the updated syllabus cited on the home page of the Graduate School of Medical Sciences, Kumamoto University to check the current status of the session before you take a session. If you cannot obtain enough information from the home page, please make contact with the instructors of the sessions. There are six types of e-learning, those marked with “eE0”, “eEL”, “eJ0”, “eJL”, “eEJ-0” and “eEJ-L”. To know the meanings of these six markings and to learn how to use e-learning system, please see the section explaining about the e-learning system in this syllabus.

Session	Date & time	Instructors	Topics
1. eJ-L	Feb 2, 2016 (Tue) 4 th period	Ito (Pathol Exp Med)	Tumor diagnosis with immunohistochemistry.
2. eJ-L	Feb 5, 2016 (Fri) 4 th period	Ito (Pathol Exp Med)	Molecular pathological diagnosis.
3.	Feb 9, 2016 (Tue) 4 th period	Mikami (Pathol Diagnosis)	Histopathologic approach to diagnostic oncology: a logic for interpretation of morphology.
4.	Feb 12, 2016 (Fri) 4 th period	Imamura (Mol Pathol)	Cross-talk between inflammatory and immune reactions and the blood coagulation system.
5.	Feb 16, 2016 (Tue) 4 th period	Imamura (Mol Pathol)	Protease virulence activities and the mechanisms.
6. eJ-L	Feb 19, 2016 (Fri) 4 th period	Takeya (Cell Pathol)	Role of macrophages in human diseases.
7. eJ-L	Feb 23, 2016 (Tue) 4 th period	Takeya (Cell Pathol)	Methods for macrophage researches.
8.	Feb 26, 2016 (Fri) 4 th period	Matsui (Diagnostic Medicine)	Practice and prospect of current diagnostic medicine.
9.	Mar 1, 2016 (Tue) 4 th period	Matsui (Diagnostic Medicine)	Undecided.
10. eJ-0	Mar 4, 2016 (Fri) 4 th period	Jono (Clin Pharm Sci)	Pathophysiological analyses with cell biological methods.
11. eJ-0	Mar 8, 2016 (Tue) 4 th period	Yamashita (Diag Radiolo)	Radiological images of representative diseases.
12. eJ-0	Mar 11, 2016 (Fri) 4 th period	Yamashita (Diag Radiolo)	Application of radiological diagnosis for researches.
13. eJ-L	Mar 15, 2016 (Tue) 4 th period	Kojima (RI Sci)	RI tracer methods: basics and application of radioisotope measurements.
14. eJ-L	Mar 18, 2016 (Fri) 4 th period	Kojima (RI Sci)	RI molecular imaging.
15.	Mar. 22, 2016 (Tue) 4 th period	Matsui (Diagnostic Medicine)	Makeup class

Lecture Series "Riron": C2 Advanced therapeutics**Subject Code 20110****(Elective: 2 credits)****Course Director :** Yutaka Sasaki (Gastroenterology & Hepatology TEL: 373-5146)

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【Objectives】

Recent advances in molecular biology and medical engineering provide a new era in the treatment of various diseases. In this regard, the molecules, which play central roles in the pathogenesis of chronic inflammation and carcinogenesis, have been identified, leading to the development of molecular targeting therapies. In addition, it has been described how immune systems of the body contribute to pathogenesis of diseases, and immune-modulation has been employed in the clinical setting. Furthermore, organ transplantation, cell transplantation and artificial organs have been introduced to complement organ failures. On the other hand, progresses in endoscopic machinery have established endoscopic treatment, and serve as less invasive treatments. This course will focus on progress in treatments and future orientation of medicine.

【Content Description】

Basic concept of molecular targeting and clinical application using antibody, peptide will be reviewed. Because the relation between immune disorders and pathogenesis has been revealed, immune modulation serve as a therapeutic strategy for viral infectious diseases, auto-immune diseases, and cancer. This course provides a rationale, current evaluation and problems of immune-modulation therapy. On the other hand, this course will introduce the basic research and progress to the establishment of organ transplantation, cell transplantation and artificial organs, and also focus on the current efficacy and limitations. In addition, progress in endoscopic treatments will be reviewed. Future therapeutic strategies will be also discussed.

【Keywords】

molecular targeting therapy, immune-modulation therapy, organ transplantation, cell transplantation, artificial organ, endoscopic treatment

【Class Style】

Power-point and /or OHP will be used in the lectures, and active participants in the discussion will be encouraged. Extra classes or video lectures are considered for those who are regularly absent for unavoidable reasons.

【Textbooks】 Textbooks are not specified, and handouts will be distributed.

【Recommended Readings】

- 1) Molecular Cell Biology, sixth edition, by Lodish H, et al. W.H.Freeman, 2008
- 2)Carithers RL Jr. Liver transplantation. American Association for the Study of Liver Diseases. Liver Transpl 2000 Jan;6 (1):122-35.

【Office Hour】 If you have any questions on topics or schedule of the classes, please contact the instructors listed above.

【Evaluation for Grades and Credits】 Grading will be based on the student's understanding of the course subject matter. The students' understanding will be evaluated on the basis of papers and quizzes related to the topics dealt with in class to be scored from 0 to 100.

Final grades will be based on the average score of the papers and quizzes as well as participation in class discussions

【Learning Before classes】 It is recommended for you to read a syllabus and indicated text books in advance.

【Learning After classes】 It is recommended for you to review the handout materials distributed in the lectures and your notebooks well. If you want to ask any questions to the lecturers, "Office Hour" is available for you. It is also recommended to review the lectures by using e-learning contents if available.

【Lecture Schedule】 Please also refer to the timetable shown in the Section 5.

Session	Date & time	Instructors	Topics
1.	eJ-0 Feb 2 (Tue)5 th period	Yutaka Sasaki	Progress in endoscopic treatment of gastrointestinal diseases
2.	eJ-0 Feb 5 (Fri) 5 th period	Yutaka Sasaki	Molecular target therapy in gastrointestinal diseases
3.	eJ-0 Feb 9 (Tue)5 th period	Yutaka Sasaki	Immune disorders in gastrointestinal & hepatic diseases
4.	eJ-0 Feb 12(Fri) 5 th period	Hirotsugu Kohrogi	Progress in diagnosis and treatment of respiratory diseases
5.	eJ-0 Feb 16(Tue)5 th period	Hirotsugu Kohrogi	Topics of allergic respiratory diseases
6.	eJ-0 Feb 19(Fri)5 th period	Hirotsugu Kohrogi	Topics of diagnosis and treatment of lung cancer
7.	eJ-0 Feb 23(Tue)5 th period	Eiji Yumoto	Progress in diagnosis and treatment of dysphagia
8.	eJ-0 Feb 26(Fri)5 th period	Eiji Yumoto	Cochlear implant as the treatment for deafness
9.	eJ-0 Mar 1(Tue)5 th period	Eiji Yumoto	Endoscopic treatment of head and neck diseases
10.	Mar 4(Fri)5 th period	Yukihiro Inomata	Organ transplantation; the past and the present
11.	Mar 8(Tue)5 th period	Yukihiro Inomata	Liver transplantation; basis and clinical application
12.	eJ-0 Mar 11(Fri)5 th period	Masatoshi Eto	Current therapeutic strategy for urogenital cancers
13.	eJ-0 Mar 15(Tue)5 th period	Masatoshi Eto	Endoscopic treatments for urinary diseases
14.	eE-0 Mar 18(Fri)5 th period	Hironobu Ihn	Molecular mechanisms of autoimmune diseases in skin
15.	Mar 22(Tue)5 th period	Hironobu Ihn	Immune disorders in skin diseases

Lecture Series "Riron": C3 Metabolic and Circulatory Regulations**Subject Code 20120****(Elective: 2 credits)**

Course Director: Eiichi Araki (Metabolic Medicine TEL: 373-5169)

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【Objectives】

Metabolic and Circulatory Regulations aim at learning the following items, (1) the pathogenesis of acute coronary syndrome and related factors, (2) the significance of personalized medicine by stratification of patients with acute coronary syndrome by stratification of patients with acute coronary syndrome by evaluating genetic and environmental factors, (3) the pathogenesis of metabolic disorders including diabetes mellitus and diabetic vascular complications, and its therapeutic strategy, (4) the molecular mechanism of effects or secretion of insulin, (5) the molecular mechanism and therapeutic strategy for metabolic syndrome and the development of obesity, (6) the relation between the progression of atherosclerosis or obesity, and inflammatory cells, (7) the physiological renal function, the functional differentiation and regulation in each segment of nephron, (8) the pathogenesis of major renal diseases and the underlining mechanisms causing the pathological conditions, (9) influence and the mechanism of the operative stress to the metabolism and circulation, and therapeutic strategy for controlling these influences.

【Content Description】

1. In this lecture, you are expected to learn the followings:

(1) Platelet activation, and the coagulation and fibrinolytic biomarkers in acute coronary syndrome;

(2) Basic mechanism of myocardial ischemia / reperfusion injury and cardiac remodeling in experimental acute myocardial infarction ;

(3) Personalized medicine by stratification of patients with acute coronary syndrome by evaluating genetic and environmental factors;

(4) Pathogenic mechanism of diabetes mellitus, diabetic complications, effects and secretion defect of insulin;

(5) Molecular mechanism and therapeutic strategy for metabolic syndrome and the development of obesity that is one of the main pathogenesis of atherosclerotic diseases;

(6) Detailed molecular structure, channels and receptors, and the regulation of nephron;

(7) Functional renal changes to the renal blood flow and blood pressure, and the pathogenic mechanism of proteinuria and renal dysfunction;

(8) Various influences by operative stress (i.e. activation of sympathetic nervous system, pain, inflammatory reaction, etc) to the metabolism and circulation, and therapeutic strategy in based on understanding these influences.

【Keywords】 acute coronary syndrome, plaque rupture, ischemia /reperfusion injury, genetic factor, environmental factor, personalized medicine, diabetes mellitus, insulin, diabetic complication, reactive oxygen species, metabolic syndrome, obesity, inflammation, nephron, hypertension, V2 receptor, nephrotic syndrome、 operative stress, pain, etc.

【Class Style】 PowerPoint and/or OHP will be used in the lectures, and active participation in the discussion is encouraged. Extra classes or video lectures are considered for those who are regularly absent for unavoidable reasons.

【Textbooks】 Textbooks are not specified, and handouts will be distributed.

【Recommended Readings】

- "Braunwald's Heart Disease: A Text of Cardiovascular Medicine, Eight edition" edited by Libby P et al. Saunders Press, Philadelphia, 2007.
- "Miller's Anesthesia, sixth edition" edited by Miller RD. Elsevier Churchill Livingstone, Philadelphia, 2005.
- "Brenner & Rector's The Kidney 8th edition, Saunders
- Comprehensive Clinical Nephrology 3rd edition, Mosby

【Office Hour】 If you have any questions on topics or schedule of the classes, please contact the instructors listed above.

【Evaluation for Grades and Credits】 Grading will be based on active class participation, paper summaries, and the final report. Grading will be based on the student's understanding of the course subject matter. The students' understanding will be evaluated on the basis of papers and quizzes related to the topics dealt with in class to be scored from 0 to 100.

Final grades will be based on the average score of the papers and quizzes as well as participation in class discussions

【Learning Before classes】 It is recommended for you to read a syllabus and indicated text books in advance.

【Learning After classes】 It is recommended for you to review the handout materials distributed in the lectures and your notebooks well. If you want to ask any questions to the lecturers, "Office Hour" is available for you. It is also recommended to review the lectures by using e-learning contents if available.

【Lecture Schedule】 Please also refer to the timetable shown in the Section 5.

Session	Date & time	Instructors	Topics
1. eE-0	Oct 9 (Fri) 5th period	Koichi Kaikita	Mechanism of myocardial ischemia / repletion injury
2.	Oct 16 (Fri) 5th period	Seiji Hokimoto	Personalized medicine by genetic and environmental factors
3. eE-0	Oct 23 (Fri) 5th period	Hisao Ogawa	Platelet activation, coagulation and fibrinolysis in acute coronary syndrome
4.	Oct 30 (Fri) 5th period	Tatsuo Yamamoto	Types and influences of operative stress
5. eE-0 eJ-0	Nov 6 (Fri) 5th period	Tomomi Gotoh	NO and nitrogen metabolism disorders
6. eE-0	Nov 13 (Fri) 5th period	Eiichi Araki	Insulin and its action –their molecular basis
7. eE-0	Nov 20 (Fri) 5th period	Eiichi Araki	Diabetic complications and their therapeutic approaches
8.	Nov 27 (Fri) 5th period	Tatsuo Yamamoto	Physiological mechanism of influences by operative stress
9.	Dec 4 (Fri) 5th period	Tatsuo Yamamoto	Therapeutic strategy controlling operative stress
10. eE-0	Dec 11 (Fri) 5th period	Yushi Nakayama	Structure and function of nephron
11. eE-L	Dec 18 (Fri) 5th period	Masashi Mukoyama	Sodium handling by the kidney
12.	Jan 8 (Fri) 5th period	Masataka Adachi	Potassium handling by the kidney
13.	Jan 15 (Fri) 5th period	Eiichi Araki	Pathogenesis and therapies in metabolic
14. eE-0 eJ-0	Jan 22 (Fri) 5th period	Tomomi Gotoh	ER stress-related diseases
15.	Jan 29 (Fri) 5th period	Yuichi Oike	Lifestyle disease

Lecture Series "Riron" : C4 Reproductive and Developmental Medicine**Subject Code 20130**
(Elective: 2 credits)

Course Director:	Fumio Endo	(Pediatrics TEL: 373-5188)	fendo@kumamoto-u.ac.jp
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	Takashi Ohba	(Obstetrics and Gynecology TEL:373-5269)	tkohba@kumamoto-u.ac.jp
	Shigemi Kimura	(Child Development TEL: 373-6525)	kimushige@kumamoto-u.ac.jp
	Tadashi Matsubasa	(Chair of Severe Motor and Intellectual Disabilities TEL: 373-5653)	matubasa@fc.kuh.kumamoto-u.ac.jp
	Hiroshi Mitsubuchi	(Neonatology TEL:373-5191)	mitsubuchi@fc.kuh.kumamoto-u.ac.jp

【Objectives】

The lecture of "Reproductive and developmental medicine" aims to understand followings: (1) Basic knowledge for physiology and pathology of human fertilization and pregnancy. (2) Medical interventions before and during pregnancy, and social issues related to these interventions. (3) Basic knowledge for physiology and pathology of development and growth of man. (4) Basic knowledge for disorders which affects children including genetic diseases.

【Content Description】

This class will introduce the most recent and important progress in the field of reproductive and developmental medicine. The lecture related to pregnancy and delivery will discuss medical and social issues in addition to the physiology of reproductive system. Maturation of eggs is the important step for fertilization, and function of placenta is another important factor for normal development of fetus. We will discuss biological and medical aspect of the reproductive system, and social and ethical problems. The ethical problems of assisted fertilization including in vitro fertilization, ICSI (Intra Cytoplasmic Sperm Injection), oocyte donation, cryopreservation of embryos, cryopreservation of sperm will be discussed.

The class for neonatal medicine, we introduce principal physiology of newborn infants and various pathological conditions of this period. The participant will learn many different disorders. One of the important topic of this course is normal development of brain function during childhood. The normal development of young brain is supported by surrounding environment of children which included social conditions. We will discuss the social problems which affect healthy development of children in recent years.

【Keywords】

Development medicine, pregnancy, fertilization, germ cells, placenta, premature baby, assisted fertilization, ethics, pediatrics, genetic disorders, inborn errors of metabolism, muscle dystrophy.

【Class Style】

Power point presentation, report.

【textbooks】 Nelson Textbook of PEDIATRICS

【Recommended Readings】 not specified.

【Office hour】 8:30AM~5:30 PM

【Evaluation for Grades and Credits】

Grading will be based on active class

Participation, paper summaries and the final report.

Grading will be based on the student's understanding of the course subject matter. The students' understanding will be evaluated on the basis of papers and quizzes related to the topics dealt with in class to be scored from 0 to 100.

Final grades will be based on the average score of the papers and quizzes as well as participation in class discussions

【Learning Before classes】 It is recommended for you to read a syllabus and indicated text books in advance.

【Learning After classes】 It is recommended for you to review the handout materials distributed in the lectures and your notebooks well. If you want to ask any questions to the lecturers, "Office Hour" is available for you. It is also recommended to review the lectures by using e-learning contents if available.

【Lecture Schedule】

Session	Date & Time	Instructors	Topics
1	Oct 8(Thur) 5 th Period	Fumio Endo	Inborn errors of metabolism
2 eE-L	Oct15(Thur) 5 th Period	Makoto Matsukura	Developmental Disorder - Problems in Medical Diagnosis and its Resolution –
3	Oct22(Thur) 5 th Period	Tadashi Matsubasa	Medical aspects of Severe Motor and Intellectual Disabilities
4	Oct29(Thur) 5 th Period	Yasuhiro Indo	Molecular Genetics of Congenital Insensitivity to Pain
5	Nov5(Thur) 5 th Period	Kimitoshi Nakamura	Early diagnosis of disorders for children
6	Nov12 (Thur) 5 th Period	Shigemi Kimura	Analysis of muscular dystrophy based on molecular biology
7 eJ-0	Nov19(Thur) 5 th Period	Hidetaka Katabuchi	Placental physiology and pathology
8	Nov26(Thur) 5 th Period	Takashi Ohba	Pathogenesis, treatments and prevention of preterm labor
9	Dec3(Thur) 5 th Period	Masanori Iwai	Recent neonatal intensive care and new strategies for neonatal hypoxic ischemic brain injury
10	Dec10(Thur) 5 th Period	Kimitoshi Nakamura	Metabolic syndrome in childhood
11	Dec17(Thur) 5 th Period	Ritsuo Honda	Disorders of sex development
12	Jan 7 (Thur) 5 th Period	Takashi Ohba	prenatal diagnosis and ethics
13	Jan14(Thur) 5 th Period	Yoshinori Okamura	Assisted reproduction update
14	Jan21(Thur) 5 th Period	Yasuhiro Indo	Nerve Growth Factor, Interoception and Emotion: Lessons from Congenital Insensitivity to Pain with Anhidrosis
15	Jan28(Thur) 5 th Period	Hiroshi Mitsubuchi	Congenital abnormalities and genetic counseling

Lecture Series "Riron ": C5 Advances in Oncologic Medicine

Subject Code 20140
(Elective: 2 credits)

Course Director : Makoto Suzuki (Thoracic Surgery TEL: 373-5533)

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Instructors : Norie Araki (Tumor Genetics and Biology TEL: 373-5119)

norie@gpo.kumamoto-u.ac.jp

Hideo Baba (Gastroenterological Surgery TEL: 373-5212)

hdobaba@kumamoto-u.ac.jp

Hideki Nakayama (Oral and Maxillofacial Surgery TEL: 373-5288) hinakayam@gmail.com

【Objectives】

To understand advances in oncologic medicine, this course serves evidences and recent findings of medical oncology as follows: (1) Overview of tumor biology and genetics; (2) Recent advances in gastroenterological surgery; (3) Recent advances in oral and maxillofacial surgery; (4) Recent advances in thoracic surgery.

【Content Description】

- (1) This course overviews landmark findings in mechanism of tumor genesis and recent developments, and serves some of leading-edge research and our data. We focus on following topics: molecular mechanisms of tumor-related genes, cell cycle, cell death, cell differentiation; therapeutic agents based on tumor biology; molecular diagnostic tools, genome, transcriptome and proteomics; cancer stem cell.
- (2) Many people suffer from gastroenterological cancers (esophageal, gastric, colon, pancreas, liver, biliary tract and gastrointestinal stromal tumor). We explain not only standard treatment for gastroenterological cancer but also cutting-edge treatment for refractory or metastatic, or recurrent gastroenterological cancer.
- (3) Prognosis of oral squamous cell carcinoma depends on existence of invasion to surrounding tissues and cervical lymph node metastasis. We explain the roles of some of key molecules in invasion and metastasis of the tumors.
- (4) Advances of thoracic surgery depend on traditional techniques of surgery for tuberculosis and development of diagnostic imaging. We explain state of art in diagnosis and treatment for lung cancer.

【Keywords】 Tumor, cutting-edge medicine, oncogene, tumor suppressor gene, cell cycle, cell death, abnormal cell differentiation, cancer drug, molecular diagnostic technology of cancer, proteomics, cancer stem cell, gastroenterological cancer, refractory cancer, challenging surgery, less invasive surgery, chemotherapy, squamous cell carcinoma, extracellular matrix, adhesion molecule, metastatic potential, invasive potential, Positron emission tomography, Magnetic resonance image, mediastinal tumor, thymoma, myasthenia gravis

【Class Style】 PowerPoint will be used in the lectures, and active participation in the discussion is encouraged. Extra classes or video lectures are considered for those who are regularly absent for unavoidable reasons.

【Textbooks】 Textbooks are not specified.

【Recommended Readings】

- "Natural obsessions: The search for the oncogene" by Angier. N, Houghton Mifflin Co, 1988.
- "Cancer: principles & practice of oncology, 7th ed" by DeVita VT, Lippincott Williams & Wilkins.2004
- "The biology of cancer" by Weinberg RA Garland Science, 2007.
- "Clinical Oncology." by Abeloff MD, Churchill Livingstone, .
- "ACS surgery: principles and practice" by Wilmore DW, WebMD.
- "Thoracic Surgery, 2nd edition " by Pearson FG, Churchill Livingstone, 2002

【Office Hour】 If you have any questions on topics or schedule of the classes, please contact the instructors listed above.

【Evaluation for Grades and Credits】 Grading will be based on active class participation, paper summaries, and final report.

【Learning Before classes】 It is recommended for you to read a syllabus and indicated text books in advance.

【Learning After classes】 It is recommended for you to review the handout materials distributed in the lectures and your notebooks well. If you want to ask any questions to the lecturers, "Office Hour" is available for you. It is also recommended to review the lectures by using e-learning contents if available.

【Lecture Schedule】 Please also refer to timetable shown in the Section 5.

Session	Date and time	Instructors	Topics
1 .eJ-0	Oct 6 (Tue) 4th period	Norie Araki	Tumor Genetics and biology (introduction)
2 .eJ-0	Oct 13 (Tue) 4th period	Norie Araki	Tumor Genetics and biology 1
3 .eJ-0	Oct 20 (Tue) 4th period	Norie Araki	Tumor Genetics and biology 2
4 .eJ-0	Oct 27 (Tue) 4th period	Hideo Baba	Gastroenterological surgery (introduction)
5 .eJ-0	Nov 10 (Tue) 4th period	Hideo Baba	Gastroenterological surgery 1
6 .eE-0	Nov 17(Tue) 4th period	Hideo Baba	Gastroenterological surgery 2
7 .eE-0	Nov 24 (Tue) 4th period	Hideo Baba	Gastroenterological surgery 3
8 .eE-0	Dec 1 (Tue) 4th period	Hideo Baba	Gastroenterological surgery 4
9 .eE-0	Dec 8(Tue) 4th period	Hideo Baba	Gastroenterological surgery 5
10 .eJ-0	Dec 15 (Tue) 4th period	Hideki Nakayama	Oral and maxillofacial surgery (introduction)
11 .eJ-0	Dec 22 (Tue) 4th period	Hideki Nakayama	Oral and maxillofacial surgery 1
12 .eJ-0	Jan 5 (Tue) 4th period	Hideki Nakayama	Oral and maxillofacial surgery 2
13 .eE-0	Jan 12 (Tue) 4th period	Makoto Suzuki	Thoracic surgery (introduction)
14 .eJ-0	Jan 19 (Tue) 4th period	Makoto Suzuki	Lung cancer
15 .eE-0	Jan 26 (Tue) 4th period	Makoto Suzuki	Medistinal tumor

Lecture Series "Riron": C6 The Forefront of Clinical Oncology II**Subject Code 20150****(Elective: 2 credits)**

Course Director: Natsuo Oya (Radiation Oncology TEL: 373-5520) n-oya@kumamoto-u.ac.jp
Instructors: Ryuji Murakami (Medical Imaging TEL: 373-5463) murakami@kumamoto-u.ac.jp
Hirota Iwase (Breast and Endocrine Surgery TEL: 373-5521) hiwase@kumamoto-u.ac.jp
Hidetaka Katabuchi (Gynecology TEL: 373-5265) buchi@kumamoto-u.ac.jp
Hironori Tashiro (Gynecology TEL: 373-5269) htashiro@kumamoto-u.ac.jp
Junichi Kuratsu (Neurosurgery TEL: 373-5216) jkuratsu@kumamoto-u.ac.jp
Hiroaki Mitsuya (Hematology TEL: 373-5156) nikyo@kumamoto-u.ac.jp
Yutaka Okuno (Hematology TEL: 373-5156) yokuno@gpo.kumamoto-u.ac.jp
Naofumi Matsuno (Hematology TEL: 373-5156) mrmn2678@yahoo.co.jp
Yuji Yonemura (Hematology TEL: 373-5156) yuyone@gpo.kumamoto-u.ac.jp

【Objectives】

In Lecture Series "Riron": C6 The Forefront of Clinical Oncology II, you learn basic concepts and novel techniques in the most advanced clinical oncology, including (1) radiation oncology, (2) breast and endocrine oncology, (3) gynecological oncology, (4) neurooncology, (5) hematological oncology.

【Content Description】

(1) The forefront of radiation oncology, especially the development in 3-D conformal external beam radiotherapy techniques is lectured. (2) The forefront of breast and endocrine oncology is lectured, especially regarding surgery, chemotherapy, and molecular target therapy for breast cancer and thyroid cancer. (3) The forefront of gynecological oncology, especially the recent development and therapeutic modalities, is explained, including brachytherapy, external beam radiotherapy and chemoradiotherapy for uterine cervical cancer. (4) The forefront of neurooncology is explained especially regarding the molecular biology in malignant brain tumors. (5) The forefront of hematological oncology is lectured especially regarding the mechanisms in tumor development and suppression.

【Keywords】 radiation oncology, 3-D conformal external beam radiotherapy, breast cancer, thyroid cancer, hormonal therapy, molecular target therapy, uterine cervical cancer, RALS, chemoradiotherapy, molecular biology in brain tumor, multidisciplinary therapy for brain tumor, hematological oncology

【Class Style】 PowerPoint will be usually used in the lectures. Video lectures or e-learning programs may be considered for those who are regularly absent for unavoidable reasons.

【Textbooks】 Textbooks are not specified. Handouts may be distributed by instructors.

【Recommended Readings】 Not specified.

【Office Hour】 If you have any questions on topics or schedule of the classes, please contact the instructors listed above by e-mail.

【Evaluation for Grades and Credits】 Grading will be based on active class participation, paper summaries, or the final report. Grading will be based on the student's understanding of the course subject matter. The students' understanding will be evaluated on the basis of papers and quizzes related to the topics dealt with in class to be scored from 0 to 100. Final grades will be based on the average score of the papers and quizzes as well as participation in class discussions

【Learning Before classes】 It is recommended for you to read a syllabus and indicated text books in advance.

【Learning After classes】 It is recommended for you to review the handout materials distributed in the lectures and your notebooks well. If you want to ask any questions to the lecturers, "Office Hour" is available for you. It is also recommended to review the lectures by using e-learning contents if available.

【Lecture Schedule】

The sessions marked with “e” are under preparation of e-learning contents. In some cases, the session that is not marked with “e” will be done by utilizing e-learning system, as soon as the e-learning contents are ready for use. Therefore, you must check the updated syllabus cited on the home page of the Graduate School of Medical Sciences, Kumamoto University to check the current status of the session before you take a session. If you cannot obtain enough information from the home page, please make contact with the instructors of the sessions. There are two types of e-learning, those marked with “eL” and “eO”. The session marked with “eL” will be done as both a traditional face to face lecture style and e-learning (for the students who cannot attend the session). On the other hand, the session marked with “eO” will be done only as e-learning and no face to face lecture will be given. To learn how to use e-learning system, please see the section explaining about the e-learning system in this syllabus.

Session	Date & time	Instructors	Topics
1.	eJ-0 Oct 6 (Tue) 5th period	Natsuo Oya	Radiation biology and physics
2.	eJ-0 Oct 13 (Tue) 6th period	Natsuo Oya	Stereotactic radiotherapy and intensity-modulated radiotherapy
3.	eJ-0 Oct 20 (Tue) 5th period	Ryuji Murakami	Image-guided radiotherapy and adaptive radiotherapy
4.	eJ-0 Oct 27 (Tue) 5th period	Hirotsuka Iwase	Biological features of breast cancer
5.	eJ-0 Nov 10 (Tue) 5th period	Hirotsuka Iwase	Paradigm shift in breast cancer treatment
6.	eJ-0 Nov 17 (Tue) 5th period	Hirotsuka Iwase	Molecular target therapy for breast cancer
7.	eJ-0 Nov 24 (Tue) 5th period	Hidetaka Katabuchi	Epidemiology of gynecological malignancies
8.	eJ-0 Dec 1 (Tue) 5th period	Hironori Tashiro	Treatment of gynecological malignancies
9.	eJ-0 Dec 8 (Tue) 5th period	Hironori Tashiro	Radiation therapy for uterine cervical cancer
10.	eJ-0 Dec 15 (Tue) 5th period	Junichi Kuratsu	Character of brain tumor
11.	eJ-0 Dec 22 (Tue) 5th period	Junichi Kuratsu	Brain tumor diagnosis
12.	eJ-0 Jan 5 (Tue) 5th period	Junichi Kuratsu	Brain tumor therapy
13.	Jan 12 (Tue) 5th period	Naofumi Matsuno	Hematological oncology I - leukocytes
14.	Jan 19 (Tue) 5th period	Yutaka Okuno	Hematological oncology II - lymphocytes
15.	eJ-0 Jan 26 (Tue) 5th period	Yuji Yonemura	Hematological oncology III - erythrocytes

Lecture Series "Riron": C7 Restorative Medicine**Subject Code 20160****(Elective: 2 credits)**

Course Director: Hiroshi Mizuta (Orthopaedic Surgery TEL: 373-5226)

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Instructors:

Hironobu Ihn	(Dermatology and Plastic Surgery TEL: 373-5233)	ihn-der@kumamoto-u.ac.jp
Yoshihiro Kinoshita	(Aggressology and Critical Care Medicine TEL: 373-5443)	kinop@kumamoto-u.ac.jp
Hiroaki Kawano	(Department of Aggressology and Critical Care Medicine TEL: 373-7031)	koumei@fc.kuh.kumamoto-u.ac.jp
Hisashi Sakaguchi	(Cardiovascular Surgery TEL: 373-5205)	kouki134@gmail.com
Yoshio Haga	(International Medical Cooperation TEL: 353-6501)	yoshio@kumamed.jp
Takeshi Takahashi	(International Cooperative Medicine TEL: 353-6501)	t99@kumamed.jp
Junji Ide	(Orthopaedic Surgery TEL : 373-5226)	ide@kumamoto-u.ac.jp
Eiichi Nakamura	(Orthopaedic Surgery TEL : 373-5226)	h@kumamoto-u.ac.jp

【Objectives】

The objectives of this course are for you to understand the following: (1) basic knowledge regarding emergency medical care; (2) factors required to improve the resuscitation rate, the mechanisms by which irreversible loss of whole-brain function occurs, and risk factors for coronary syndrome; (3) the latest knowledge regarding cardiovascular diseases and their surgical treatment; (4) the mechanisms of skin wound healing, differences in body surface blood flow distribution between anatomical locations, and plastic surgery procedures and regenerative medical techniques; (5) disorders of bone and joint function and the reconstruction thereof; (6) basic knowledge required to plan out and implement clinical studies.

【Content Description】

In this class, the current situation and problems of restorative medicine are explained in terms of both life support and vital function.

With continued progress in the field of medicine, critical care medicine has produced a steady flow of successful results and its functional prognosis has also improved dramatically. We will explain the basics of emergency and intensive medical care, and in order to contribute the international guideline for the resuscitation techniques and also further improvement of the rate ROSC (return of spontaneous circulation), we will provide lectures regard to the basics of understanding risks for cerebral ischemia during resuscitation, as well as the processes by which induces brain death and results in death even when the heartbeat is restarted to scientifically examine the methods of prevention. Moreover, we will provide lectures regarding risk factors for acute coronary syndrome, which needs urgent therapy, and the progress of surgical treatments for heart failure, ischemic heart diseases, and valvular heart diseases.

Although disorders of the skin, bones, and joints are rarely directly life-threatening conditions, they greatly affect a patient's vital functions. We will explain the theory of skin wound healing and the latest molecular biological knowledge, and we will also provide lectures regarding the progress made in the area of skin flaps through studies of blood flow in human skin and discuss reconstructive medicine for the blood vessels, lymph vessels, and nerves in terms of the development of microsurgery. In addition, we will discuss reconstructive methods for collapsed joint function, pseudoarthrosis, and bone defects, and we will also describe attempts at cartilage regeneration and bone regeneration by including recent study results.

Moreover, in this course, we will provide instruction regarding methods of establishing a study hypothesis, which is essential in conducting a clinical study, as well as the selection of study designs, the handling of clinical data, and methods of statistical analysis.

【Keywords】 cardiopulmonary arrest, acute coronary syndrome, brain death, surgery for heart failure, ischemic heart disease, valvular heart disease, wound healing, cell growth factors, regenerative medicine, skin flap, angiosomes, microsurgery, ligament, articular cartilage, bone defect, epidemic research

【Class Style】 PowerPoint and/or OHP will be used in the lectures, and active participation in the discussion is encouraged. Extra classes or video lectures are considered for those who are regularly absent for unavoidable reasons.

【Textbooks】 Textbooks are not specified, and handouts will be distributed.

【Recommended Readings】 Will be introduced throughout the course.

【Office Hour】 If you have any questions on topics or schedule of the classes, please contact the instructors listed above.

【Evaluation for Grades and Credits】 Grading will be based on active class participation, paper summaries, and the final report. Grading will be based on the student's understanding of the course subject matter. The students' understanding will be evaluated on the basis of papers dealt with in class to be scored from 0 to 100.

Final grades will be based on the average score of the papers as well as participation in class discussions.

【Learning Before classes】 It is recommended for you to read a syllabus and indicated text books in advance.

【Learning After classes】 It is recommended for you to review the handout materials distributed in the lectures and your notebooks well. If you want to ask any questions to the lecturers, "Office Hour" is available for you. It is also recommended to review the lectures by using e-learning contents if available.

【Lecture Schedule】 Please also refer to the timetable shown in the Section 5.

The sessions marked with "e" are under preparation of e-learning contents. In some cases, the session that is not marked with "e" will be done by utilizing e-learning system, as soon as the e-learning contents are ready for use. Therefore, you must check the updated syllabus cited on the home page of the Graduate School of Medical Sciences, Kumamoto University to check the current status of the session before you take a session. If you cannot obtain enough information from the home page, please make contact with the instructors of the sessions.

There are six types of e-learning, those marked with "eE0", "eEL", "eJ0", "eJL", "eEJ-0" and "eEJ-L". To know the meanings of these six markings and to learn how to use e-learning system, please see the section explaining about the e-learning system in this syllabus.

Session	Date & time	Instructors	Topics
1 .eE-0	Oct. 7 (Wed) 4th period	Hironobu Ihn	Wound healing
2 .eJ-0	Oct. 14(Wed) 4th period	Hironobu Ihn	Flap
3 .eJ-0	Oct. 21 (Wed) 4th period	Hironobu Ihn	Microsurgery
4 .eJ-0	Oct. 28 (Wed) 4th period	Junji Ide	Joint reconstruction
5 .eJ-0	Nov. 4 (Wed) 4th period	Hiroshi Mizuta	Repair and regeneration of articular cartilage
6 .eJ-0	Nov. 11 (Wed) 4th period	Eiichi Nakamura	Reconstruction of bone
7 .eJ-0	Nov. 18 (Wed) 4th period	Takeshi Takahashi	Clinical Research in Emergency and Critical Care Medicine
8 .eJ-0	Nov. 25 (Wed) 4th period	Yoshihiro Kinoshita	Important factors in the success for resuscitation
9 .eJ-0	Dec. 2 (Wed) 4th period	Yoshihiro Kinoshita	Diagnosis of brain death and the denervated organs
1 0 .eJ-0	Dec. 9 (Wed) 4th period	Hiroaki Kawano	Risk factors for acute coronary syndrome and gender difference
1 1 .eJ-0	Dec. 16 (Wed) 4th period	Hisashi Sakaguchi	Surgical treatment of heart failure
1 2 .eJ-0	Jan. 6 (Wed) 4th period	Hisashi Sakaguchi	Surgical treatment of ischemic heart disease
1 3 .eE-0	Jan. 13 (Wed) 4th period	Hisashi Sakaguchi	Surgery of valvular heart disease
1 4 .eJ-0	Jan. 20 (Wed) 4th period	Yoshio Haga	Establishment of hypothesis and study design
eE-0			
1 5 .eJ-0	Jan. 27(Wed) 4th period	Yoshio Haga	How to analyze clinical data
eE-0			

Lecture Series "Riron": C8 Cancer therapeutics**Subject Code 20170****(Elective: 2 credits)**

Course Director: Hideo Baba (Gastroenterological Surgery TEL: 373-5213)	hdobaba@kumamoto-u.ac.jp
Instructors: Yutaka Sasaki (Gastroenterology and Hepatology TEL: 373-5146)	sasakiy@kumamoto-u.ac.jp
Hirotsugu Kohrogi (Respiratory Medicine TEL: 373-5012)	kohrogi@kumamoto-u.ac.jp
Makoto Suzuki (Thoracic Surgery TEL: 373-5533)	smakoto@kumamoto-u.ac.jp
Hideki Nakayama (Oral and Maxillofacial Surgery TEL: 373-5288)	hinakaya@fc.kuh.kumamoto-u.ac.jp
Eiji Yumoto (Otolaryngology-Head and Neck Surgery TEL: 373-5255)	yu6167@gpo.kumamoto-u.ac.jp
Hiroshi Mizuta (Orthopaedic Surgery TEL: 373-5223)	mizuta@kumamoto-u.ac.jp
Hirota Iwase (Breast and Endocrine Surgery TEL: 373-5521)	hiwase@kumamoto-u.ac.jp
Hidetaka Katabuchi (Gynecology TEL: 373-5269)	buchi@kumamoto-u.ac.jp
Masatoshi Eto (Urology TEL: 373-5237)	etom@kumamoto-u.ac.jp
Hironobu Ihn (Dermatology TEL: 373-5230)	ihn-der@kumamoto-u.ac.jp
Yukihiro Inomata (Pediatric Surgery and Transplantation TEL: 373-5616)	yino@fc.kumamoto-u.ac.jp
Junichi Kuratsu (Neurosurgery TEL: 373-5219)	jkuratsu@kumamoto-u.ac.jp
Hiroaki Mitsuya (Hematology TEL: 373-5153)	nikyo@kumamoto-u.ac.jp
Natsuo Oya (Radiation Oncology TEL: 373-5520)	n-oya@kumamoto-u.ac.jp

【Objectives】

In the current lecture, we lead to comprehend the fundamental knowledge of therapy for cancer such as surgery, radiotherapy, chemotherapy and immunotherapy and the historical change, standard treatment and future directions of cancer therapy.

Furthermore, the aims of the current lecture are to understand thoroughly the leading-edge medical treatment for various types of cancer as follows: (1) gastroenterological tumor (2) respiratory tract tumor (3) brain and nervous system neoplasm (4) head and neck tumor (5) otolaryngological neoplasia (6) breast endocrine tumor (7) genitourinary system tumor (8) gynecological tumor (9) orthopaedic and neuro-musculoskeletal tumor (10) skin tumor (11) hematopoietic tumor (12) pediatric tumors.

【Content Description】

The aims of current lecture are to understand the up-to date treatment for the various types of cancer in addition to standard cancer therapy such as surgery, radiotherapy, chemotherapy and immunotherapy. In late years a guideline is devised every each organ, and maintain the balance of therapy is planned about the cancer.

A number of clinical trials are promoted to attempt the standardization of the cancer therapy. You can learn how the standard treatments are confirmed from the results of various clinical trials.

【Keywords】 Surgical cure, chemotherapies, radiotherapy, immune therapy, an anticancer drug, molecule target treatment, head and neck cancer, lung cancer, mesothelium class, tumor of mediastinum, breast cancer, gastrointestinal cancer, Hepato-biliary-pancreat cancer, renal cancer, urothelial cancer, prostate cancer, uterine cancer, an ovarian cancer, bone soft part tumor, skin cancer, nucleus nervous system neoplasm, endocrinoma, child solid cancer, acute leukemia, chronicity myeloproliferative disorder, marrow aberrant type symptom-complex, lymphoproliferative disease, multiple myeloma, an HIV connection tumor, a metastatic tumor, on koro Gee emergency, an NCCN guideline

【Class Style】 With the lecture pattern that attached great importance to questions and answers [the form of the class], we utilize power point, OHP. In addition, we deal with a student and the member of society student of the distant place by supplementary lecture, intensive lecture, video lecture or e-learning.

【Textbooks】 We distribute in particular the print which we summarized the point of the lecture in without appointing it.

【Recommended Readings】

- A new clinical oncology
- *Cancer principles & practice of oncology*, V.T. DeVita, S.Hellman, S.A.Rosenberg, Lippincott Williams & Wilkins
- *Clinical Oncology*, M.D.Abeloff, J.O. Armitage, J.E.Niederhuber, M.B.Kastan, W.G.McKenna, Elsevier
- *Cancer Medicine*, Holland-Frei, AACR
- *The biology of Cancer*, R.A.Weinberg, Garland Science
- NCCN guideline

【Office Hour】 We cope whether the question about the doubt of lecture contents and the specialism can refer by a telephone or an E-mail to the teacher mentioned above if we have you visit the laboratory.

【Evaluation for Grades and Credits】 We evaluate the attendance situation to a lecture, lecturing questions and answers and the lecture understanding degree about the matter which we raised to the [the aim of the class] by reports about a theme shown at being finished

Grading will be based on the student's understanding of the course subject matter. The students' understanding will be evaluated on the basis of papers and quizzes related to the topics dealt with in class to be scored from 0 to 100. Final grades will be based on the average score of the papers and quizzes as well as participation in class discussions

【Learning Before classes】 It is recommended for you to read a syllabus and indicated text books in advance.

【Learning After classes】 It is recommended for you to review the handout materials distributed in the lectures and your notebooks well. If you want to ask any questions to the lecturers, "Office Hour" is available for you. It is also recommended to review the lectures by using e-learning contents if available.

【Lecture Schedule】 Please refer to the class schedule described in an attached sheet.

Session	Date & time	Instructors	Topics
1 . eJ-0	Feb. 1(Mon)5 th period	Yutaka Sasaki	Medical treatment of the gastrointestinal cancer
2 . eJ-0	Feb. 4(Thu)5 th period	Hideo Baba	Surgical cure of the digestive cancer
3 . eJ-0	Feb. 8(Mon)5 th period	Hirotsugu Kohrogi	Medical treatment of the lung cancer
4 . eJ-0	Feb.12(Fri) 6 th period	Makoto Suzuki	Surgical treatment of the lung cancer
5 .	Feb.15(Mon)5 th period	Hideki Nakayama	The treatment of the Oral cancer
6 . eJ-0	Feb.18(Thu)5 th period	Eiji Yumoto	The treatment of the head and neck cancer
7 . eJ-0	Feb.22(Mon)5 th period	Hiroshi Mizuta	The treatment of the bone soft part tumor
8 . eJ-0	Feb.25 (Thu)5 th period	Hirotsugu Iwase	Treatment of breast cancer
9 . eJ-0	Feb.29(Mon)5 th period	Hidetaka Katabuchi	The treatment of the gynecologic malignant tumor
1 0 . eJ-0	Mar. 3(Thu)5 th period	Masatoshi Eto	The treatment of the genitourinary system tumor
1 1 . eJ-0	Mar. 7(Mon)5 th period	Hironobu Ihn	Skin cancer therapy
1 2 .	Mar.10(Thu)5 th period	Yukihiro Inomata	Pediatric Solid Cancer Therapy
1 3 . eJ-0	Mar.14(Mon)5 th period	Junichi Kuratsu	The treatment of the brain tumor
1 4 .	Mar.17(Thu)5 th period	Yutaka Okuno	The treatment of the hematopoietic tumor
1 5 . eJ-0	Mar.24(Thu)5 th period	Natsuo Oya	Radiotherapy of the cancer

Lecture Series “Riron”: C9 Palliative Care

Subject Code 20180
(Elective: 2 credits)

Course Director: Tatsuo Yamamoto (Anesthesiology, TEL: 373-5275)

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【Objectives】

Most clinical professionals have been affected by caring for patients with palliative care needs. Such patients may challenge us at both a professional and at a personal level in areas where we feel our confidence or competence are challenged. This course serves as introductory for Palliative care medicine.

【Content Description】

In order to understand the principle of palliative care medicine, we discussed the followings: (1) oncology, (2) symptom management, (3) emotional issues in palliative medicine, (4) culture and spiritual aspects of palliative medicine, (5) contribution of palliative medicine of allied health professions.

【Keywords】 cancer pain, the World Health Organization’s algorithm, chemotherapy, radiotherapy, family, grief therapies,

【Class Style】 PowerPoint and/or OHP will be used in the lectures, and active participation in the discussion is encouraged. Extra classes or video lectures are considered for those who are regularly absent for unavoidable reasons.

【Textbooks】 Textbooks are not specified, and handouts will be distributed.

【Recommended Readings】

- Oxford Textbook of Palliative medicine. 3rd. Edited by Doyle D, Hanks G, et al., Oxford University Press
- Oxford Handbook of Palliative care. Edited by Watson M, Lucas C, Hoy A, Back I, Oxford University Press

【Office Hour】 If you have any questions on topics or schedule of the classes, please contact course director.

【Evaluation for Grades and Credits】 Grading will be based on active class participation, paper summaries, and the final report. Grading will be based on the student’s understanding of the course subject matter. The students’ understanding will be evaluated on the basis of papers and quizzes related to the topics dealt with in class to be scored from 0 to 100. Final grades will be based on the average score of the papers and quizzes as well as participation in class discussions

【Learning Before classes】 It is recommended for you to read a syllabus and indicated text books in advance.

【Learning After classes】 It is recommended for you to review the handout materials distributed in the lectures and your notebooks well. If you want to ask any questions to the lecturers, "Office Hour" is available for you. It is also recommended to review the lectures by using e-learning contents if available.

【Lecture Schedule】

In this class, student chooses 14 lectures from “Cancer e-learning” of Japan Society of Clinical Oncology. Detail of this class is uploaded in e-learning system Moodle of Kumamoto University.

Lecture Series "Riron": C10 The Theory of Clinical Research**Subject Code 20190 (Elective: 2 credits)****Course Director:**

Hirotaka Iwase (Breast and Endocrine Surgery TEL: 373-5521)

hiwase@kumamoto-u.ac.jp

Instructors:

Yasuhiro Kadooka (Medical Ethics TEL: 373-5534)

y-kad@kumamoto-u.ac.jp

Koichiro Usuku (Medical Information Technology TEL: 373-5739)

space-usk@fc.kuh.kumamoto-u.ac.jp

Hideyuki Saito (Clinical Pharmaceutical Sciences TEL: 373-5820)

saitohide@fc.kuh.kumamoto-u.ac.jp

Akinobu Hamada (Medical Oncology and Translational Research TEL:03-3542-2511)

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Kenji Tamura (Medical Oncology and Translational Research TEL: 03-3542-2511)

ketamura@ncc.go.jp

Makoto Suzuki (Thoracic Surgery TEL: 373-5533)

smakoto@kumamoto-u.ac.jp

Hideo Baba (Gastro-enterological Surgery TEL: 373-5212)

hdobaba@kumamoto-u.ac.jp

Toru Beppu (Multidisciplinary Treatment for Gastroenterol. Cancer TEL: 373-5212)

tbeppu@kumamoto-u.ac.jp

【Objectives】

In Lecture Series, C10 The Theory of Clinical Research, you learn the theory of the clinical research that assumed bioethics a background systematically and learn treatment to be based on a characteristic of the biology, as evidence based medicine, especially in gastric cancer, colorectal cancer, liver cancer, lung cancer and breast cancer. Furthermore, you learn the basics for new treatments based on clinical translational researches, the development of new drugs based on the data of clinical trials, pharmacokinetics and those ethics.

【Content Description】

These lectures consist as follows;

- 1) Bioethics; the clinical research that assumed bioethics a background for the history of the study theory, a problem of the ethical issues specialized in the methodology of the clinical study, a study participant needing special consideration, the ethic guideline attentive reading of the clinical study, consideration about the social responsibility of the researcher.
- 2) You learn basically, epidemiological background of clinical trials, design of clinical trials, personalized chemotherapy based on pharmacogenomics information, and personalized therapy based on tumor biology.
- 3) You learn about the biochemical characters and the treatments based on evidence of the clinical trials (EBM; evidence based medicine) in various kinds of cancers, such as gastric cancer, colorectal cancer, lung cancer, liver cancer, and breast cancer. In addition, the latest topics of the translational study and prospects of the molecular biology will be discussed.

【Keywords】

clinical research, life ethics, ethic guideline, lung cancer, gastric cancer, colorectal cancer, hepatic cancer, breast cancer, EBM, chemotherapy, molecular target therapy, pharmacokinetics, translational study, personalized treatment.

【Class Style】 PowerPoint will be usually used in the lectures. Video lectures or e-learning programs may be considered for those who are regularly absent for unavoidable reasons.

【Textbooks】 Textbook are not specified, and handouts will be distributed in some classes

【Recommended Readings】 American Society of Clinical Oncology Clinical Practice Guideline, National Comprehensive Cancer Network Clinical (NCCN) Guidelines for the Treatment of Cancer by Site, which are available on the internet. British Medical Association Ethics Department. Medical Ethics Today The BMA's handbook of ethics and law. BMJ Books, 2004, pp. 489-534 (Chapter 14: Research and Innovative treatment).

【Office Hour】 If you have any questions on topics or schedule of the classes, please contact the instructors listed above by e-mail.

【Evaluation for Grades and Credits】 Grading will be based on active class participation, paper summaries, or the final report.

【Before classes】 Read wide range of literature surely.

【After classes】 Prepare for the submission of the report and the summary of the experimental result.

【Lecture Schedule】 Please also refer to the timetable shown in the Section 10
The sessions marked with “e” are under preparation of e-learning contents. In some cases, the session that is not marked with “e” will be done by utilizing e-learning system, as soon as the e-learning contents are ready for use. Therefore, you must check the updated syllabus cited on the home page of the Graduate School of Medical Sciences, Kumamoto University to check the current status of the session before you take a session. If you cannot obtain enough information from the home page, please make contact with the instructors of the sessions. There are two types of e-learning, those marked with “eL” and “eO”. The session marked with “eL” will be done as both a traditional face to face lecture style and e-learning (for the students who cannot attend the session). On the other hand, the session marked with “eO” will be done only as e-learning and no face to face lecture will be given. To learn how to use e-learning system, please see the section explaining about the e-learning system in this syllabus.

Session	Date & time	Instructors	Topics
eJ-0	1. Oct 5 (Mon) 5th period	Yasuhiro Kadooka	History of bioethics for clinical research
eJ-0	2. Oct 13 (Tue) 5th period	Yasuhiro Kadooka	Details of bioethical guideline for clinical trials
eJ-0	3. Oct 19 (Mon) 5th period	Yasuhiro Kadooka	Topics of bioethics for clinical research
eJ-0	4. Oct 26 (Mon) 5th period	Koichiro Usuku	Epidemiological background of clinical trials
eE-0	5. Nov 2 (Mon) 5th period	Hideyuki Saito	Personalized chemotherapy based on pharmacogenomics information
eEJ-0	6. Nov 9 (Mon) 5th period	Akinobu Hamada	Pharmacokinetics/Pharmacodynamics of anti-tumor agents (1)
eEJ-0	7. Nov 16 (Mon) 5th period	Kenji Tamura	Pharmacokinetics/Pharmacodynamics of anti-tumor agents (2)
eEJ-0	8. Nov 24 (Tue) 5th period	Hiroataka Iwase	Design and evaluation of clinical trials
eE-0	9. Nov 30 (Mon) 5th period	Makoto Suzuki	Clinical trials on lung cancer (1)
eE-0	10. Dec 7 (Mon) 5th period	Makoto Suzuki	Clinical trials on lung cancer (2)
eE-0	11. Dec 14 (Mon) 5th period	Hideo Baba	Clinical trials on gastric cancer
eE-0	12. Dec 21 (Mon) 5th period	Hideo Baba	Clinical trials on colorectal cancer
eE-0	13. Jan 4 (Mon) 5th period	Toru Beppu	Clinical trials on hepatic cell carcinoma
eEJ-0	14. Jan 18 (Mon) 5th period	Hiroataka Iwase	Clinical Trials on breast cancer (1)
eEJ-0	15. Jan 25 (Mon) 5th period	Hiroataka Iwase	Clinical Trials on breast cancer (2)

Academic Year 2015, D1 Medical and Life science Seminar

- Place: Lecture room 2,
Medical Education & Library Building 3F.
- Time & Date: From 17:30 (Usually on Wednesday)

No	Schedule	Talker	Title	Affiliation	Inviter
1.	May	Yoshihiro TAKIHARA	Geminin, a molecular switch turning on and off quiescence or blood cell production in hematopoietic stem cells	Professor, Department of Stem Cell Biology, Research Institute for Radiation Biology and Medicine, Hiroshima University	AIDS Research III
2.	June 3 rd (WED)	Takashi MIURA	Modelling pattern formation during development	Professor, Department of Anatomy and Cell Biology, Faculty of Medical Sciences, Kyushu University	Cardiovascular Medicine
3.	July 3 rd (FRI) 18:30~	Minoru MATSUDA	Aphasia reconsidered: symptomatology and neuroanatomical correlates	Associate Professor, Department of Behavioral Neurology and Cognitive Neuroscience, Tohoku University School of Medicine	Neuropsychiatry
4.	July 8 th (WED)	Hiroyuki NOJI	Single-molecule biophysics on ATP synthase	Professor, The University of Tokyo	Molecular Cell Biology
5.	August 12 th (WED)	Keiya OZAWA	Current progress of gene therapy	Professor/Director of Research Hospital, The Institute of Medical Science, The University of Tokyo	Immunogenetics
6.	September	Takeshi YAGI	Complex neural networks from neuronal individuality	Professor, Graduate School for Frontier Biosciences, Osaka University	Morphological Neural Science
7.	October	Naoko OTANI	Gut microbiota, chronic inflammation and cancer	Professor, Tokyo University of Science	Microbiology
8.	November	Noriyuki TSUMAKI	—Preparing —	Professor, Center for iPS Cell Research and Application Kyoto University	Cell Modulation
9.	January 13 th (WED)	Hidenobu SOEJIMA	Genomic imprinting —Beckwith-Wiedemann syndrome and related disorders—	Professor, Department of Biomolecular Sciences, Division of Molecular Genetics and Epigenetics, Saga Medical School, Faculty of Medicine, Saga University	Obstetrics & Gynecology
10.	—Preparing —		—Preparing —		AIDS Research I

Note: The date, time or place of these lectures may change due to the inviter's and lecturer's schedules.

Please check the details with the seminar guide leaflet distributed to each Department beforehand.

Also please check our website for the latest information. We might add the seminar other than the above.

<http://www.medphas.kumamoto-u.ac.jp/medgrad/keijiban/seminar.html>

Academic Year 2015, D2 Learning from Experienced Doctors Seminar

- Place: Lecture room 2,
Medical Education & Library Building 3F.
- Time & Date: From 17:30 (Usually on Wednesday)

No	Schedule	Talker	Title	Affiliation	Inviter
1.	April 15 th (WED)	Haruhisa INOUE	Translational neuroscience using iPSC technology	Professor, Center for iPS Cell Research and Application Kyoto University	Cell Modulation
2.	May 13 th (WED)	Nao SUZUKI	Recent topics on fertility preservation of young cancer patients	Professor and Chairman, Department of Obstetrics and Gynecology, School of Medicine, St. Marianna University	Obstetrics & Gynecology
3.	June 26 th (FRI)	Atsushi OHTSU	Promotion of translational researches for cancer therapy in Japan	Director of Exploratory Oncology Research & Clinical Trial Center, National Cancer Center	Immunogenetics
4.	July 15 th (WED)	Hiroshi YOTSUYANAGI	Viral Hepatitis in the global era	Department of Infectious Diseases, Internal Medicine Graduate School of Medicine, University of Tokyo	AIDS Research III
5.	September	Yasuhiro OTOMO	Disaster Medical System in Japan -Lessons Learned from two Great Earthquakes-	Professor and Chairman, Department of Acute Critical Care and Disaster Medicine, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University	General Medicine
6.	October 24 th (SAT) 13:00~	Makoto SUEMATSU	AMED: mission for future medical R/D	Professor, Department of Biochemistry & Integrative Medical Biology, School of Medicine, Keio University	Molecular Genetics
7.	November	Yoshiki SAWA	Translational study of myocardial regeneration	Professor, Department of Cardiovascular Surgery, Osaka University Graduate School of Medicine	Medical Biochemistry
8.	December 16 th (WED)	Koichi TANAKA	Living donor liver transplantation	Director, Kobe International Frontier Medical Center	Pediatric Surgery & Transplantation
9.	January	Masaru MIMURA	Driving Evaluation of Cognitively Impaired Individuals	Professor, Department of Neuropsychiatry, Keio University School of Medicine	Neuropsychiatry
10.	-Preparing -	Katsuto TAMAI	-Preparing -	Professor, Department of Stem Cell Therapy Science, Graduate School of Medicine, Osaka University	Cell Modulation

Note: The date, time or place of these lectures may change due to the inviter's and lecturer's schedules.

Please check the details with the seminar guide leaflet distributed to each Department beforehand.

Also please check our website for the latest information. We might add the seminar other than the above.

(<http://www.medphas.kumamoto-u.ac.jp/medgrad/keijiban/seminar.html>)

*** Each seminar will be held in Japanese. ***

A report format of “D1: Medical and Life Science Seminar”

Write 2 essays based on 2 talks chosen from the seminar “D1: Medical and Life Science Seminar”. Length of the essays should be 250-500 words. “D1 :“Medical and Life Science Seminar” requires students to attend more than 15 lectures for credit before completion of their Thesis research. Send each essay to the supervisor (inviter of the talker) of the talk within one month by E-mail (not by hard copy or any other digital media). The file of the essay should be included in the E-mail both in an attached file and in the text. A carbon copy E-mail should be also sent to Medical Faculty Educational Affairs Planning Section (iyg-igaku@jimu.kumamoto-u.ac.jp). Attendance will be taken in every talk by signing your name at the entrance of the lecture room.

Graduate schools of medicine, Medical Course , (Doctor) D1“Medical and Life Science Seminar” Report

Student : Grade	Registered number	Division	Name
Title of talk:			
Talker:			
Date:			
Place:			
A body of essay: Fill this A4 sheet with 250-500 words			

A report format of “D2: Learning from Experienced Doctors Seminar”

Write 2 essays based on 2 talks chosen from the seminar “D2: Learning from Experienced Doctors Seminar”. Length of the essays should be 250-500 words. “D2: Learning from Experienced Doctors Seminar” requires students to attend more than 15 lectures for credit before completion of their Thesis research. Send each essay to the supervisor (inviter of the talker) of the talk within one month by E-mail (not by hard copy or any other digital media). The file of the essay should be included in the E-mail both in an attached file and in the text. A carbon copy E-mail should be also sent to Medical Faculty Educational Affairs Planning Section (iyg-igaku@jimu.kumamoto-u.ac.jp). Attendance will be taken in every talk by signing your name at the entrance of the lecture room

Graduate schools of medicine, Medical Course, (Doctor) D2 “Learning from Experienced Doctors Seminar” Report

Student : Grade	Registered number	Division	Name
Title of talk:			
Talker:			
Date:			
Place:			
A body of essay: Fill this A4 sheet with 250-500 words			

**Approval of Credits of Elective Subject in Doctoral Course,
D3 Medicine and Life Science Training
(Subject code 22220)**

1. In the wake of realization of doctoral course lessons in the graduate school, presentations at academic meetings, such as academic conferences and lecture meetings, under the sponsorship of academic societies and universities, but not under the sponsorship of private organizations will be approved as credits.

2. "D3 Medicine and Life Science Training" is an elective subject in the doctoral course and up to a maximum of 2 credits can be awarded from presentations at academic conferences. (Refer to the list of lecture course/subject and credit in the syllabus.)

3. The criteria for credit approval are stipulated below. In addition, academic meetings that meet the above criteria such as academic conferences, lecture meetings and symposiums, will be judged by the committee of the postgraduate education.

- 1) In international academic meetings such as conferences, meetings, and symposiums, which are held domestically and abroad, or in national conferences and study meetings, which are held domestically, attendance as a leading presenter of a poster or an oral presentation as the first author of the abstract will be approved for a maximum of 2 credits.
- 2) In local academic meetings, such as conferences, lecture meetings and seminars, leading a poster or oral presentation as the first author of the abstract will be approved for a maximum of 1 credit.

For relation of the term of academic meetings and the number of credits to be approved, refer to the detailed regulations as shown in the next page.

4. How to apply for credits and the process of approving credits (The stipulations of this matter and the necessary forms are published on the website for the Graduate School of Medical Sciences and can be downloaded from the website).

- 1) Graduate students should record and submit the necessary information. Record in the prescribed application form (Refer to Format 1) the names of academic meetings, the term of the meetings and reports. Submit the written form to the Educational Affairs Planning Section (Ext. 5029) with 1) a certificate of participation (a copy is acceptable), 2) a copy of the program in which the presentation is published in and 3) a copy of the abstract that the student has published as a leading presenter. In principle, submit the forms within the same academic year as conference participation. The application form will be examined by the committee of the postgraduate education (generally held on every third Wednesday).
- 2) The committee of the postgraduate education will review all submissions and calculate credit based on the detailed regulations (Attachment 1). The credits will be calculated, and when they reach 2 or more, they will be given to SOSEKI by the Educational Affairs Planning Section. Students need to view SOSEKI to check their acquired credits. If the number of credits doesn't reach 2, it will not be approved (0 credits).

The Detailed Regulations for Approving the Number of Credits in D3 Medicine and Life Science Training

In a faculty meeting on May 28, 2008, it was approved that beginning from the academic year of 2009, students can acquire up to a maximum of 2 credits as D3 Medicine and Life Science Training (which is an elective subject in the doctoral course) by participating in academic meetings as a leading presenter. The detailed regulations of credit approval are stipulated below.

1. Presentations at academic meetings given in 2008 by students who entered in the academic year of 2008 can be approved for credit. However, the application form and the documents that show proof of the students' presentations must be submitted within the 2008 academic year.

2. The relation between the term of academic meetings and the number of credits to be approved is based on the following criteria.

1) The maximum credits will be given for participation in three (3) day academic meetings. "Riron" lecture-style classes, are lecture courses in a subject that consist of fifteen (15) 90-minute sessions (32.5 hours in total). These are worth 2 credits. Academic meetings are generally held from 8 a.m. to 6 p.m. It can be considered that three days participation in academic meetings is equivalent to about thirty (30) hours of study in a regular class.

2) An academic meeting, which is held for half a day should be counted one sixth ($1/6$) of one credit. For example, one third ($1/3$) of the stipulated maximum credits should be given by an academic meeting held for one (1) day, a half ($1/2$) for one and a half ($1\ 1/2$) days and two thirds ($2/3$) for two (2) days.

3) Specific examples of calculating credits:

When a student gives a presentation as the leading presenter at international meetings or domestic national academic meetings held for three days or more, 2 credits should be given. When meetings are held for one day, two thirds ($2/3$) of one credit will be given, when they are held for one and a half days, one (1) credit should be given, and when they are held for two days, four thirds ($4/3$) should be given.

When a student gives a presentation as the leading presenter at local academic meetings held for two days, two thirds ($2/3$) of one credit should be given, when meetings are held for one day, one third ($1/3$) of one credit should be given and when they are held for half a day, one sixth ($1/6$) of one credit should be given.

3. When the number of days a student participate in does not match the stipulations above, credits to be awarded will be decided, after deliberations, by the committee of the postgraduate education.

**Application Form for Credits of
D3 Medicine and Life Science Training: (Presentations at academic meetings)**

Application date: (year/month/day)

Name:	___ Year	Student number:	Affiliation :
Course name (if applicable):		Phone number:	
E-mail address:			
Name of academic meeting:			
Date of meeting (y/m/d): ~		City and venue of meeting:	
Date when the applicant participated in the meeting(y/m/d): ~ (___ days)			
Presenters' names (all):			
Title of the presentation: (circle one) oral poster			
The number of credits to be applied for approval (Refer to the detailed regulations in Attachment 1 about how to calculate): ___ credits			
Report about what you have learned through participating in the academic meeting (Write 200 words or more below.)			

Submit 1) a certificate of participation in the academic meeting (a copy is acceptable), 2) a copy of the program in which the presentation is published in, 3) a copy of the abstract that the student has published as a leading presenter in written form together with this application form to Student Affairs Section (5029). (Screening for approval of credits will be conducted in the committee of the postgraduate education, which is held on every third Wednesday.)

Academic Year 2015, D4 Translational Research Seminar

- Place: Lecture room 2, Medical Education & Library Building 3F.
- Note: The date, time or place of these lectures may change due to the instructor's and lecturer's schedules.
Please check our website for the latest information.

No	Schedule	Talker	Title	Affiliation	Inviter
1.	April 15 th (WED)	Haruhisa INOUE	Translational neuroscience using iPSC technology	Professor, Center for iPS Cell Research and Application Kyoto University	Cell Modulation
2.	May 13 th (WED)	Nao SUZUKI	Recent topics on fertility preservation of young cancer patients	Professor and Chairman, Department of Obstetrics and Gynecology, School of Medicine, St. Marianna University	Obstetrics & Gynecology
3.	June 26 th (FRI)	Atsushi OHTSU	Promotion of translational researches for cancer therapy in Japan	Director of Exploratory Oncology Research & Clinical Trial Center, National Cancer Center	Immunogenetics
4.	August 12th (WED)	Keiya OZAWA	Current progress of gene therapy	Professor/Director of Research Hospital, The Institute of Medical Science, The University of Tokyo	Immunogenetics
5.	October 24 th (SAT) 13:00~	Makoto SUEMATSU	AMED: mission for future medical R/D	Professor, Department of Biochemistry & Integrative Medical Biology, School of Medicine, Keio University	Molecular Genetics
6.	November	Yoshiki SAWA	Translational study of myocardial regeneration	Professor, Department of Cardiovascular Surgery, Osaka University Graduate School of Medicine	Medical Biochemistry
7.	November	Noriyuki TSUMAKI	—Preparing —	Professor, Center for iPS Cell Research and Application Kyoto University	Cell Modulation
8.	—Preparing —	Katsuto TAMAI	—Preparing —	Professor, Department of Stem Cell Therapy Science, Graduate School of Medicine, Osaka University	Cell Modulation

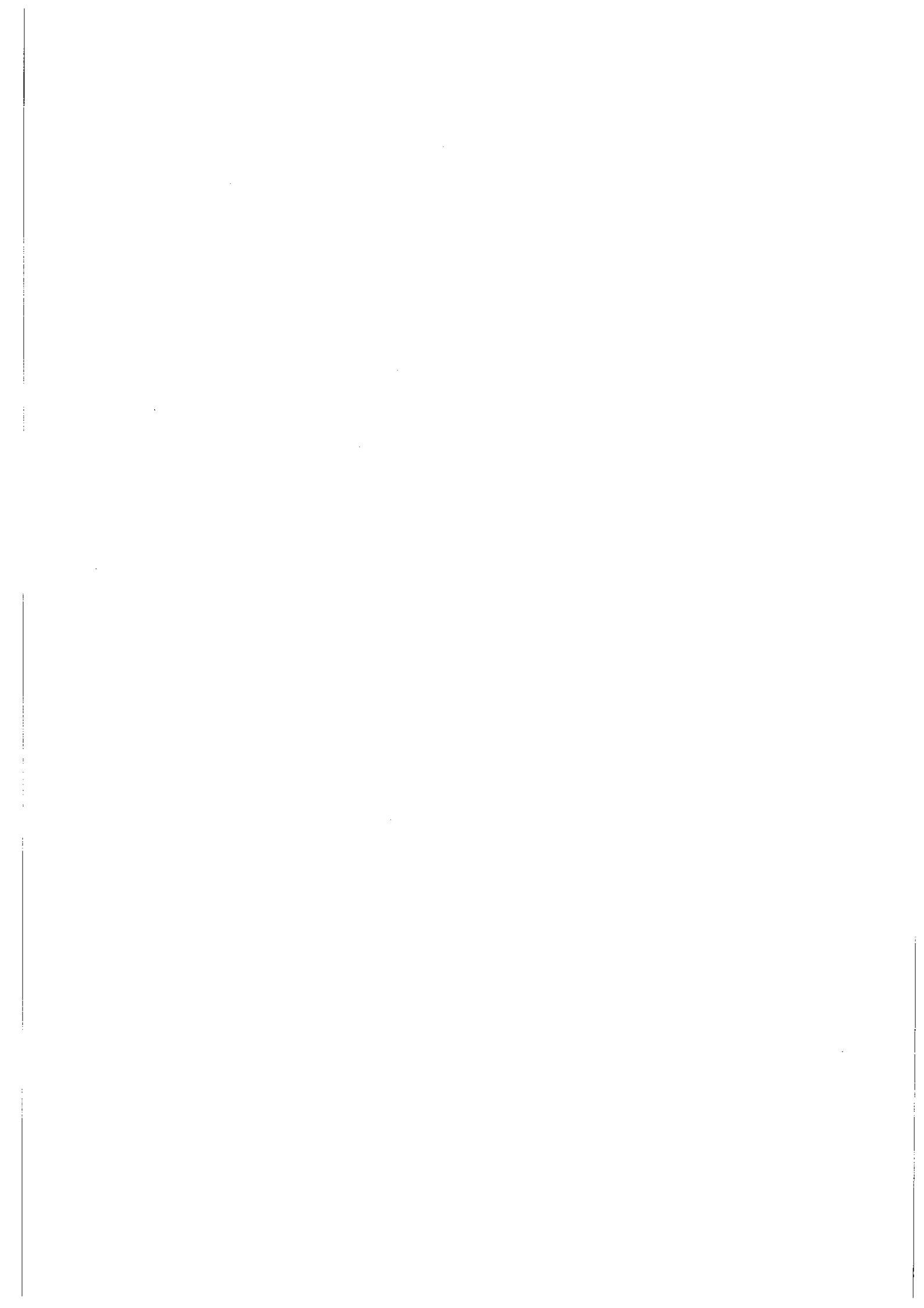
A report format of "D4: Translational Research Seminar"

This course, offered from 2014, is the subject using the selected 5 seminars of "D2 Learning from Experienced Doctors Seminar" and the selected seminars of "HIGO Business Seminar Series."

Write 1 essay based on 1 talk chosen from the seminar "D4: Translational Research Seminar". Length of the essay should be 250-500 words. "D4: Translational Research Seminar" requires students to attend more than 8 lectures for credit before completion of their Thesis research. Send the essay to Medical Faculty Educational Affairs Planning Section within one month by E-mail (not by hard copy or any other digital media). The file of the essay should be included in the E-mail both in an attached file and in the text. (iyg-igaku@jimu.kumamoto-u.ac.jp). Attendance will be taken in every talk by signing your name at the entrance of the lecture room

Graduate schools of medicine, Medical Course, (Doctor) D4" Translational Research Seminar" Report

Student : Grade	Registered number	Division	Name
Title of talk:			
Talker:			
Date:			
Place:			
A body of essay: Fill this A4 sheet with 250-500 words			



9. Course Work subject

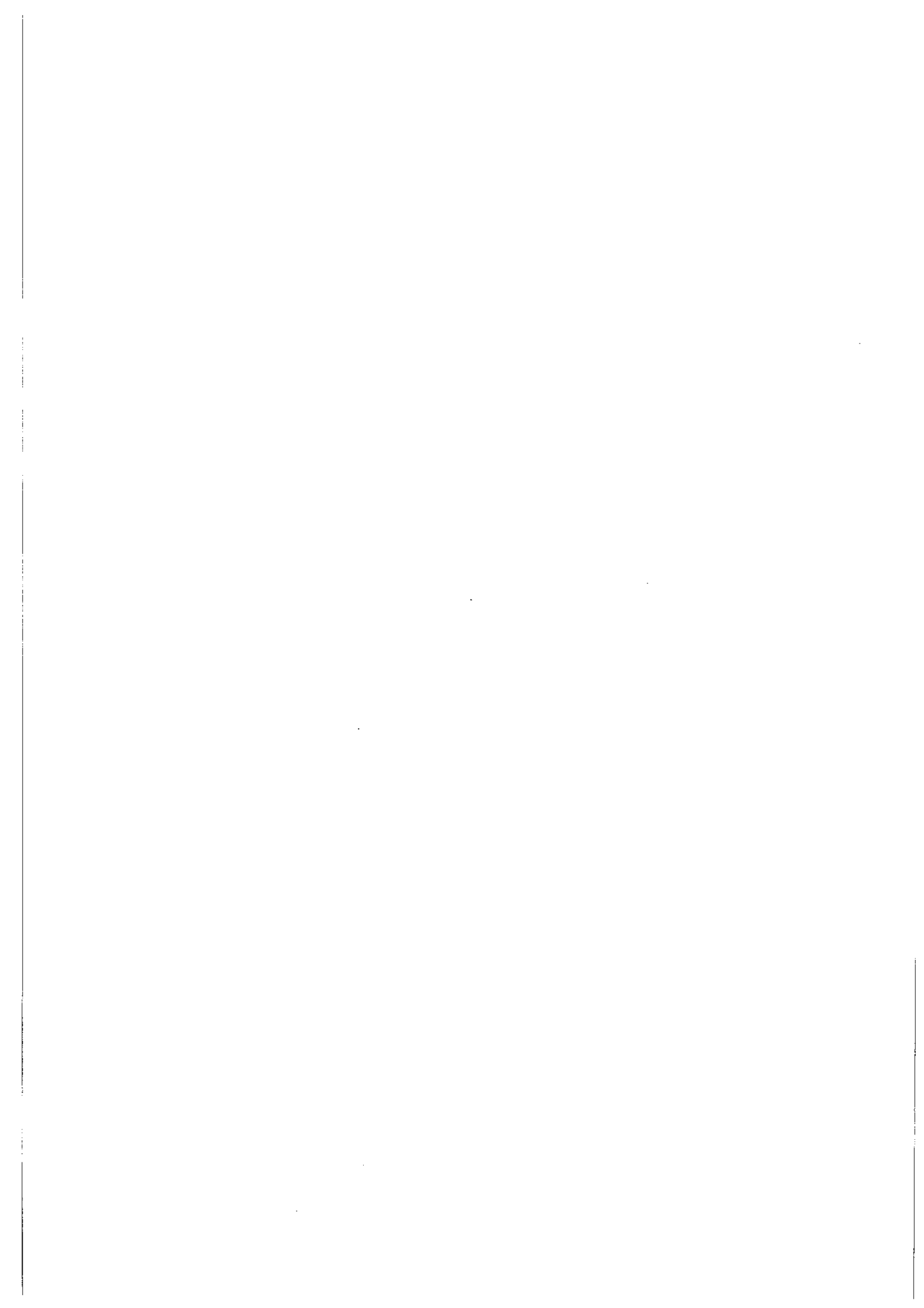
(Medical Experiment Course)

Academic Year 2015 Graduate School's Medical Experiment Course

Location : Lecture Room 2(Medical Education & Library Building 3F)

Date	AM		PM	
April 6 (Mon.)	8:45 ~ 10:15	Introduction to recombinant DNA technique (Molecular Genetics : Kazutoyo Terada)	13:15 ~ 14:45	Principle and application of polymerase chain reaction (Cell Differentiation : Kiyomi Tamura)
	10:30 ~ 12:00	Gene Transfer Technique (Molecular Physiology : Wei fanyan)	15:00 ~ 16:30	Experimental approaches to study transcriptional regulation system in eukaryote (Kidney Development : Satomi Tanaka)
April 7 (Tue.)	8:45 ~ 10:15	Cell imaging techniques (Medical Cell Biology : Noriko Saitoh)	13:15 ~ 14:45	Protein Purification (General Methods) (Molecular Cell Biology : Masatoshi Esaki)
	10:30 ~ 12:00	Basic science and clinical research for molecular imaging (Pathology and Experimental Medicine: Koki Hasegawa)	15:00 ~ 16:30	Protein for labile molecule handling - An example: Purification of a protease (Molecular Pathology : Takahisa Imamura)
April 8 (Wed.)	8:45 ~ 10:15	Methods in cell biology (Molecular Pharmacology : Kazuaki Umeda)	13:15 ~ 14:45	Analytical methods for intracellular signaling (Hematopoiesis : Shinya Suzu)
	10:30 ~ 12:00	Experiment study and safety control (Environmental Safety Center: Yoshihiro Yamaguchi)	15:00 ~ 16:30	Introduction to flowcytometry (Department of Immunology and Hematology, School of Health Sciences : Seiji Inui)
April 9 (Thu.)	Health Examination			
April 10 (Fri.)	8:45 ~ 10:15	Pharmacokinetics (Clinical Pharmaceutical Sciences : Hideyuki Saito)	13:15 ~ 14:45	Production of polyclonal and monoclonal antibodies (Germline Development : Akira Nakamura)
	10:30 ~ 12:00	Basic Methods in Immunology (Immunogenetics : Satoru Senju)	15:00 ~ 16:30	In situ hybridization (Developmental Neurobiology : Kunimasa Ota)
April 13 (Mon.)	8:45 ~ 10:15	Experimental animals and animal Experimentations I (Division of Transgenic Technology : Masaki Ohmura)	13:15 ~ 14:45	Reproductive Engineering Techniques (Reproductive Engineering: Naomi Nakagata)
	10:30 ~ 12:00	Experimental animals and animal Experimentations II (Division of Developmental Genetics : Kimi Araki)	15:00 ~ 16:30	Proteomics (Tumor Genetics and Biology : Norie Araki)
April 14 (Tue.)	8:45 ~ 10:15	Practice and Guidance for Biological Laboratory Safety (Medical Virology: Yosuke Maeda)	13:15 ~ 14:45	Guidance for Living Modified Organism (LMO) (Division of Bioinformatics : Masatake Araki)
	10:30 ~ 12:00	Immunohistochemistry (Cell Pathology : Yoshihiro Komohara)	15:00 ~ 16:30	Methods for Literature Search (Lecture Room: The 3 rd floor of General Medical Research Building) (Medical Information Science : Koichiro Usuku)
April 16 (Thu.)	10:30 ~ 12:00	About researcher ethics. (Bioethics : Yasuhiro Kadooka)	13:15 ~ 14:45	/

※The lectures will be given in Japanese.



10. Departmental Course “Practice(jissen)” I,II

Medical Sciences

Field		Subject	Page	Field		Subject	Page	
Basic Medicine	1	Anatomy	73	Surgery	46	Gastroenterological Surgery	115	
	2	Histology	74		47	Thoracic Surgery	116	
	3	Morphological Neural Science	75		48	Cardiovascular Surgery	117	
	4	Developmental Neurobiology	76		49	Breast and Endocrine Surgery	118	
	5	Sensory and Cognitive Physiology	77		50	Pediatric Surgery and Transplantation	119,120	
	6	Molecular Physiology	78		51	Neurosurgery	121,122	
	7	Molecular Enzymology	79		52	Orthopaedic	123	
	8	Medical Biochemistry	80		53	Obstetrics and Gynecology	124,125	
	9	Molecular Genetics	81		54	Urology	126	
	10	Tumor Genetics and Biology	82		55	Ophthalmology	127	
	11	Pathology and Experimental Medicine	83		56	Otolaryngology-Head and Neck Surgery	128,129	
	12	Cell Pathology	84		57	Oral and Maxillofacial Surgery	130	
	13	Molecular Pathology	85		58	Dermatology and Plastic Surgery	131	
	14	Molecular Pharmacology	86		59	Agressology	132	
	15	Pharmacology and Molecular Therapeutics	87		60	Anesthesiology	133	
	16	Microbiology	88		61	International Medical Cooperation	134	
	17	Immunology	89					
	18	Immunogenetics	90		Institute of Molecular Embryology and Genetics	62	Cellular Interactions	—
	19	Medical Oncology and Translational Research	91			63	Molecular Cell Biology	135
Environmental and Socio Medical Sciences	20	Regulatory Science	—	64		Kidney Development	136	
	21	Public Health	92	65		Brain Morphogenesis	137	
	22	Forensic Medicine	93	66		Cell Modulation	138	
	23	Bioethics	94	67		Cell Maintenance	139	
	24	Clinical Ethics	—	68		Cell Differentiation	140	
25	Clinical Psychology	—	69	Pattern Formation		—		
Internal Medicine and Pediatrics	26	Respiratory Medicine	95	70		Stem Cell Biology	—	
	27	Cardiology	96	71		Medical Cell Biology	141	
	28	Endocrinology and Metabolism	97	Center for AIDS Research		72	AIDS Research I	142
	29	Nephrology	98		73	AIDS Research II	143	
	30	Gastroenterology and Hepatology	99		74	AIDS Research III	144	
	31	Hematology	100		75	AIDS Research IV	145	
	32	Rheumatology	101		76	AIDS Research V	146	
	33	Infectious Diseases	102		77	AIDS Research VI	—	
	34	Neurology	103		78	AIDS Research VII	147	
	35	Pediatrics	104		79	AIDS Research VIII	—	
	36	Diagnostic Medicine	105		80	AIDS Research IX	148	
	37	Diagnostic Radiology	106		81	AIDS Research X	149	
	38	Radiation Oncology	107		82	AIDS Research XI	150	
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**Research Conducting Program:
Anatomy
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20380

(Required: 10 credits)

Supervisors: Takaichi Fukuda
Program schedule: year 1-4, every Monday (1st period)
Site and Facilities: seminar room and laboratories at Department of Anatomy

【Course Description】 Every physiological function *in vivo* requires particular anatomical structures for its execution. Morphological and functional aspects are inseparably related to each other within the body such that morphological approaches still constitute the essential part of the biomedical science. This Department Course focuses on the tissue architecture of the central nervous system, particularly on several critical components of the system such as cytoarchitecture, synapses, neuronal gap junctions, dendrites and spines. Students are instructed for necessary experimental techniques including electron microscopy, confocal laser scanning microscopy, computer-based 3D-reconstruction/analysis of the structure, and unbiased morphometry (stereology), through intensive reading of the representative literatures, lectures, and discussion on the research activities of individual students.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed and reports submitted.

【Evaluation Criteria】 The achievement will be evaluated according to the following issues: 1) the ability of critical reading of the representative papers, 2) knowledge on the principles of major morphological techniques and the ability to deduce the appropriate conclusion from the obtained data, 3) the ability to explain the significance of their own study from the historical perspective.

**Research Conducting Program:
Anatomy
Departmental Course "Jissen" II
(Anatomy Practice)**

Subject Code 21190

(Selective/Required: 8 credits)

Supervisors: Takaichi Fukuda
Program schedule: year 1-4, every Friday (6-7th periods)
Site and Facilities: seminar room and laboratories at Department of Anatomy

【Course Description】 Students are instructed for execution of the experiment through the skilled morphological techniques. They learn to prepare high-quality specimens for histology, to operate EM and CLSM with the highest resolution, and to observe and interpret the structure for an in-depth analysis. Obtained results should be presented in scientific meetings and journals.

【Evaluation for Grades and Credits】 Students are evaluated for their achievements in experimental skills, validity of their interpretation of the obtained data and conclusions, and publications.

【Evaluation Criteria】 The following criteria must be satisfied: 1) acquisition of principal experimental skills for morphology, 2) appropriate analysis of the obtained results, 3) publication in high-quality journal(s).

**Research Conducting Program:
Histology
Practical course I
(PhD Thesis Research)**

Subject Code 20280

(Required: 10 credits)

Supervisor: Tomohiko Wakayama

Program Schedule: year 1-4, every Tuesday (7th period)

Site and Facilities: seminar rooms and laboratories at Department of Histology

【Course Description】

Histology is the study of the tissues of the body for human and experimental animals. Students will learn how these tissues are arranged to constitute organs of their bodies. Spermatogenesis is a complicated process to produce spermatozoa. "Staging" or the cellular association in seminiferous epithelium is required for the evaluation of spermatogenesis. The stages are defined according to morphological criteria. Histochemistry is a valuable method to determine stages in spermatogenesis. Students will learn histochemistry to indicate methods for visualize the expression and cellular localization of a variety of biological molecules in tissue sections. Students will learn several procedures to obtain the information of cellular localization based on enzymatic reactions, lectin reactions, antigen-antibody reactions, or nucleic-acid hybridization. They should also analyze the function of the molecules in spermatogenesis. The results should be published as scientific papers and students will also present their data in some scientific meetings

【Evaluation for Grades and Credits】

Students are evaluated for their course grades and credits based on the course hours completed and reports submitted.

【Evaluation Criteria】

The evaluation will be done based on the following issues.

- 1) The ability to read the representative literatures related in the research theme.
- 2) The knowledge on the principles and skills of histochemical techniques.
- 3) The ability to analyze the obtained data.
- 4) The ability to explain their research theme.

**Research Conducting Program:
Histology
Practical course II
(Experimental Technique Learning)**

Subject Code 21090

(Elective/Required: 8 credits)

Supervisor: Tomohiko Wakayama

Program Schedule: year 1-4, every Thursday (7th periods)

Site and Facilities: seminar rooms and laboratories at Department of Histology

【Course Description】

Students will acquire histochemical techniques to analyze functional molecules in spermatogenesis. They will learn to prepare and observe tissue specimens for histochemistry in light and electron microscopy. They should present obtained results in scientific meeting and journals.

【Evaluation for Grades and Credits】

Students are evaluated based on the acquisition of histochemical skills and reports. The reports can be substituted by publication of scientific papers, presentations in scientific meetings, or progress reports in laboratory meetings.

【Evaluation Criteria】

Evaluation will be done based on the following criteria.

- 1) Acquisition of histochemical techniques to analyze the expression and cellular localization of a variety of functional molecules in spermatogenesis.
- 2) Research progression based on the data obtained by experiments.
- 3) Publication in high-quality journal(s).

**Research Conducting Program:
Morphological Neural Science
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20400

(Required: 10 credits)

Supervisor: Nobuaki Tamamaki
Program Schedule: year 1-4, every Tuesday (6th period)
Site and Facilities: seminar room and laboratories at Department of Morphological Neural Science

【Course Description】 All physical functions are under regulation of nervous system. Neurons are elements that compose the human brain, and that elaborate human brain function. Human spirit and thought resides in the neural circuit. Although efforts to address neural circuit mechanism in the human brain at adult stage is important, but seems less-focused and seems to be too far to the target. In the Department of Morphological Neural Science, we deduce the neural circuit mechanism in the human brain from the process of brain development. Practically speaking, one fertilized egg generates neuroepithelium and finally complex brain circuits. We expect to investigate simpler brain constructs in the developing brain. In this course, we will advise the attendance what the major point we have to address next in this research field and how it should be presented. In these processes we expect the attendance decides a research theme for their thesis.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for brain science and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.
1) Proposal of appropriate research projects on the basis of understanding the background on the neuroanatomy and developmental neurobiology.
2) Understanding how to investigate neuronal cell lineage and function of neural cells.
3) Logical/proper experimental design to identify neural cell types and to reveal neurogenesis.
4) Novel findings obtained by appropriate and proper analytical approaches.
5) Original and innovative findings that can contribute to the research of neuroscience.

**Research Conducting Program:
Morphological Neural Science
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21210

(Elective/Required: 8 credits)

Supervisor: Nobuaki Tamamaki
Program Schedule: year 1-4, every Thursday (6th-7th periods)
Site and Facilities: seminar room and laboratories at Department of Morphological Neural Science

【Course Description】 The aim of this class is to acquire the techniques that is necessary to reveal neuronal cell lineage, cell migration, morphology of neural cells. These technical training will start from the fixation of animal brain, sectioning, staining and observation of normal brain structures. The training will be followed by neurotracing techniques like retrograde labeling and anterograde labeling. The tracer includes not only traditional ones but also recombinant adenovirus, lentivirus, and other simple retroviruses. To enhance the productivity from these molecular biological tools, we produce original mice with transgenes. These techniques are not limited in the field of neuroscience but applicable to any other research fields. Finally attendants to this course are expected to acquire ability to choose best methodology logically and show satisfactory data.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】

The achievement will be evaluated according to the following criteria.
1) Acquisition of experimental skills to use mice for neuroanatomical study.
2) Understanding how to reveal neuronal cell lineage, cell migration, morphology of neural cells.
3) Acquisition of how manipulated genes are introduced in to neuron and transduce them.
4) Acquisition of ability of planning proper experiment to achieve their own research subjects.

**Research Conducting Program:
Developmental Neurobiology
Department Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20270

(Required: 10 credits)

Supervisor: Kunimasa Ohta
Program Schedule: year 1-4, every Wednesday (6th period)
Site and Facilities: seminar room and laboratories at Department of Developmental Neurobiology

【Course Description】

This course focuses on the molecular mechanism of cell-cell interactions in the field of developmental neurobiology, especially maintenance of the neural stem cells and neural network formation. Students learn first basic knowledge in this field by reading original articles in detail, then plan and discuss what kinds of the researches are possible and meaningful. In the periodical lab meeting students must show their own results and discuss with all lab members and bring up their ability of research. Finally, the experimental results should be reported in international scientific journals.

【Evaluation for Grades and Credits】

Students are evaluated for their course grades and credits based on the progress and discussion in the lab, academic conference presentation of study results, and publication of the article

【Evaluation Criteria】

The achievement will be evaluated according to the following issues.

- 1) Research planning and experimental design
- 2) Approaching the research plans
- 3) Quality of results

**Research Conducting Program:
Developmental Neurobiology
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21080

(Elective/Required: 8 credits)

Supervisor: Kunimasa Ohta
Program Schedule: year 1-4, every Monday (6th-7th periods)
Site and Facilities: seminar room and laboratories at Department of Developmental Neurobiology

【Course Description】

The aim of this course is to acquire the techniques to analyze chick and mouse embryos *in vivo* and *in vitro*. Specifically, gene transfer by electroporation and virus vector, immunohistochemistry, in situ hybridization, primary neuronal culture and monoclonal antibody production are guided. Moreover, conventional molecular biological and biochemical analytical techniques are guided.

【Evaluation for Grades and Credits】

Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】

The achievement will be evaluated according to the following criteria.

- 1) Understanding of developmental processes of chick and mouse embryos.
- 2) Understanding of each experimental mechanism
- 3) Ability for experimental troubleshooting.

**Research Conducting Program:
Sensory and Cognitive Physiology
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code: 20390

(Required; 10 credits)

Supervisor: Wen-Jie Song, Makoto Takemoto, Masataka Nishimura

Program Schedule: year 1-4, every Monday (1st period)

Site and Facilities: seminar room and laboratories at Department of Sensory and Cognitive Physiology

【Course Description】 Sensory perception is a major brain function, and still remains to be a major research subject of neuroscience. Sensory information is first sensed and transformed by peripheral organs into neuronal activities. Neuronal activities are further transformed along subsequent afferent pathways. We now know that our brain processes sensory information in an analytical manner. We will learn in this class mechanisms of sensory information processing at the molecular, cellular, and system level, through reading research articles that have significantly advanced our understanding of sensory information processing. Meanwhile, methods used for sensory physiology research will be thoroughly discussed. Students are then required to make their own plan of auditory research, using electrophysiological or optical approaches. The supervisors will give advice on the design and execution of experiments, and also on the analyses and publication of research results.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned on recent progress in sensory physiology and neuroscience, and their ability in design and execution of research projects as well as in interpretation of research results. Publications of research articles or meeting abstracts and presentations at lab meetings, are also taken into account for evaluation.

【Evaluation Criteria】 A successful student must

- 1) be highly motivated in conducting proper design and execution of experiments that are anticipated to advance our understanding of auditory neuroscience, and
- 2) have developed skills in scientific communication, and
- 3) have obtained novel findings on neural basis of auditory perception, or
- 4) have obtained novel findings on neuronal mechanisms of acoustic information processing, or
- 5) have obtained novel findings on molecular mechanisms of sensory information processing.

**Research Conducting Program:
Sensory and Cognitive Physiology
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code: 21200

(Elective/Required; 8 credits)

Supervisor: Wen-Jie Song, Makoto Takemoto, Masataka Nishimura

Program Schedule: year 1-4, every Thursday (6th-7th periods)

Site and Facilities: seminar room and laboratories at Department of Sensory and Cognitive Physiology

【Course Description】 The aim of this class is for the students to acquire techniques required for cellular and system neurophysiology. Specifically, students are required to master 1) techniques for preparing acute or chronic animal models for sensory physiology research, and 2) patch clamp recording at all configurations through investigation of ion channels and receptors, or 3) in vivo intracellular and extracellular recording techniques through experimental analyses of cellular physiology and neuronal circuit properties, or 4) optical imaging and psychophysical techniques through experiments in auditory perception.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】

A successful student must

- 1) have gained the ability of preparing acute or chronic animal models for sensory physiology research, and
- 2) have mastered patch-clamp techniques for the analyses of ion channels and receptors, or
- 3) have mastered intracellular or extracellular recording techniques for sensory neurophysiology, or
- 4) have mastered optical imaging techniques for auditory physiology, or
- 5) have mastered psychophysical techniques for addressing problems in auditory perception.

**Research Conducting Program:
Molecular Physiology
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20250

(Required: 10 credits)

Supervisor: Kazuhito Tomizawa

Program Schedule: year 1-4, every Tuesday (6th-7th period)

Site and Facilities: Seminar room and laboratories at Department of Molecular Physiology

【Course Description】 The balanced functioning of physiological processes and maintenance of an organism's internal environment within a narrow range are important for the survive of life. Hormones and central nervous system are involved in the regulation of homeostasis. The aim of this Departmental Course is to learn how to propose scientific hypothesis for novel molecular mechanisms of the regulation of homeostasis. The hypothesis must then be proven experimentally. On the basis of the results obtained, further experimental design will be constructed to develop a novel approach for the acknowledgement of pathophysiology of some diseases and prevention and treatment of the diseases. Specific research projects to be executed should be determined by searching latest literatures related to the molecular physiology. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of research. Finally, the experimental results should be reported in international scientific journals in the fields of physiology, pathophysiology, molecular biology and cell biology. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for molecular physiology and pathophysiology, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into account for evaluation.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Proposal of appropriate research projects on the basis of understanding the background on the molecular mechanism on regulation of homeostasis by hormone and central nervous system.
- 2) Understanding how to investigate molecular mechanism of the regulation of homeostasis.
- 3) Logical/proper experimental design to clear the mechanism of the regulation of homeostasis.
- 4) Novel findings obtained by appropriate and proper analytical approaches.
- 5) Original and innovative findings that can contribute not only to better understanding for molecular mechanism on homeostasis but also to successful development of diagnosis, prevention, and treatment of various diseases.

**Research Conducting Program:
Molecular Physiology
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21060

(Elective/Required: 8 credits)

Supervisor: Kazuhito Tomizawa

Program Schedule: year 1-4, every Thursday (6th-7th periods)

Site and Facilities: Seminar room and laboratories at Department of Molecular Physiology

【Course Description】 The aim of this class is to acquire the techniques to examine molecular mechanism on the regulation of homeostasis. Specifically, students are required to master 1) techniques for cell culture and functional regulation of cultured cells using gene transfection and protein transduction, 2) isolation of pancreatic β cells and the culture, 3) optical imaging techniques such as intracellular Ca^{2+} imaging, 4) physiological analyses in vivo, and 5) molecular analyses for signal transduction such as protein phosphorylation.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of experimental skills to culture cells and regulate gene and protein functions in cells.
- 2) Acquisition of experimental skills to isolate pancreatic β cells.
- 3) Acquisition of experimental techniques to image intracellular signaling such as calcium.
- 4) Acquisition of experimental techniques for physiological analyses in vivo.
- 5) Acquisition of experimental skills to investigate signal transduction such as protein phosphorylation.

Research Conducting Program:
Molecular Enzymology
Departmental Course "Jissen" I
(PhD Thesis Research)

Subject Code 20260

(Required: 10 credits)

Supervisor: Hisayuki Nomiya
Program Schedule: year 1-4, every Tuesday (6th period)
Site and Facilities: seminar room and laboratories at Department of Molecular Enzymology

【Course description】 The aim of this course is to understand the catalytic mechanisms of FAD-dependent redox enzymes on the basis of their three-dimensional structures. The enzymes studied are FAD-dependent enzymes participating in the metabolism of fatty acids or amino acids with known three-dimensional structures (deposited in the PDB protein data bank) and with known catalytic mechanisms. The atomic coordinates can be obtained from PDB and their structures will be constructed on PC with graphic softwares and manipulated virtually on the PC screen. The reaction mechanisms will then be discussed at the atomic level. Engineering the amino acid residues in the active site toward intended specificity may also be possible with simulation programs. These newly designed enzymes with intended novel substrate specificity or new type of reaction will be prepared and analyzed. The results thus obtained will be published in scientific journals.

【Evaluation for Grades and Credits】 Students are comprehensively evaluated based on the experiments performed and quality of the report submitted.

【Evaluation Criteria】 Students will be evaluated according to the following criteria.

- 1) Capability of understanding and critical reading of the papers related to their research projects.
- 2) Rationale in the planning experiments and in the discussion of results.

Research Conducting Program:
Molecular Enzymology
Departmental Course "Jissen" II
(PhD Thesis Research)

Subject Code 21070

(Elective/Required: 8 credits)

Supervisor: Hisayuki Nomiya
Program Schedule: year 1-4, every Tuesday (6th period)
Site and Facilities: seminar room and laboratories at Department of Molecular Enzymology

【Course description】 The aim of this class is to learn the techniques of biochemical, molecular biological and protein engineering through the experiments that can modify the catalytic properties of FAD-dependent enzymes. This course includes the construction of mutant enzymes with amino acid-replacement, expression of the enzyme proteins in *Escherichia coli*, purification of the expressed enzymes, analysis of enzymatic properties and X-ray crystallographic analysis of FAD-dependent enzymes.

【Evaluation for Grades and Credits】 Students are evaluated based on the report submitted.

【Evaluation Criteria】 The report submitted will be evaluated according to the following criteria.

- 1) Discussion on the experimental design and results
- 2) Overall consistency of the reports

Research conducting program:
Medical Biochemistry
Departmental Course "Jissen" I
(PhD Thesis Research)

Subject Code 20500

(Required: 10 credits)

Supervisor: Kazuya Yamagata, Tatsuya Yoshizawa
Program Schedule: year 1-4, every Friday (6th period)
Site and Facilities: Seminar room and laboratories at Medical Biochemistry

[Course Description] The aim of this course is to clarify novel metabolic pathways and investigate the molecular mechanisms of diabetes mellitus, metabolic syndrome or atherosclerosis by using biochemical and cellular biological approaches. The obtained results should be reported in scientific journals and scientific meeting. Students will be conducted how to proceed the processes in this Departmental Course.

[Evaluation for Grades and Credits] Students will be comprehensively assessed by the ability of understanding and discussing on related literatures to the project, ability of proposing research project, accuracy of experiments, interpretation of experimental results, and presentation/reports in the course. Research article or presentation in the scientific meeting is also taken into consideration to assess the level of achievement in the PhD research.

[Evaluation Criteria] The achievement will be evaluated according to the following criteria.
1) Acquisition of the latest knowledge on mechanism of glucose and lipid metabolism regulation and pathology of diabetes. Obtaining novel findings by appropriate and proper experimental approaches.
2) Acquisition of the latest knowledge on mechanism of metabolic syndrome or atherosclerosis development/progression. Obtaining novel findings by appropriate and proper experimental approaches.
3) Acquisition of the latest knowledge of the basic research on developing novel remedies for diabetes, metabolic syndrome and atherosclerosis and their clinical applications. Obtaining novel findings by appropriate and proper experimental approaches.

Research conducting program:
Medical Biochemistry
Departmental Course "Jissen" II
(Experimental Technique Learning)

Subject Code 21310

(Elective/Required: 8 credits)

Supervisor: Kazuya Yamagata, Tatsuya Yoshizawa
Program Schedule: year 1-4, every Tuesday (6th-7th periods)
Site and Facilities: Seminar room and laboratories at Medical Biochemistry

[Course Description] The aim of this practical course is to acquire various biochemical, cellular biological and molecular biological experimental technique required for investigating pathogenesis of glucose and lipid metabolism regulation or cardiovascular lesion development/progression resulting from diabetes, metabolic syndrome or atherosclerosis, and for proposing novel therapeutic strategy for these diseases.

[Evaluation for Grades and Credits] Students will be comprehensively assessed based on course hours completed, acquisition of experimental skills and reports. Research article or presentation in the scientific meeting will be occasionally approved as a report for grades and credits.

[Evaluation Criteria] The achievement will be evaluated according to the following criteria.
1) Understanding and acquisition of biochemical, cellular biological and molecular biological experimental methods for analysis of diabetes, metabolic syndrome or atherosclerosis.
2) Ability of proposing and carrying out appropriate plan for research subjects in the field of metabolic medicine.

Research Conducting Program: Molecular Genetics Departmental Course “Jissen” I (PhD Thesis Research)	Subject Code 20240 (Required: 10 credits)
Supervisor: Yuichi Oike, Kazutoyo Terada, Motoyoshi Endo, Tsuyoshi Kadomatsu, Keishi Miyata Program Schedule: year 1-4, every Tuesday (3rd period) Site and Facilities: staff room and laboratories at Department of Molecular Genetics, as a general rule	
【Course Description】 The aim of this Departmental Course is to learn how to propose scientific hypothesis for the roles of the gene products, which are associated with metabolic disorders, stress response, protein quality control or apoptosis. The hypothesis must then be proven by in vitro, in vivo or individual level experiments. Further experiments using corresponding gene-knockout mice will be designed and performed to examine the biological functions of those gene products in tissue or whole body levels. Finally, the experimental results should be reported in academic meeting and international scientific journal. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.	
【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for the fields, which are related to our Department. In addition, the ability for experimental planning, interpretation and criticism of the results obtained, are also evaluated on oral presentation, reports and so on. The scientific article, presentation at the academic meeting or progress reports at the department meeting are also taken into consideration to assess the level of achievement in the PhD research.	
【Evaluation Criteria】 The achievement will be evaluated according to the following criteria. 1) Understanding the experimental procedures concerning molecular genetics, metabolomics and molecular cell biology. 2) Proposal of appropriate research projects on the basis of understanding the background on molecular genetics, metabolomics and molecular cell biology. 3) Logical and proper experimental design to execute proposed projects. 4) Obtaining current information concerning molecular genetics, metabolomics, molecular cell biology, and furthermore original and innovative findings.	

Research Conducting Program: Molecular Genetics Departmental Course “Jissen” II (Experimental Technique Learning)	Subject Code 21050 (Elective/Required: 8 credits)
Supervisor: Yuichi Oike, Kazutoyo Terada, Motoyoshi Endo, Tsuyoshi Kadomatsu, Keishi Miyata Program Schedule: year 1-4, every Monday (2nd period) Site and Facilities: staff room and laboratories at Department of Molecular Genetics, as a general rule	
【Course Description】 The aim of this class is to acquire the techniques, using animals like mice, tissue or cultured cells, to perform experiments concerning molecular biology, molecular cell biology, biochemistry and histochemistry. Using these techniques, students are instructed to plan, and to execute experiments to clarify the biological roles of genes and their products, which are supposed to be involved in metabolic disorders, stress response, protein quality control or apoptosis.	
【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student’s scientific article, presentation and discussion at the laboratory and academic meetings.	
【Evaluation Criteria】 The achievement will be evaluated according to the following criteria, in response to each student’s research project. 1) Acquisition of experimental skills, using cultured cells, concerning molecular biology, molecular cell biology and biochemistry. 2) Acquisition of experimental skills, using tissue and whole body, concerning molecular biology, biochemistry and histochemistry. 3) Proposal of appropriate research projects on the basis of understanding the background on molecular genetics, metabolomics and molecular cell biology. 4) Planning and executing logical and proper experimental design to proposed projects.	

**Research Conducting Program:
Tumor Genetics and Biology
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20520

(Required: 10 credits)

Supervisor: Norie Araki

Program Schedule: year 1-4, every Friday (1st period)

Site and Facilities: seminar room and laboratories at Department of Tumor Genetics and Biology

【Course Description】 The aim of this Departmental Course is to learn how to propose scientific hypothesis for the specific molecular mechanisms of tumor cells and its stem cells compared with normal cells, especially on the cell cycle, differentiation, and apoptosis. Recent scientific literatures related to the subject of tumor genetics, molecular and cellular biology will be searched and studied in detail, that is, how to proposed the hypothesis based on the back ground, create experimental evidences, and discuss and prospect on the original and innovative findings. The specific research projects demonstrated must be proven experimentally. On the basis of the results obtained, further experimental design will be constructed to develop a novel approach for understanding of tumor related diseases. Finally, the experimental results should be reported in international scientific journals in the fields of oncology, biochemistry, molecular biology, and/or cell biology, All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for tumor genetics and biology, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Understanding how to investigate the differences of molecular mechanisms between tumor cells, tumor stem cells and normal cells, especially on the cell cycle, differentiation, and apoptosis.
- 2) Understanding how to investigate the molecular function of tumor related molecules in tumor cells by the methods of molecular biology and cell biology such as their over expressions or knock down strategies.
- 3) Proposal of appropriate research projects and experimental design on own thesis subject.
- 4) Novel findings obtained on the abnormal cellular and molecular functions in tumor cells.
- 5) Proper discussion and review on the original findings obtained.
- 6) Paper publication and oral presentation on own original findings in the thesis subject with proper discussion against the questionnaires.

**Research Conducting Program:
Tumor Genetics and Biology
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21330

(Elective/Required: 8 credits)

Supervisor: Norie Araki

Program Schedule: year 1-4, every Thursday (6th-7th periods)

Site and Facilities: seminar room and laboratories at Department of Tumor Genetics and Biology

【Course Description】 The aim of this class is to acquire the techniques to analyze molecular mechanism and cellular biology of tumor and its stem cells. Specifically, experimental techniques to be earned in this course include establishment of experimental tumor cellular models after overexpression or knockdown of particular tumor related molecules, and comprehensive screening of tumor related cellular molecules with proteomic differential display, such as 2-Dimensional differential gel electrophoresis with specific fluorescent dyes (2D-DIGE), nanoLC-shotgun based differential proteomics (iCAT, iTRAQ4-plex, 8-Plex) that were newly established in this department, using nano-LC tandem MS (ESI-QTOF, ESI-QQQ, MALDI-TOF-TOF, DNA array), with the highest sensitivity, resolution, and throughput. Particular emphasis is placed also on and advanced techniques to investigate intracellular signal transduction, tumor cellular observation with time laps-confocal microscopic analysis, bioinformatics on tumor related molecules and so on, all of which will be thoroughly studied in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of experimental skills to analyze cellular biology, molecular biology, biochemistry on tumor and its stem cells, that is, cell culture, microscopic analysis, DNA/RNA preparation, PCR, DNA cloning/sequences, plasmid construction/overexpression, siRNA/knockdown, western blotting, immuno-precipitation, protein purification/identification/sequencing, 2D-PAGE, MAS-spectrometry, nano-HPLC operation, molecular information mining methods, and so on.
- 2) Understanding how to analyze the differentially expressed gene and protein in tumor cells.
- 3) Execution of experimental techniques to the proposed research projects and proper construction of experimental design on own thesis subject.

**Research Conducting Program:
Pathology and Experimental Medicine
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20590

(Required: 10 credits)

Supervisor: Takaaki Ito

Program Schedule: year 1-4, every Monday (1st-4th periods)

Site and Facilities: seminar room and laboratories at Department of Pathology and Experimental Medicine

【Course Description】 During studying in our research program, the graduate students learn, study, and explore some aspects of mechanisms of cell differentiation, cell proliferation and their relationship in normal development, tissue regeneration and tumorigenesis of lung epithelium (according to the students' requests, other tissue or cell systems are acceptable). For the investigations, we use human and animal tissues and culture cells, focusing on transcriptional regulation, cell signaling system, cell proliferation activity, cell protein expression profile, morphological changes and epithelial-mesenchymal interactions. We are also interested in tissue stem cells and cancer stem cells and their regulatory system. Data gained will be discussed weekly or bi-weekly and productively among graduate students and faculty members.

【Evaluation for Grades and Credits】 Graduate students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the researches for proliferation and differentiation of lung epithelial cell (or other cell system), and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Understanding of basic scientific issues of cell biology and pathology of the epithelial, mesenchymal or hematopoietic cell systems in normal or neoplastic conditions.
- 2) Logical/proper experimental design to study of mechanisms of cell proliferation and differentiation of the above cell and tissue systems.
- 3) Novel findings in the fields of cell proliferation and differentiation researches obtained by appropriate and proper analytical approaches.
- 4) Original and innovative findings that can contribute not only to better understanding for the above issues, to successful development for diagnosis, but also to elucidation of molecular pathogenesis of various diseases.

**Research Conducting Program:
Pathology and Experimental Medicine
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21400

(Elective/Required: 8 credits)

Supervisor: Takaaki Ito, Kohki Hasegawa, Kanako Niimori

Program Schedule: year 1-4, every Tuesday (1st-4th periods)

Site and Facilities: seminar room and laboratories at Department of Pathology and Experimental Medicine

【Course Description】 The aim of this class is to acquire the techniques to study the above research issues. Specifically, experimental techniques to be earned in this course include morphological techniques including immunohistochemistry and in situ hybridization, cell and tissue cultivation, flow cytometrical analyses, various blotting methods, gene transfection techniques, and diagnostic techniques of various pathological samples.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Understanding the cell and tissue morphology in normal and pathological conditions.
- 2) Acquisition of reliable morphological techniques to study of research projects.
- 3) Acquisition of experimental skills to investigate signal transduction mechanisms.
- 4) Acquisition of experimental skills to investigate transcriptional activity.
- 5) Acquisition of experimental techniques to produce recombinant genes and proteins for studying cell proliferation and differentiation mechanisms.
- 6) Understanding the FACS analyses.

**Research Conducting Program:
Cell Pathology
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20510

(Required: 10 credits)

Supervisor: Motohiro Takeya
Program Schedule: year 1-4, every Tuesday (6th period)
Site and Facilities: seminar room and laboratories at Department of Cell Pathology

【Course Description】 The aim of this Departmental Course is to learn morphological and functional changes of the cells induced by various pathological processes including metabolic disorders, circulatory disturbances, inflammation, or tumorigenesis. For this purpose students will have an opportunity to examine pathological changes of human tissues obtained at biopsy, surgical operation or autopsy. To pursue detailed disease process of a selected disease, students are requested to plan and conduct their own research project. During their own research process the students will learn the fundamental skills for pathological diagnosis, ultrastructural observation, cell culture, handling of animals, cell biology and molecular biology. Worldwide information should be collected through scientific literatures to execute their own original research projects. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of the research. Finally, the experimental results should be reported in international scientific journals in the fields of pathology, biochemistry, cell biology or molecular biology. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the following points. Their understanding and knowledge earned about scientific information on recent progress of pathological process for a targeted disease, and ability for experimental planning and interpretation and criticism of the results obtained are subjects for evaluation. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Ability to explain and evaluate pathological changes of tissue specimens at cellular and tissue levels.
- 2) Understanding of fundamental techniques to perform pathological experiments.
- 3) Ability to design the experiments to clarify cellular and molecular pathogenesis of a selected disease process.
- 4) Ability to propose original research data and discuss according to the recent progress of the research field concerned.

**Research Conducting Program:
Cell Pathology
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21320

(Elective/Required: 8 credits)

Supervisor: Motohiro Takeya
Program Schedule: year 1-4, every Thursday (6th-7th periods)
Site and Facilities: seminar room and laboratories at Department of Cell Pathology

【Course Description】 The aim of this class is to acquire the techniques to analyze disease process. These techniques include processing of histopathological specimens, immunohistochemical analysis, confocal laser microscopy, electron microscopy, production of monoclonal antibodies, establishment of animal disease models, and various techniques of molecular biology. Particular emphasis is placed on the techniques to evaluate macrophage functions in various pathological conditions. These include detection of macrophages in pathological tissue specimens, isolation and culture of human and animal macrophages, functional evaluation of macrophage-specific receptors, intracellular processing of phagocytosed materials, detection of cytokines produced by macrophages, and signal transduction pathway during macrophage activation. All of which will be thoroughly studied in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of fundamental experimental skills to conduct pathological examination.
- 2) Understanding how to obtain and process pathological specimens.
- 3) Knowledge about basic techniques of cellular and molecular biology to evaluate functional molecules during pathological process.
- 4) Acquisition of experimental skills to evaluate gene expression of macrophage-related molecules.
- 5) Ability to design the suitable experimental methods to obtain new information.

**Research Conducting Program:
Molecular Pathology
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20490

(Required: 10 credits)

Supervisors: Takahisa Imamura

Program Schedule: year 1-4, every Thursday (6th period)

Site and Facilities: seminar room and laboratories at Department of Molecular Pathology

【Course Description】 You will understand that blood coagulation is associated with the biodefense caused by inflammation and immune reactions, which is presented by immunostaining of tissues where infection and allergic reactions are induced. You will see functional changes of plasma and cells treated with proteases and modification by chemicals, e.g. protease inhibitors, and learn methods for analysis of the pathology. Cancer cell C5a receptor expression is investigated by immunostaining and studied in relation to the cancer progression. Functional changes of C5a receptor expressing cancer cells by C5a is presented by Matorigel chamber assay and animal experiments, revealing a contribution of the C5a-C5a receptor system in the cancer biology. Students study scientific paper writing on the results obtained by such experiments.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the understanding of reference papers and books associated with the theme and critic ability, research planning, interpretation and presentation of the results and the reports. Evaluation is done by the report, which can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of the knowledge about molecules and cells associated with blood coagulation.
- 2) Setup of proper theme to analyze blood coagulation, protease functions and cancer.
- 3) Proper experiment planning for the theme.
- 4) Novel findings obtained by appropriate and proper analytical approaches for blood coagulation, protease functions and cancer.

**Research Conducting Program:
Molecular Pathology
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21300

(Elective/Required: 8 credits)

Supervisors: Takahisa Imamura

Program Schedule: year 1-4, every Tuesday (6th-7th periods)

Site and Facilities: seminar room and laboratories at Department of Molecular Pathology

【Course Description】 You study how to preparation animal allergy models and observe the animals and their tissues. You have practice of vascular permeability assay, cell culturing, protease assay using fluorogenic substrates, antibody preparation, immunological methods, handling of DNA, RNA and proteins, and recombinant protein preparation. With these technics, blood clotting reactions, protease pathogenicity and cancer metastasis are investigated at the molecular levels.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of the technic for allergy induction in the animal and understanding of the principle.
- 2) Acquisition of the technic for solation of neutrophils or monocytes from peripheral blood and their function analysis.
- 3) Ability to culture of cancer cells.
- 4) Analytic ability for protease enzymatic reactions.
- 5) Ability to prepare antibodies and perform analysis using immunological methods.
- 6) Ability to handle DNA, RNA, proteins and biological macromolecules.
- 7) Ability to prepare recombinant proteins.
- 8) Novel findings obtained by appropriate and proper analytical approaches for blood coagulation, protease functions and cancer.

**Research Conducting Program:
Molecular Pharmacology,
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20410

(Required: 10 credits)

Supervisor: Hiroyuki Nakanishi, Kazuaki Umeda, Koji Kikuchi, Yasuhisa Sakamoto
Program Schedule: year 1-4, every Thursday (2th period)
Site and Facilities: seminar room and laboratories at Department of Molecular Pharmacology

【Course Description】 The aim of this Departmental Course is to learn how to identify molecules that regulates the cooperation of cytoskeletons and membranes in various important cell functions, such as cell motility, adhesion, mitosis, endocytosis, and polarization. On the basis of results obtained, further experimental design will be constructed to prove the molecular mechanisms by which the identified molecules regulate these cell functions. Specific research projects to be executed should be determined by searching latest literatures related to the cooperation of cytoskeletons and membranes. Research projects can be modified and improved depending on the progress and achievement of research. Finally, the experimental results should be reported in international scientific journals in the fields of biochemistry, molecular biology, cell biology. All instructions in the above-mentioned processes, which are necessary to fulfill requirement for PhD thesis, are conducted in this Department Course.

【Evaluation for Grades and Credits】 Students are generally evaluated for their "Jissen I" course grades and credits based on the course hours completed, their abilities of understanding and criticism of articles and papers related to the theme. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.
1) Understanding the latest knowledge on the regulatory mechanism of cytoskeletons and the cooperation between cytoskeleton and membranes.
2) Novel original findings related to the regulatory mechanism of cytoskeletons and the cooperation between cytoskeleton and membranes.
3) Understanding the latest knowledge on cell motility, adhesion, mitosis, endocytosis, and polarization.
4) Logical/proper experimental design to identify molecules that regulate cytoskeletons and membranes.

**Research Conducting Program:
Molecular Pharmacology,
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21220

(Elective/Required: 8 credits)

Supervisor: Hiroyuki Nakanishi, Kazuaki Umeda, Koji Kikuchi, Yasuhisa Sakamoto
Program Schedule: year 1-4, every Monday (3th-4th periods)
Site and Facilities: seminar room and laboratories at Department of Molecular Pharmacology

【Course Description】 The aim of this class is to acquire several experimental techniques, including biochemistry, molecular biology, and cell biology. Specially, experimental techniques to be earned in this course include the followings: 1) methods for isolation and identification of molecules that regulates the reorganization of cytoskeletons and membranes; 2) analysis of the molecular mechanisms by which identified molecules regulate the reorganization of cytoskeletons and membranes; and 3) analysis of the roles of those molecules in cell motility, adhesion, mitosis, endocytosis, and polarization.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course "Jissen" II, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.
1) Acquisition of experimental skills to learn methods for isolation and identification of molecules involved in the reorganization of cytoskeletons and membranes.
2) Understanding how to analysis the reorganization of cytoskeletons and membranes by biochemical, molecular biological, and cell biological experimental method.
3) Understanding of the analysis of cell motility, adhesion, endocytosis, mitosis, endocytosis, and polarization.
4) Logical/proper experimental design to identify molecules that regulate cytoskeletons and membranes.

**Research Conducting Program:
Pharmacology and Molecular Therapeutics
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20600

(Required: 10 credits)

Supervisor: Shokei Kim-Mitsuyama, Yu Hasegawa, Hoichi Yorinaka, Nobutaka Koibuchi,
Program Schedule: year 1-4, every Tuesday (6th period)

Site and Facilities: seminar room and laboratories at Department of Pharmacology and Molecular Therapeutics

【Course Description】 The aim of this Departmental Course is to learn how to propose scientific hypothesis for the mechanism of cardiovascular diseases and pharmacological action of various cardiovascular drugs. The hypothesis must then be proven experimentally. Therefore, you will learn about the techniques for the analysis of intracellular signal transduction, transcription factors, gene expressions, and analysis of cardiovascular function in vivo. Specific research projects to be executed should be determined by searching latest literatures related to the mechanism of cardiovascular diseases obtained by using the above mentioned techniques. Furthermore, you will learn about the scientific mechanism for the beneficial effects of combination therapy of various cardiovascular drugs with different pharmacological actions. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of research. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for pathophysiology and therapy of cardiovascular diseases, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Understand how to analyze intracellular signaling molecules, gene expression, gene-engineering animals, cardiovascular function in vivo, and administer various drugs in vivo.
- 2) Understand the significance of combination therapy of various cardiovascular drugs.
- 3) Logical experimental design to elucidate the pharmacological action of various cardiovascular drugs on cardiovascular diseases.

**Research Conducting Program:
Pharmacology and Molecular Therapeutics
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21410

(Elective/Required: 8 credits)

Supervisor: Shokei Kim-Mitsuyama, Yu Hasegawa, Hoichi Yorinaka, Nobutaka Koibuchi,
Program Schedule: year 1-4, every Tuesday (6th-7th periods)

Site and Facilities: seminar room and laboratories at Department of Pharmacology and Molecular Therapeutics

【Course Description】 The aim of this class is to acquire the techniques to examine the molecular mechanism of cardiovascular diseases including hypertension and to analyze the pharmacological action of various cardiovascular drugs in animal disease models.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Understand how to administer drug in animals.
- 2) Appropriate experimental designs to examine the pharmacological action of various cardiovascular drugs on cardiovascular disease models.
- 3) To find out the novel mechanism of action of cardiovascular drugs.

**Research Conducting Program:
Microbiology
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20480

(Required: 10 credits)

Supervisor: Tomohiro Sawa, Yosuke Maeda
Program Schedule: year 1-4, every Tuesday (6th period)
Site and Facilities: seminar room and laboratories at Department of Microbiology

【Course Description】 The aim of this Departmental Course is to learn how to propose scientific hypothesis for the mechanisms of molecular pathogenesis of infectious disease and host defense. The hypothesis must then be proven experimentally. On the basis of the results obtained, further experimental design will be constructed to develop a novel approach for prevention and treatment of infectious diseases. Specific research projects to be executed should be determined by searching latest literatures related to the microbial pathogenesis and host defense. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of research. Finally, the experimental results should be reported in international scientific journals in the fields of microbiology, biochemistry, molecular biology, cell biology, and/or infectious diseases. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for microbial pathogenesis and host defense mechanism, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Proposal of appropriate research projects on the basis of understanding the background on the microbial pathogenesis and host defense mechanisms.
- 2) Understanding how to investigate molecular pathogenesis and host defense for microbial infections.
- 3) Logical/proper experimental design to identify the pathogenic and host defense factors.
- 4) Novel findings obtained by appropriate and proper analytical approaches.
- 5) Original and innovative findings that can contribute not only to better understanding for microbial pathogenesis and host defense but also to successful development of diagnosis, prevention, and treatment of various diseases.

**Research Conducting Program:
Microbiology
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21290

(Elective/Required: 8 credits)

Supervisor: Tomohiro Sawa, Yosuke Maeda
Program Schedule: year 1-4, every Thursday (6th-7th periods)
Site and Facilities: seminar room and laboratories at Department of Microbiology

【Course Description】 The aim of this Jissen II is to acquire the techniques to analyze host responses to various pathogenic bacteria and virus during infections. Specifically, experimental techniques to be earned in this course include establishment of experimental infection models of animals, such as mice and rats, and cultured cells, and analysis of various signaling factors and host defense molecules produced in cells and tissues. Particular emphasis is placed also on safe and proper handling of various pathogens (culture methods etc.), identification and analysis of toxins, analytical methods for reactive oxygen species, free radicals, and nitric oxide (NO), proteomics/metabolomics (LC-MS/MS etc.), development of well-characterized infection models with cultured cells and experimental animals, and advanced techniques to investigate intracellular signal transduction, all of which will be thoroughly studied in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of experimental skills to produce animal models for infectious diseases.
- 2) Understanding how to detect and identify bacterial toxins, and determine their biological activities.
- 3) Acquisition of experimental techniques to produce recombinant genes and proteins of various microbial factors and host defense molecules, so that their structures and functions can be accurately analyzed and understood.
- 4) Understanding of chemical reactivities, biological functions, identification/detection methods of reactive oxygen species and NO.
- 5) Acquisition of experimental skills to investigate signal transduction mechanisms in the various infectious animal models.

Research Conducting Program:
Immunology
Departmental Course "Jissen" I
(PhD Thesis Research)

Subject Code 20290

(Required: 10 credits)

Supervisor: Kazuhiko Maeda, Masahiro Kitabatake
Program Schedule: year 1-4, every Tuesday (6th period)
Site and Facilities: seminar room and laboratories at Department of Immunology

【Course Description】 Recently, it is necessary to clarify the principle through a new immunity that controls and strengthens the immune reaction when applying it to an actual medicine and the medical treatment. To establish a molecular basis of the immunity control, the research program is actually planned and practiced aiming to verify the feasibility based on the experimental result that has been clarified so far and to develop a new advanced approach and technology. Studying the acquired immunity, particularly regarding the deteriorated immune reaction of humoral immunity with abnormality of cellular, molecular and genetic factors using the various gene-altered animals elucidates the basis of the immune system. Through the further investigation of the individual abnormality of the immune system, the knowledge, the experimental skill, and the research activity develop for a mature scientist participating in the international academic and research fields.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, understanding and knowledge earned about scientific information on recent progress in the research for immune system and host defense mechanism, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Proposal of appropriate research projects on the basis of understanding the background on the immune system and host defense mechanism.
- 2) Understanding how to investigate molecular mechanism of allergy and autoimmunity.
- 3) Logical/proper experimental design to identify the abnormality in the immune system against various microbial infections and cancer.
- 4) Novel findings obtained by appropriate and proper analytical approaches.
- 5) Original and innovative findings that can contribute to better understanding for the immuno-manipulation.

Research Conducting Program:
Immunology
Departmental Course "Jissen" II
(Experimental Technique Learning)

Subject Code 21100

(Elective/Required: 8 credits)

Supervisor: Kazuhiko Maeda, Masahiro Kitabatake
Program Schedule: year 1-4, every Friday (5th-6th periods)
Site and Facilities: seminar room and laboratories at Department of Immunology

【Course Description】 The aim of this class is to acquire various experimental techniques in immunology, biochemistry, and molecular biology to study the molecular basis of various diseases associated with the impairment of the immune system such as allergy and autoimmune diseases. Three kinds of experimental techniques are trained: (1) molecular analysis, (2) cellular and signal transduction analyses for the study of functions of genes and proteins in cells, (3) the individual body responses based on the gene-targeted mice. They include general molecular biology techniques regarding genome and cDNA analyses, cloning of DNAs, identification and localization of the specific molecules, and the analysis of molecular functions in the animals. Genetic alteration in mouse ES cells and its application are used for the study of molecular function in the development of mouse. Immunological techniques include establishment of high-affinity monoclonal antibodies against cellular and humoral components, immunofluorescent visualization of specific molecules in cells, and application to flow cytometric analysis and cell separation. Immune responses and the occurrence of tumors or autoimmunity are observed in the experimental animal model, all of which will be thoroughly studied in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of experimental skills to produce animal models of autoimmunity, allergy, and cancer.
- 2) Understanding how to detect and identify immuno-regulatory molecules, and determine their biological activities.
- 3) Acquisition of experimental techniques to produce recombinant genes and proteins of various immunological factors and host defense molecules, so that their structures and functions can be accurately analyzed and understood.
- 4) Understanding of chemical reactivities, biological functions, identification/detection methods of immunoregulators.
- 5) Acquisition of experimental skills to investigate signal transduction mechanisms in the various autoimmune and cancer models.

Research Conducting Program: Immunogenetics Departmental Course "Jissen" I (Required: 10 credits)
Subject Code20300

Instructors: Yasuharu Nishimura, Satoru Senju, Atsushi Irie, Hirotake Awai
Program Schedule: year 1-4, every Monday (6th period)
Site and Facilities: seminar room and laboratories at Department of Immunogenetics

【Course Description】 Students should learn important discoveries in the recent immunology researches, hypothesis regarding the phenomena, identification of immune cells and molecules involved in immune-regulation, by studying several examples of discoveries. In addition, they should identify genes encoding for molecules relevant to immunological function or antigens, examine their pattern of expression, structure of the genes, and collect information on the intra-cellular and intra-tissue localization of the molecules. Based on such information, experiments should be designed to study the functional significance of the molecules in the immune system and to evaluate the possibility of the application of the molecules to clinical immune-therapies. They should also analyze the function of the molecules in human immune system, study the relation of the molecules with auto-immune diseases, and evaluate the possibility of application of the information to anti-cancer immune-therapies. Finally, the results of the above-mentioned studies should be published as scientific papers, and the students will also be trained to present their data in some scientific meetings.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on their ability to understand and criticize scientific reports and other literatures, to make plan for their research, to present their experimental results and interpretation by oral presentations and reports. The reports can be substituted by scientific papers, presentations in scientific meetings, or progress reports in laboratory meetings.

【Evaluation Criteria】

Evaluation will be done based on the following criteria for the research theme of each student..

- 1) Acquisition of knowledge on the antigen-processing and antigen-recognition and new research achievements
- 2) Acquisition of knowledge on the antigens recognized by immune system, immune responses following antigen-recognition and new research achievements
- 3) Acquisition of knowledge on the basic researches of immune-regulation or its clinical applications and new research achievements.
- 4) Acquisition of knowledge regarding their own research themes by learning related literatures, and adequate planning and execution of experiments.

Research Conducting Program: Immunogenetics Departmental Course "Jissen" II (Elective/Required: 8 credits)
Subject Code21110

Instructors: Yasuharu Nishimura, Satoru Senju, Atsushi Irie, Hirotake Awai
Program Schedule: year 1-4, every Friday (5th and 6th periods)
Site and Facilities: seminar room and laboratories at Department of Immunogenetics

【Course Description】

Students will be taught to obtain experimental techniques of cellular-immunology, biochemistry and molecular biology for the immunological investigations of human, mouse and other experimental animals. Specifically, the following experimental skills will be taught; Isolation and analysis of immune cells, in vivo and in vitro experiments mainly to analyze immune responses triggered by interaction of antigen presenting cells and T lymphocytes; molecular and protein-chemistry-based analyses of molecules with immunological functions and antigenic activities, analyses of antigen-recognition by T lymphocytes and signal transduction related to T lymphocyte activation.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the acquisition of experimental skills and reports. The reports can be substituted by scientific papers, presentations in scientific meetings, or progress reports in laboratory meetings.

【Evaluation Criteria】

Evaluation will be done based on the following criteria for the research theme of each student.

- 1) Acquisition of techniques for isolation and functional analyses of immune cells.
- 2) Acquisition of techniques for analyses of expression pattern, structure, and function of proteins expressed in immune system.
- 3) Acquisition of techniques for analyses of structure, expression pattern, and function of genes expressed in immune system.
- 4) Acquisition of techniques for immunological analyses using experimental animals.
- 5) Adequate planning and execution of experiments for conducting their researches.

**Research Conducting Program:
Medical Oncology and Translational Research
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22890

(Required: 10 credits)

Supervisor: Akinobu Hamada, Kenji Tamura, Tetsuya Nakatsura
Program Schedule: year 1-4, every Thursday (5th-6th period)
Site and Facilities: Conference room at National Cancer Center

【Course Description】

The aim of this program is to learn how to make protocol for clinical studies or translational research to solve current issue against medical oncology. Based on their findings, students are expected to write original paper to be submitted to internationally recognized journals and give oral or poster presentation in scientific conferences.

【Evaluation for Grades and Credits】

Students are evaluated for their course grades and credits based on attendance and overall performance in understanding scientific information on recent progress in medical oncology and quality of research design, finding, and presentations. The presentation including discussion at the laboratory and scientific meetings is also taken into account for evaluation.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Proposal of research projects on the basis of understanding medical oncology and translational research.
- 2) Understanding of clinical data and regulatory sciences.
- 3) The accomplishment of research projects.
- 4) Novel findings obtained by appropriate and proper approaches.

**Research Conducting Program:
Medical Oncology and Translational Research
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 23020

(Elective/Required: 8 credits)

Supervisor: Akinobu Hamada, Kenji Tamura, Tetsuya Nakatsura
Program Schedule: year 1-4, every Tuesday (5 period)
Site and Facilities: Conference room at National Cancer Center

【Course Description】

The aim of this program is to learn how to diagnose, treat, evaluate related to exploratory clinical oncology and translational research. Students will learn how to make protocols for clinical studies to resolve these clinical issues.

【Evaluation for Grades and Credits】

Students are evaluated for their course grades and credits based on attendance and overall performance in experimental skills and techniques acquired during this course. The report assessment can be substituted by the assessment of each student's presentation and discussion at the intra-laboratory meeting and scientific meetings.

【Evaluation Criteria】

The achievement will be evaluated according to the following criteria.

- 1) Acquisition of their knowledge of clinical complication and guideline related to exploratory clinical oncology and translational research.
- 2) Acquisition of their knowledge of how to diagnose and treat related clinical oncology.
- 3) Their accomplishment of research projects.

**Research Conducting Program:
Public Health
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 23060

(Required: 10 credits)

Supervisor: Takahiko Katoh, Takao Kitano, Wataru Miyazaki, Aya Hisada

Program Schedule: year 1-4, every Thursday (6th period)

Site and Facilities: seminar room and laboratories at Department of Public Health

【Course Description】 Along with the 21st century's common keywords of Ageing Society, Information Society and Globalization, there is also a new international trend of health enhancement and disease prevention, based on the principles of health promotion and technology. In reply to these contemporary issues, this Department Course will give lectures in Health Information Medicine (epidemiology and biostatistics), International Health Medicine, and Health Care Science (Health, Medicine & Welfare system). At the same time, through practical research, students will use the social applications of medical science to understand the concepts in the relationship between medicine and society, the skills of observation and practical medical techniques. Students will be trained in how to write theses and give oral presentations based on the results of the above-mentioned research.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for public health, and ability for research planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Fundamental understanding of how to read a scientific paper, the methodology of epidemiology, and molecular biology.
- 2) Acquire the latest knowledge and understand the current conditions of lifestyle-related diseases through reviews of the literature of epidemiology research.
- 3) Acquire the latest knowledge about the molecular and environmental epidemiology and obtain new results of research in these fields.
- 4) Acquire established knowledge related to a research theme through a review of the literature, then propose and carry out an appropriate research project.

**Research Conducting Program:
Public health
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 23070

(Elective/Required: 8 credits)

Supervisor: Takahiko Katoh, Takao Kitano, Wataru Miyazaki, Aya Hisada

Program Schedule: year 1-4, every Tuesday (6th-7th periods)

Site and Facilities: seminar room and laboratories at Department of Public Health

【Course Description】 The contents of this class are as follows: 1) acquisition of the concepts of health, medical care, and the welfare service and system; and 2) understanding molecular epidemiological studies of the interaction between genes and the environment in life-style related disease such as cancer and hypertension, and health disorders like osteoporosis. Concretely, this class provides opportunities for collecting questionnaires & genome DNA in the community and occupational field and then performing epidemiological studies, learning how to prevent illnesses, and making policies for health maintenance & promotion.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Proposal of an appropriate research design for the solution of a research theme.
- 2) Acquisition of basic experimental skills, such as PCR.
- 3) Revision of working hypothesis depending on the research results and examination of an appropriate research design.
- 4) Acquisition of presentation skills to announce the result of research.
- 5) Consideration of research findings and the writing of a research paper.

Research Conducting Program: Forensic Medicine Departmental Course “Jissen” I (PhD Thesis Research)	Subject Code 21010 (Required: 10 credits)
Supervisor: Yoko Nishitani, Kosei Yonemitsu Program Schedule: year 1-4, every Tuesday (6th period) Site and Facilities: seminar room, laboratory room, and autopsy room at Department of Forensic Medicine	
【Course Description】 The aim of this course is to learn the skill of forensic pathology and how to diagnose causes of death. Students are also expected to study about the toxicology and biological effects of drugs and alcohol as below: (1) mechanisms of alcoholic liver disease, (2) effect of alcohol on nervous system in Drosophila, (3) analysis of affinity between drugs and proteins, (4) development of new immunological drug screening. Students are expected to submit the paper to research meetings and journals.	
【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on their understanding and knowledge earned about information on recent progress in the research for forensic pathology. The presentation at the academic meetings is also taken into consideration to assess the level of achievement in the PhD research.	
【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.	
1) Understanding of the forensic pathology and toxicology. 2) Knowledge about recent problems and arguments in the field. 3) Ability to summarize the background of the research and plan adequate research schedule. 5) Ability to summarize and present their own research results or arguments.	

Research Conducting Program: Forensic Medicine Departmental Course “Jissen” II (Experimental Technique Learning)	Subject Code 21820 (Elective/Required: 8 credits)
Supervisor: Yoko Nishitani, Kosei Yonemitsu Program Schedule: year 1-4, every Friday (6th-7th periods) Site and Facilities: seminar room, laboratory room, and autopsy room at Department of Forensic Medicine	
【Course Description】 The aim of this course is to discuss each case of forensic autopsies. Participating students are expected to present research results at the academic meetings and write and publish papers in international journals in the relevant fields.	
【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on their understanding and knowledge earned about information on recent progress in the research for forensic pathology. The presentation at the academic meetings is also taken into consideration to assess the level of achievement in the PhD research.	
【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.	
1) Understanding the role of forensic medicine as social medicine. 2) Understanding the unusual death and its treatment. 3) Knowledge about recent problems and arguments in the field. 4) Ability to summarize the background of the research and plan adequate research schedule. 5) Ability to summarize and present their own research results or arguments.	

**Research Conducting Program:
Bioethics
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 21020

(Required: 10 credits)

Supervisor: Yasuhiro Kadooka
Program Schedule: year 1-4, every Tuesday (6th period)
Site and Facilities: seminar room at Department of Bioethics

【Course Description】 Research methods in the field of bioethics include (1) theoretical consideration regarding ethics, political philosophy, law, cultural anthropology and (2) empirical investigation using qualitative or quantitative methods. In this subject, participating students will read relevant articles and analyze ethical issues arising from medical practice, life and death of human, cutting-edge medical technology, medical research and biomedical science. By attempting to integrate fore-mentioned two methods, students are expected to improve their understanding and learn to conduct a doctoral research in the field. Students are required to determine their research themes, plan bioethical studies, and write and publish their own research paper in international journals in the field of bioethics, applied ethics or philosophy.

【Evaluation for Grades and Credits】 Students are comprehensively evaluated for their course grades and credits based on the course hours completed, their understanding and critical comments on course materials provided by lecturer and their research topic, ability to plan their own research, interpret the obtained results and develop valid arguments based on bioethical deliberation. The presentation at the academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

1. Understanding of major discussions on bioethical issues published in relevant international journals
2. Acquired knowledge of issues and arguments in the field
3. Well thought description of the implications of the results of their own research
4. Ability to discuss, present, and write bioethics paper(s) in English
5. Ability to appropriately summarize their own research results and discussions

**Research Conducting Program:
Bioethics
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21830

(Elective/Required: 8 credits)

Supervisor: Yasuhiro Kadooka
Program Schedule: year 1-4, every Friday (6th-7th periods)
Site and Facilities: seminar room at Department of Bioethics

【Course Description】 The aim of this course is to learn how to accomplish a descriptive empirical research regarding major bioethical problems. Participating students are required to conduct their own research, write and publish research paper(s) in international journals in the relevant fields.

【Evaluation for Grades and Credits】 Students are comprehensively evaluated for their course grades and credits based on the course hours completed, acquisition of research method(s), close analysis and critical interpretation of attributed data, deliberate discussion, and presentation of them. The presentation at the academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

1. Ability to review appropriate literature, identify unresolved bioethical issues and determine their own research themes
2. Ability to plan research projects
3. Ability to conduct their research projects as planned
4. Ability to discuss the implications of their own research and relevant arguments, summarize and present their own research results, make a presentation at an academic meeting, and write and publish articles in international academic journal(s)

Research Conducting Program: Respiratory Medicine Departmental Course “Jissen” I (PhD Thesis Research)	Subject Code 22790 (Required: 10 credits)
<p>Supervisor: Hirotsugu Kohrogi, Kazuhiko Fujii, Hidenori Ichiyasu, Shinichiro Okamoto, Susumu Hirotsako, Keisuke Kojima, Sho Saeki</p> <p>Program Schedule: year 1-4, every Monday (4th period)</p> <p>Site and Facilities: seminar room and laboratories at Department of Respiratory Medicine, and Souken</p>	
<p>【Course Description】 The aim of this Departmental Course is to learn how to summarize clinical and experimental data for clinical implication by investigating airway and pulmonary inflammation with immunological, allergological, microbiological approach. Additionally, pathogenesis of lung cancer is investigated by genetic analysis. To learn cell biology on respiratory cells obtained by bronchoalveolar lavage and lung biopsy, high quality of papers on respiratory medicine are choose to discuss the scientific and medical values of the research. On the bases of above-mentioned processes, clinically obtained specimens and experimental models of lung diseases are investigated. Finally, the experimental results should be reported at the international conferences and published on international scientific journals in the fields of respiratory medicine and its related fields. All instructions of these processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.</p>	
<p>【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for respiratory medicine including allergy, infection, interstitial lung disease and lung cancer, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.</p>	
<p>【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.</p> <ol style="list-style-type: none"> 1) Histochemical staining and its diagnosis are understood, and relating novel findings are obtained 2) Immunohistochemical staining and its diagnosis are understood, and relating novel findings are obtained. 3) Experimental model analysis and genetic analysis are understood, and relating novel findings are obtained 4) Proposal of appropriate research projects on the basis of understanding the background of the respiratory diseases, and the projects should be described and the experiment should be done. 	

Research Conducting Program: Respiratory Medicine Departmental Course “Jissen” II (Experimental Technique Learning)	Subject Code 22920 (Elective/Required: 8 credits)
<p>Supervisor: Hirotsugu Kohrogi, Naoki Saita, Kazuhiko Fujii, Hidenori Ichiyasu, Keisuke Kojima, Sho Saeki</p> <p>Program Schedule: year 1-4, every Tuesday (3rd-4th periods)</p> <p>Site and Facilities: seminar room and laboratories at Department of Respiratory Medicine, and Souken</p>	
<p>【Course Description】 The aim of this class is to acquire the techniques to analyze clinical and experimental data for clinical implication by investigating airway and pulmonary inflammation with immunological, allergological, microbiological approach. Additionally, pathogenesis of lung cancer is investigated by genetic analysis. Respiratory infectious disease and acute respiratory distress syndrome (ARDS) are investigated by using clinical protocol for finding their diagnosis and therapy. In interstitial lung disease, lung remodeling mechanism probably induced by cytokines is investigated by molecular biological approach on lung cells and inflammatory cells. The results should be reported at the international conferences and published on international scientific journals in the fields of respiratory medicine and its related fields.</p>	
<p>【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student’s presentation and discussion at the laboratory and academic meetings.</p>	
<p>【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.</p> <ol style="list-style-type: none"> 1) Acquisition of experimental skills of histochemical staining and its diagnosis. 2) Acquisition of experimental skills of immunohistochemical staining and its diagnosis. 3) Acquisition of experimental model analysis and genetic analysis 4) Planning the experiment of research projects and analyze the obtained data for further research. 5) Analysis of the results and reporting at international conferences and scientific journals. 	

**Research Conducting Program:
Cardiology
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22800

(Required: 10 credits)

Supervisor: Hisao Ogawa, Seiji Hokimoto, Koichi Kaikita

Program Schedule: year 1-4, every Tuesday (6th period)

Site and Facilities: seminar room and laboratories at Department of Cardiovascular Medicine

【Course Description】 The aim of this Departmental Course is to learn how to propose scientific hypothesis for the mechanisms of pathogenesis of cardiovascular diseases. The hypothesis must then be proven experimentally. On the basis of the results obtained, further experimental design will be constructed to develop a novel approach for prevention and treatment of cardiovascular diseases. Specific research projects to be executed should be determined by searching latest literatures related to the cardiovascular diseases. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of research. Finally, the experimental results should be reported in international scientific journals in the fields of cardiovascular medicine. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course. The content of this Course is the followings: 1) To learn the coagulation and fibrinolytic biomarkers that are related to the pathogenesis of acute coronary syndrome, and discuss the merits and demerits of the clinical assessment in the platelet activation; 2) To learn the clinical evidences for Japanese population based on prospective studies linking with clinical practice; 3) To learn the theories and methods of the gene analysis by using the DNA microarray; 4) To establish the mouse models of experimental myocardial infarction or ischemia / reperfusion, analyze the molecules related to cardiac remodeling and myocardial ischemia / reperfusion injury; 5) To learn the mechanism in the expression of atherogenic molecules in cultured vascular endothelial cells and vascular smooth muscle cells; 6) To explore the stimulating factors which cause the myocardial hypertrophy by using the rat neonatal myocardium. 7) To learn the theories and methods to generate genetically altered mice. 8) To learn how to evaluate physiological parameters in small animal by using echocardiography and micro catheter.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research, and the ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Proposal of appropriate research projects on the basis of understanding the background on the pathogenesis of cardiovascular diseases.
- 2) Understanding how to perform the experiments related to the basic and clinical cardiovascular researches described in the Course Description.
- 3) Appropriate experimental design to identify the important factors for the pathogenesis of cardiovascular diseases.
- 4) Novel findings obtained by appropriate and proper analytical approaches.
- 5) Original and innovative findings that can contribute to better understanding for cardiovascular pathogenesis.
- 6) Acquisition of knowledge and skills to generate genetically altered mice and to evaluate their phenotypes.

**Research Conducting Program:
Cardiology
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22930

(Elective/Required: 8 credits)

Supervisor: Hisao Ogawa, Seiji Hokimoto, Koichi Kaikita

Program Schedule: year 1-4, every Thursday (6th-7th periods)

Site and Facilities: seminar room and laboratories at Department of Cardiovascular Medicine

【Course Description】 The aim of this class is to acquire the techniques to analyze the pathogenesis and mechanism of cardiovascular diseases. Specifically, experimental techniques to be earned in this course include ELISA to measure the biomarkers of blood coagulation and fibrinolysis in ischemic heart diseases. The experimental techniques also include the measurements of platelet aggregation by using the optical density change or light scattering. You learn how to isolate and culture vascular endothelial and smooth muscle cells, and neonatal rat cardiomyocytes. Difference of rat myocyte hypertrophy induced by various stimulators is observed in light microscopy. Protein or mRNA extraction, Western blot, and real-time RT-PCR analysis by using the samples of cardiovascular tissues and cultured cells are also studied in this Departmental Course. You learn the theories and methods how to generate genetically altered mice. Their phenotypes are analyzed by various modalities including echocardiography and micro catheter.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition and understanding of skills to perform ELISA for the measurement of the biomarkers of blood coagulation and fibrinolysis in ischemic heart diseases.
- 2) Understanding how to measure platelet aggregation by using the optical density change or light scattering.
- 3) Acquisition of experimental techniques to isolate and culture vascular endothelial and smooth muscle cells, and neonatal rat cardiomyocytes.
- 4) Acquisition of experimental skills to observe phenotype difference of rat myocyte hypertrophy induced by various stimulators by using light microscopy.
- 5) Understanding of protein or mRNA extraction, Western blot, and real-time RT-PCR analysis from the samples of cardiovascular tissues and cultured cells.
- 6) Acquisition of knowledge and skills to generate genetically altered mice and to evaluate their phenotypes.

**Research Conducting Program:
Endocrinology and Metabolism
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20700

(Required: 10 credits)

Supervisor: Eiichi Araki

Program Schedule: year 1-4, every Tuesday (1st and 2nd period)

Site and Facilities: seminar room and laboratories at Department of Metabolic Medicine

【Course Description】 Select several manuscripts concerning the mechanisms of the action of hormones and the cause of metabolic or endocrinological diseases, and learn the molecular biological methods that are used for the analysis. Moreover, how these techniques are applied to reveal underlying mechanism and to create the novel treatment of the metabolic or endocrinological diseases will be maneuvered by the rap session. Furthermore, after the intensive analysis at the levels of gene, protein, organs and individuals on the mechanisms of the metabolic or endocrinological diseases, make discussion concerning the meaning and application to diagnosis and to treatment of the obtained results. Finally, learn how to present the results and make manuscripts.

【Evaluation for Grades and Credits】 It depends on reports. The presentation technique including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Understanding the emergence mechanism of hormone action as well as metabolic and endocrinological diseases.
- 2) Understanding the emergence mechanism of arteriosclerosis, dyslipidemia and diabetic complications.
- 3) Understanding the molecular biological methods to analyze the diseases.
- 4) Ability to apply the molecular biological methods to analyze the disease.
- 5) Ability to analyze the mechanism of the metabolic and endocrinological diseases, with regard to the levels of gene, protein, organs and individuals.
- 6) Understanding the meaning of the results and ability to apply the results to diagnosis and treatment of the diseases
- 7) Ability to summarize the results to the manuscript.

**Research Conducting Program:
Endocrinology and Metabolism
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21510

(Elective/Required: 8 credits)

Supervisor: Eiichi Araki

Program Schedule: year 1-4, every Monday (1st and 2nd period)

Site and Facilities: seminar room and laboratories at Department of Metabolic Medicine

【Course Description】 Practice about the followings, 1) design of a expression vector which express appropriate molecule, 2) construct the vector and introduce it into cells, 3) methods to analyze the expression and function of the expressed molecule, 4) methods to identify mutations of the genes involve in metabolic and endocrine diseases, 5) methods to analyze the function of the mutated genes by using reverse genetical techniques.

【Evaluation for Grades and Credits】 It depends on reports. The presentation technique including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Ability to design and construct vectors which express requested molecules, and introduce them to appropriate cells.
- 2) Ability to analyze expression and function of the aimed molecule by various methods.
- 3) Ability to identify the mutation of the genes involved in the metabolic and endocrine diseases.
- 4) Ability to analyze the function of the mutated genes *in vitro* and *in vivo*.
- 5) Ability to create and analyze genetically modified animals.

**Research Conducting Program:
Nephrology
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20720

(Required: 10 credits)

Supervisor: Masashi Mukoyama
Program Schedule: year 1-4, every Monday (6th period)
Site and Facilities: to be announced

【Course Description】 The aim of this Departmental Course is to learn how to propose scientific hypothesis for the elucidation of the molecular pathophysiology of the kidney diseases. Then, students should learn the methods of the molecular biology, cell biology, protein chemistry, and molecular genetics to design the experimental strategy to prove the hypothesis. The nephron is composed of a variety of differentiated epithelial cells and the function of each nephron segment is completely different from the others. Students should learn the heterogeneity of each nephron segment function and the diversity of the kidney disease phenotypes that is caused by the disorder of a single nephron segment. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of research. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for renal physiology and kidney diseases, and , and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Students should complete more than 75% of the total course hours.
- 2) Understanding the functional heterogeneity of the nephron segment.
- 3) Understanding the distribution of the ion channels, ion transporters, and hormonal receptors along the nephron segment.
- 4) Understanding the pathophysiology of the kidney diseases related to the functional disorders of the ion channel/transporters and the hormonal receptors.

**Research Conducting Program:
Nephrology
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21530

(Elective/Required: 8 credits)

Supervisor: Masashi Mukoyama
Program Schedule: year 1-4, every Tuesday (6th-7th periods)
Site and Facilities: to be announced

【Course Description】 The aim of this class is to acquire the techniques to analyze the expression levels of specific genes and proteins from the isolated kidneys from rats and mice as well as from the cultured mammalian cells. Specifically, students are required to learn the regulatory mechanisms of gene expression by measuring the expression levels of ion channels/transporters in the animal disease model. Also, students are required to learn the molecular pathophysiology of the "ion channelopathies" by investigating the structure-function relationships of the ion channel/transporters. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of research. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for renal physiology and kidney diseases, and , and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Students should complete more than 75% of the total course hours.
- 2) Understanding the techniques to isolate and analyze the expression levels of mRNA and the DNA sequences.
- 3) Understanding the techniques to isolate and analyze the expression levels of protein and its function.
- 4) Understanding the techniques to culture mammalian cells.

Research Conducting Program: Gastroenterology and Hepatology Departmental Course "Jissen" I (PhD Thesis Research)	Subject Code 20690 (Required: 10 credits)
Supervisor: Yutaka Sasaki, Motohiko Tanaka, Hideaki Naoe, Masakuni Tateyama, Takashi Shono, Takehisa Watanabe, Tetsuya Murao, Kotaro Fukubayashi, Shunpei Hashigo Program Schedule: year 1-4, every Friday(1st period) Site and Facilities: Seminar room and laboratory at Department of Gastroenterology & Hepatology	
【Course Description】 Cancer incidence of organs in digestive tracts and liver are high and the patterns of carcinogenesis are fundamentally based on chronic inflammation. Aim of this course is to elucidate molecules responsible for the process from inflammation to carcinogenesis. For this aim, planning experiments with cell lines and animal model, perform these experiment through molecular biological technique. Furthermore, validate roles of the relevant molecules by using human tissue and serum. Finally, supervise oral presentation and writing papers.	
【Evaluation for Grades and Credits】 Students are totally evaluated for their understanding and critical power about articles related to their own research theme, planning experiments, oral presentation and report regarding obtained results.	
【Evaluation Criteria】 The report will be evaluated regarding the criteria listed below depending on each research theme. 1) Comprehension on clinical evidence related to gastrointestinal and liver carcinogenesis 2) Comprehension on traditional basic research about the gastrointestinal and liver carcinogenesis 3) Comprehension on up-to-date information about relation between inflammation and carcinogenesis, obtaining new research results 4) Comprehension on previous knowledge related to the research theme through learning references, and experiment based on appropriate planning.	

Research Conducting Program: Gastroenterology and Hepatology Departmental Course "Jissen" II (PhD Thesis Research)	Subject Code 21500 (Elective/Required: 8 credits)
Supervisor: Yutaka Sasaki, Motohiko Tanaka, Hideaki Naoe, Masakuni Tateyama, Takashi Shono, Takehisa Watanabe, Tetsuya Murao, Kotaro Fukubayashi, Shunpei Hashigo Program Schedule: year 1-4, every Thursday(2nd period) Site and Facilities: Seminar room and laboratory at Department of Gastroenterology & Hepatology	
【Course Description】 Aim of this course is to supervise practice to comprehend experimental skills for cell line, animal model and human tissue. Specifically, these techniques include such as real-time PCR, Northern blotting, Southern blotting, DNA microarray, Western blotting, 2D-DIGE, siRNA.	
【Evaluation for Grades and Credits】 Students are evaluated based on the comprehension of experimental technique and report. It is possible to substitute original paper, presentation in academic conference or progress report in laboratory meeting instead of report.	
【Evaluation Criteria】 The evaluation is based on the criteria listed below depending on each research theme. 1) Acquire the skills of extracting and sampling genes and protein from cell lines and animal models. 2) Acquire the skills of analyzing gene expression after understanding basic rationale of them 3) Acquire the skills of analyzing protein expression after understanding basic rationale of them. 4) Acquire the skills of regulating target molecules function after understanding basic rationale of hem. 5) Planning appropriate experiments for determined research theme and put it into practice.	

Research Conducting Program : Hematology Departmental Course “Jissen” I (PhD Thesis Research)	Subject Code 20710 (Required: 10 credits)
Supervisor: Hiroaki Mitsuya, Yutaka Okuno Program Schedule: year 1-4, every Friday (6th period) Site and Facilities: seminar room and laboratories at Department of Hematology	
【Course Description】 The aim of this course is to advance the knowledge and understanding of the attendees on the emergence mechanism of leukemia, malignant lymphoma, and multiple myeloma and historical processes on the emergence and to help the attendees learn molecular mechanisms of ontogeny and differentiation of stem cells and molecular basis of hematological malignancies. Identification of new molecular targeted drugs will be discussed and examined. Finally, the experimental results are to be reported at the international conferences and published on international scientific journals.	
【Evaluation for Grades and Credits】 Students are evaluated for attendance to seminars, the understanding and ability of scientific and practical criticism on the relevant issues. In addition, the attendees' ability of experimental planning, interpretation and criticism of the results are promoted. Publication and presentations including discussions in the laboratory and academic meetings are also taken into consideration for assessment.	
【Evaluation Criteria】 The achievement will be evaluated according to the following criteria. 1) Understanding of ontogeny and differentiation of hematopoietic stem cells 2) Understanding of emergence of hematological malignancies 3) Understanding of basic and clinical research aiming at development of new therapeutic drugs 4) Planning and execution of experiments on the relevant research themes	

Research Conducting Program : Hematology Departmental Course “Jissen” II (Experimental Technique Learning)	Subject Code 21520 (Elective/Required: 8 credits)
Supervisor: Hiroaki Mitsuya, Yutaka Okuno Program Schedule: year 1-4, every Tuesday (6-7th period) Site and Facilities: seminar room and laboratories at Department of Hematology	
【Course Description】 The aim of this class is to learn the basis of classification, characteristics, and treatment of hematological malignancies. Understanding of molecular targeted drugs used in clinical fields and their effects is also aimed.	
【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.	
【Evaluation Criteria】 The achievement will be evaluated according to the following criteria. 1) Understanding of classification and characteristics of hematological malignancies 2) Understanding of molecular targeted drugs of hematological malignancies 3) Understanding of <i>in vivo</i> and <i>in vitro</i> evaluation methods of drug treatment	

Research Conducting Program :

Subject Code 20770

Rheumatology

Departmental Course "Jissen" I

(PhD Thesis Research)

(Required: 10 credits)

Supervisor: Hiroaki Mitsuya, Shinya Hirata

Program Schedule: year 1-4, every Thursday (6th period)

【Course Description】

The aim of this course is to advance the understanding of the attendees on the mechanisms of the immune system, control of immune reactions, immune tolerance, emergence of auto immune diseases, and effector cells of immune reactions and to help the attendees examine clinical samples of salivary glands and synovium tissues by immunohistochemical and genetic methods. Pathogenesis of auto immune diseases is investigated using the methods of genetic analysis, induction of apoptosis, cytokine assay, and analyses of cell surface. Experimental results obtained are to be reported at the international conferences and published in international scientific journals.

【Evaluation for Grades and Credits】

Students are evaluated for attendance to seminars, the understanding and ability of scientific and practical criticism on relevant issues. In addition, the attendees' ability of experimental planning, interpretation and criticism of the results are promoted. Publication and presentations including discussions in the laboratory and academic meetings are also taken into consideration for assessment.

【Evaluation Criteria】

The achievement will be evaluated according to the following criteria.

- 1) Acquisition of the newest information on mechanisms of emergence of collagen diseases
- 2) Acquisition of the newest information on antigen recognition by immune system
- 3) Acquisition of the newest issues on clinical application of control of immune reactions
- 4) Planning and execution of experiments of the relevant research based on the scientific information

Research Conducting Program :

Subject Code 21580

Rheumatology

Departmental Course "Jissen" II

(Experimental Technique Learning)

(Elective/Required: 8 credits)

Supervisor: Hiroaki Mitsuya, Shinya Hirata

Program Schedule: year 1-4, every Tuesday (6-7th period)

Site and Facilities: seminar room and laboratories at Department of Hematology and Rheumatology

【Course Description】

The aim of this class is to understand experimental methods for mechanisms of immune system, control of immune reactions, immune tolerance, emergence of auto immune diseases and to analyze clinical samples of salivary glands and synovium tissues by immunohistochemical and genetic methods, induction of apoptosis, cytokine assay, and analyses of cell surface. The experimental results should be reported at the international conferences and published on international scientific journals.

【Evaluation for Grades and Credits】

Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】

The achievement will be evaluated according to the following criteria.

- 1) Acquisition of experimental skills of immunohistochemical staining and analysis of salivary glands and synovium tissues from clinical samples and animal models
- 2) Understanding of autoantibodies used for autoimmune diseases and spectrum of the positivity of the antibodies among the diseases
- 3) Acquisition of update information on control of immune reactions and its clinical applications
- 4) Planning and execution of the experiment on relevant research projects based on the newest scientific information

Research Conducting Program : Infectious diseases Departmental Course "Jissen" I (PhD Thesis Research)	Subject Code 20580
Supervisor: Hiroaki Mitsuya, Tatsuya Kawaguchi, Toshikazu Miyakawa Program Schedule: year 1-4, every Thursday (6th period) Site and Facilities: seminar room and laboratories at Department of Infectious diseases	(Required: 10 credits)
【Course Description】 The aim of this course is to advance the knowledge and understanding of the attendees on the issues of development of anti-human immunodeficiency virus (HIV) drugs, the mechanisms of action of such drugs, and the mechanisms of drug resistance of the virus and further to learn selected methods of drug design for overcoming the resistance and exploration of new molecular targets for development of new drugs. Experiments for elucidation of the resistance and screening for the drug resistance are also planned and practiced. The results should be summarized, reported at the international conferences, and published on international scientific journals.	
【Evaluation for Grades and Credits】 Students are evaluated for their attendance to seminars, their understanding and ability of criticism on the relevant issues. In addition, ability for experimental planning, interpretation and criticism of the results are considered. Publication and presentations including discussion at the laboratory and academic meetings are also taken into consideration for assessment.	
【Evaluation Criteria】 The achievement will be evaluated according to the following criteria. 1) Understanding of life cycle of HIV through invasion to liberation from host cells and responses of the infected host 2) Understanding of structures and functions of HIV genes 3) Understanding of characteristics of anti-HIV drugs and mechanisms of drug resistance 4) Understanding and practice of methods of cell culture, isolation of virus, gene recombination 5) Planning and execution of experiments along the research themes	

Research Conducting Program : Infectious diseases Departmental Course "Jissen" II (Experimental Technique Learning)	Subject Code 21390
Supervisor: Hiroaki Mitsuya, Tatsuya Kawaguchi, Toshikazu Miyakawa Program Schedule: year 1-4, every Tuesday (6-7th period) Site and Facilities: seminar room and laboratories at Department of Infectious diseases	(Elective/Required: 8 credits)
【Course Description】 The aim of this class is to learn experimental methods for research of emerging and re-emerging infections and further to learn usage of clinical samples in safe, isolation of virus and immune cells, epidemiological research methods, tissue culture, and basic methods of immunobiology and molecular biology.	
【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.	
【Evaluation Criteria】 The achievement will be evaluated according to the following criteria. 1) Understanding of emergence, re-emergence, and opportunistic infections. 2) Understanding of epidemiological methods for nosocomial infections	

**Research Conducting Program :
Neurology
Departmental Coarse "Jissen" I
(PhD Thesis Research)**

Subject Code 20750

(Required: 10 credits)

Supervisor: Yukio Ando, Yasushi Maeda
Program Schedule: year 1-4, every Tuesday(6th period)
Site and Facilities: seminar room and laboratories at Department of Neurology

【Course Description】 The aim of this Departmental Coarse is to learn the achievement of modern neurology regarding etiology, and pathologic elucidation of hereditary neurodegenerative diseases. Students are required to practice on several disease models and evaluate likelihood of clinical application and future prospects of gene therapy as well as regenerative therapy on such diseases. Furthermore, characteristics of various viral vectors to be used in gene therapies, problems in exon skipping, and possibility of regenerative therapy to use iPS and stem cells for advanced cases (usually excluded from gene therapy nor exon skipping therapy), are studied during the coarse. All research results mentioned above are summarized in a thesis, and a guidance will be provided to give an oral presentation.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the coarse hours completed, their understanding and knowledge earned about scientific information on recent progress in the field of their research, and ability for experimental planning and interpretation and criticism on the results obtained. The presentation including discussion at the laboratory and academic meetings and scientific papers cited in international peer-reviewed journal, are also taken into consideration to assess the level of achievements in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Novel research results are always updated and latest knowledge in neurology are obtained.
- 2) Obtaining knowledge about gene therapy, exon skipping, basic research on regenerative therapy and their clinical application.
- 3) Proposal of appropriate research projects and performing original and innovative experimental studies on the bases of conventional knowledge associated with their study theme.

**Research Conducting Program :
Neurology
Departmental Coarse "Jissen" II
(Experimental Technique Learning)**

Subject Code 21560

(Elective/Required: 8 credits)

Supervisor: Yukio Ando, Yasushi Maeda
Program Schedule: year 1-4, every Thursday (6th-7th periods)
Site and Facilities: seminar room and laboratories at Department of Neurology

【Course Description】 The aim of this class is to acquire the basic techniques required to develop the gene therapy, regenerative therapy for laboratory mice as well as human subjects, such as cell culture, immuno-histochemistry, Western blotting, and molecular biologic experimental maneuvers. Depending on need for their own projects, training about observation of immunostaining specimens, electron microscope, a viral vector making, and cell culture will be trained.

【Evaluation for Grades and Credits】 Students are evaluated for their coarse grades and credits based on the coarse hours completed, their experimental skills and techniques acquired during this coarse, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion or progress reports at the laboratory meeting, presentation in academic meetings or peer-reviewed papers cited on academic journals.

【Evaluation Criteria】 The achievement on each student's research thesis will be evaluated according to the following criteria.

- 1) Acquisition of experimental skills for cell culturing, immuno-histostaining, and Western blotting.
- 2) Acquisition of maneuver to transfer therapeutic gene into viral vector.
- 3) Acquisition of basic experimental techniques used in the field of gene therapy required in animal models.
- 4) Logical/proper experimental study protocol being planned and carried out continuously.

**Research Conducting Program:
Pediatrics
Departmental Course "Jissen" I**

Subject Code 20740

(PhD Thesis Research)

(Required: 10 credits)

Supervisor: Fumio Endo
Program Schedule: year 1-4, every Thursday (6th period)
Site and Facilities: to be announced

【Course Description】

Offers a broad range of studies related to genes and human disorders, gene therapy, regenerative medicine. Provides a detailed analysis of molecular approaches used to characterize the various human disorders and gene therapy for the genetic disorders, which has been recently applied to cure the genetic disorders of children. Ethical issues related to ethical issues in the field of genetic medicine are included

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the mini-report about understanding of contents provided in each study theme above mentioned tasked at the end of each class.

【Evaluation Criteria】

Understanding the pathophysiology of Genetic disorders
Understanding the basic features of stem cells and recent research.
Understanding of the clinical uses of gene therapy for genetic disorders.
Understanding the regenerative medicine

**Research Conducting Program:
Pediatrics
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21550

(Elective/Required: 8 credits)

Supervisor: Fumio Endo
Program Schedule: year 1-4, every Tuesday (6th-7 period)
Site and Facilities: to be announced

【Course Description】

Provides importance of animal models in genetic medicine, a detailed analysis of animal models of human genetic disorders, molecular approaches used to characterize the primary gene defects of animal models, and gene therapy for various heritable human disorders with emphasis on the most recent developments.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the mini-report about understanding of contents provided in each study theme above mentioned tasked at the end of each class.

【Evaluation Criteria】

Understanding the studies of animal models for Genetic disorders
Understanding the regenerative medicine
Understanding the basic features of stem cells
Understanding of the clinical uses of gene therapy

**Research Conducting Program:
Diagnostic Medicine
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 23080

(Required: 10 credits)

Supervisor: Hirotaka Matsui
Program Schedule: year 1-4, every Tuesday (6th period)
Site and Facilities: seminar room and laboratories at Department of Diagnostic Medicine

【Course Description】 The aim of this course is to learn the process of some notable phenomenal findings in the field of laboratory medicine, and how to verify the working hypotheses for its pathogenesis by giving actual examples. Especially, we will focus on collecting information about laboratory procedure and diagnostic medicine required for "translational research", which links basic medical sciences and clinical researches. Research projects should be proposed and examined by using the methods of molecular genetics, cell biology, molecular biology, developmental engineering, and laboratory medicine. Human samples (bloods, tissues, spinal and other various fluids) will be used and investigated for research projects. On the basis of laboratory medicine, new methods which can make a diagnosis and the analysis of the pathological condition should be studied. Finally, the research progresses in the above-mentioned processes are necessary to fulfill requirements for PhD thesis, and reported by oral presentation.

【Evaluation for Grades and Credits】 Students are comprehensively evaluated for their course grades and credits based on the course hours completed, their understanding of research papers, ability to criticize and propose research projects, and presentation and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated by the following criteria.

- 1) Acquisition of experimental skills for laboratory medicine of various diseases and obtaining novel findings.
- 2) Understanding how to perform the experimental procedures in laboratory medicine and making research progress.
- 3) Acquisition of experimental skills for basic medical sciences associated with development of brand-new methods or clinical applications and obtaining new results.
- 4) Logical/proper experimental design for specific research project by appropriate and proper analytical approaches.

**Research Conducting Program:
Diagnostic Medicine
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 23090

(Elective/Required: 8 credits)

Supervisor: Hirotaka Matsui
Program Schedule: year 1-4, every Thursday (6th-7th periods)
Site and Facilities: seminar room and laboratories at Department of Diagnostic Medicine

【Course Description】 Recent advance in comprehensive genome analysis led to the identification of many somatic as well as germ-line gene mutations that are involved in the development of malignancies. Therefore, it is expected that malignancies will be able to be diagnosed at a high sensitivity in the department of diagnostic medicine in the near future. Meanwhile, oncologists engaged in diagnostic medicine are required to understand molecular pathogenesis of malignancies. With these backgrounds, the experiments in this course include gene mutation searching, cDNA cloning and functional analysis of mutant proteins. The education is aimed at the development of students' faculties to plan and execute experiments that will be necessary to settle unresolved issues by the students themselves. In addition, newly-introduced analytical techniques in laboratory medicine including mass-spectrometry will be introduced to the students.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated by the following criteria.

- 1) Ability to collect and understand the manuscripts (written in English) that are helpful to their own research projects.
- 2) Understanding the principles of general analytical methods in molecular biology as well as in biochemistry.
- 3) Acquisition of skills to perform experiments by themselves and of ability to interpret the results of the experiments appropriately.
- 4) Comprehension of analytical methods that can be utilized for the resolution of uncertain issues in the research field of oncology.
- 5) Ability to perform presentations of their own research.
- 6) Understanding the previous innovate findings in the research area of laboratory medicine.

**Research Conducting Program:
Diagnostic Radiology
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20630

(Required: 10 credits)

Supervisor: Yasuyuki Yamashita
Program Schedule: year 1-4, every Wednesday (2th period)
Site and Facilities: Diagnostic Radiology Conference Room 6F

【Course Description】 The aim of this Departmental Course is to learn how imaging technology development has been applied to diagnosis various diseases and how it has contributed to the improvement of treatment outcome. Practical knowledge of diagnostic radiology, including the role of MR,CT, nuclear medicine, ultrasound and interventional radiology will be discussed. In addition, radiological anatomy of various organs will be studied. The clinical results should be presented in the conference.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for diagnostic radiology, and ability for experimental and clinical study planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Understanding and knowledge of the principle and method of diagnostic radiology and radiological anatomy.
- 2) Proposal and execution of appropriate research projects in imaging. studies
- 3) Proposal and execution of appropriate research projects in other imaging techniques.

**Research Conducting Program:
Diagnostic Radiology
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21440

(Elective/Required: 8 credits)

Supervisor: Yasuyuki Yamashita
Program Schedule: year 1-4, every Tuesday (3th-4th periods)
Site and Facilities: Diagnostic Radiology Conference Room 6F

【Course Description】 The aim of this Departmental Course is to learn how various imaging modalities including MR,CT, nuclear medicine, ultrasound and interventional radiology has been applied to diagnosis various diseases of various organs including brain, head&neck, chest, abdomen, pelvis and musculoskeletal systems. Practical knowledge of diagnostic radiology and imaging findings will be discussed. In addition, the principle and method of 3-D rendering technique and image processing will be also discussed using dedicated workstation. The experimental or clinical results should be reported in international scientific journals in the fields of diagnostic radiology.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, the degree of understanding of diagnostic radiology acquired during the course and reports submitted for evaluation.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Understanding and knowledge of the principle and method of diagnostic radiology and 3-D imaging.
- 2) Proposal and execution of appropriate research projects in 3-D imaging.
- 3) Proposal and execution of appropriate research projects in other imaging techniques.

**Research Conducting Program:
Radiation Oncology
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20620

(Required: 10 credits)

Supervisor: Natsuo Oya
Program Schedule: year 1-4, every Friday (6th period)
Site and Facilities: Radiotherapy Planning Room , New Clinical Laboratory and Examination Center BF

【Course Description】 The aim of this Departmental Course is to learn how biological and technological development has been applied to cancer radiotherapy and how it has contributed to the improvement of cancer treatment outcome. By patients undergoing radiotherapy, practical knowledge of radiation oncology and radiotherapy, including the role of radiotherapy in cancer treatment, the procedure of eligibility decision, the technique of radiotherapy field setting and dose fractionation planning, the technique of irradiation, will be discussed. In addition, the principle and method of high-precision 3-D conformal external beam radiotherapy, including stereotactic radiotherapy, intensity modulated radiotherapy and functional image-incorporating radiotherapy, will be also discussed by participating in treatment planning or phantom experiments. The experimental or clinical results should be reported in international scientific journals in the fields of radiation oncology.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for radiation oncology, and ability for experimental and clinical study planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.
1) Understanding and knowledge of the principle and method of radiation oncology and high-precision 3-D conformal external beam radiotherapy.
2) Proposal and execution of appropriate research projects in high-precision 3-D conformal external beam radiotherapy.
3) Proposal and execution of appropriate research projects in other radiotherapy techniques.

**Research Conducting Program:
Radiation Oncology
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21430

(Elective/Required: 8 credits)

Supervisor: Natsuo Oya
Program Schedule: year 1-4, every Thursday (6th-7th periods)
Site and Facilities: Radiotherapy Planning Room , New Clinical Laboratory and Examination Center BF

【Course Description】 By patients undergoing radiotherapy, practical knowledge of radiation oncology and radiotherapy, including the role of radiotherapy in cancer treatment, the procedure of eligibility decision, the technique of radiotherapy field setting and dose fractionation planning, the technique of irradiation, will be discussed. Students are encouraged to learn how to operate the radiotherapy planning system, to designate adequate radiotherapy plans for various clinical cases, and to evaluate the plans experimentally. They are also encouraged to participate in the clinical conferences to understand the role of radiation oncology as an important part of the multi-disciplinary cancer treatment

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, the degree of understanding of radiation oncology, their radiotherapy planning techniques acquired during the course and reports submitted for evaluation.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.
1) Understanding and knowledge of the principle and method of radiation oncology.
2) Understanding of the treatment procedure of radiotherapy.
3) Acquisition of radiotherapy planning techniques.
4) Proposal and execution of appropriate experimental radiotherapy planning.
5) Understanding of the practice of clinical radiotherapy.

**Research Conducting Program:
Neuropsychiatry
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22810

(Required: 10 credits)

Supervisor: Manabu Ikeda
Program Schedule: year 1-4, every Tuesday (6th period)
Site and Facilities: seminar room and laboratories at Department of Neuropsychiatry

【Course Description】 The aim of this Departmental Course is to learn about procedure to evaluate psychiatric and behavioral symptoms of clinical cases of dementia and related disorders such as Alzheimer's disease, neurosyphilis, carbon monoxide poisoning, encephalitis, Korsakoff syndrome and other organic psychiatric diseases. Further aim is to investigate procedure of research about relationship between psychiatric symptoms and cognitive impairments using neuropsychological techniques, to investigate appropriate method to identify neuronal bases of psychiatric and behavioral symptoms using neuroimaging techniques. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis and to present orally, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding literary works and reports earned about research theme, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of basic knowledge and being able to diagnose exactly and to evaluate symptoms in organic psychiatric disorders.
 - 2) Acquisition of the newest knowledge and getting novel result in research theme about psychiatric and behavioral symptoms in organic psychiatric disorders.
 - 3) Acquisition of the newest knowledge and getting novel result in clinical research by means of neuropsychological techniques and neuroimaging techniques.
- Acquisition of former knowledge with reference to research theme by learning about literatures, and making up and execution appropriate research plan.

**Research Conducting Program:
Neuropsychiatry
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22940

(Elective/Required: 8 credits)

Supervisor: Manabu Ikeda
Program Schedule: year 1-4, every Thursday (6th-7th periods)
Site and Facilities: seminar room and laboratories at Department of Neuropsychiatry

【Course Description】 The aim of this class is to acquire the techniques to analyze psychiatric and behavioral symptoms of dementia and related disorders such as Alzheimer's disease, neurosyphilis, carbon monoxide poisoning, encephalitis, Korsakov syndromes and organic psychoses. Specifically, experimental techniques to be earned in this course include clinical symptomatology, neuropsychology, and neuroimaging. Particular emphasis is placed also on assessment of psychiatric and behavioral symptoms using international evaluation scales, construction of databases by using spreadsheet applications, clinical statistical skills, and neuroimaging analysis, all of which will be thoroughly studied in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during their course, and reports submitted for evaluation. The report assessment can be submitted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of experimental skills to assess psychiatric and behavioral symptoms using validated evaluation scales.
- 2) Acquisition of experimental skills to assess cognitive dysfunction using appropriate neuropsychologic scales.
- 3) Acquisition of experimental skills to construct databases by using spreadsheet applications and clinical statistical skills.
- 4) Acquisition of experimental skills of neuroimaging analysis based on data of MRI and SPECT imaging.
- 5) Proposal of appropriate research projects to identify novel finding.

**Research Conducting Program:
General Medicine
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20650

(Required: 10 credits)

Supervisor: Shunji Kasaoka, Jun-ichi Taniguchi

Program Schedule: year 1-4

Site and Facilities: seminar room at Department of Emergency and General Medicine

【Course Description】 The aim of this Departmental Course is to learn how to practice general medicine. In addition, students should learn the effective teaching methods of basic medical competence. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis and to present orally, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for general medicine, and ability for interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of basic knowledge and teaching methods of general medicine.
- 2) Acquisition of the newest knowledge and getting novel result in research theme about general medicine.
- 3) Acquisition of former knowledge with reference to research theme by learning about literatures, and making up and execution appropriate research plan.

**Research Conducting Program:
General Medicine
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21460

(Elective/Required: 8 credits)

Supervisor: Shunji Kasaoka, Jun-ichi Taniguchi

Program Schedule: year 1-4

Site and Facilities: seminar room at Department of Emergency and General Medicine

【Course Description】 The aim of this Departmental Course is to learn how to practice general medicine. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis and to present orally, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the department and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of basic knowledge of general medicine.
- 2) Acquisition of the newest knowledge and getting novel result in research theme about general medicine.

**Research Conducting Program:
Health Care Science
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 21000

(Required: 10 credits)

Supervisor: Hideki Kishikawa, Hirofumi Soejima
Program Schedule: year 1-4, every Thursday (5th period)
Site and Facilities: Health Care Center at Kurokami Campus

【Course Description】 It is well-known that lifestyle-related disease is caused by the changes of life environment factors such as aging, food, exercise, sleep, and stress. In this departmental course, students learn how the life environment factors including food, exercise, sleep, and stress is associated with lifestyle-related disease such as obesity, diabetes mellitus, hypertension, and hyperlipidemia. Then, students learn the receptivity of salt and sweetness that influence feeding, learn cardiopulmonary function or blood coagulation in case of decreased exercise function, and learn mental psychological analysis to reveal response pattern for stress to examine the fluctuation of physiology function and exercise function through life cycle.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for health care science, and ability for study planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of the latest knowledge about lifestyle-related disease and disease in youth.
- 2) Proposal of appropriate research projects on the basis of understanding the background on health care science and execution of the study.

**Research Conducting Program:
Health Care Science
Departmental Course "Jissen" II
(Study Technique Learning)**

Subject Code 21810

(Elective/Required: 8 credits)

Supervisor: Hideki Kishikawa, Hirofumi Soejima
Program Schedule: year 1-4, every Thursday (5th period)
Site and Facilities: Health Care Center at Kurokami Campus

【Course Description】 In this departmental course, students measure the receptivity of salt and sweetness that influence feeding, measure cardiopulmonary function or blood coagulation in case of decreased exercise function, perform mental psychological analysis to reveal response pattern for stress to examine the fluctuation of physiology function and exercise function through life cycle. Specific research projects to be executed should be determined by searching latest literatures related to the health medicine. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of research.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their study skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of the latest knowledge about life style related disease and disease in youth.
- 2) Logical/proper study design to prove the hypothesis about health care science .
- 3) Novel findings obtained by appropriate analytical approaches.

**Research Conducting Program:
Clinical Chemistry and Informatics
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20640

(Required: 10 credits)

Supervisor: Tetsumi Irie, Yoichi Ishitsuka

Program Schedule: year 1-4, every Friday (1st period)

Site and Facilities: seminar room and laboratories at Department of Clinical Chemistry and Informatics

【Course Description】 The aim of this Departmental Course is to learn how to select optimally the dosage form and the mode of drug administration based upon the drug information accumulated during the research and development of pharmaceuticals. In addition, the techniques for biostatistics and computer-based analysis are acquired during this Course. Since the therapeutic window is quite narrow in the medicine used by the newborn baby and the infant, population pharmacokinetic parameters for the medicine can be determined based on the therapeutic drug monitoring data. These parameters can be used for designing individualized dosage regimen for the neonate in clinical practice in order to overcome the problem of "therapeutic orphans". Research projects and working hypothesis can be modified and improved depending on the progress and achievement of research. Finally, the experimental results should be reported in scientific journals in the fields of pharmaceutical sciences, pharmaceutical technology, drug delivery system, therapeutic drug monitoring, clinical chemistry and/or informatics. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for pharmaceuticals, clinical chemistry, and informatics, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Proposal of appropriate research projects on the basis of understanding the background on the pharmaceutical sciences, clinical chemistry and informatics.
- 2) Understanding how to analyze pharmacokinetic/pharmacodynamic data and design the individualized dosage regimen for patients.
- 3) Logical/proper experimental design to optimal drug delivery system.
- 4) Novel findings obtained by appropriate and proper analytical approaches.
- 5) Original and innovative findings that can contribute not only to pharmaceutical sciences for the research and development of pharmaceuticals but also to the optimal individualized dosage regimen for patients in clinical practices.

**Research Conducting Program:
Clinical Chemistry and Informatics
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21450

(Elective/Required: 8 credits)

Supervisor: Tetsumi Irie, Yoichi Ishitsuka

Program Schedule: year 1-4, every Thursday (3rd-4th periods)

Site and Facilities: seminar room and laboratories at Department of Microbiology

【Course Description】 The aim of this class is to acquire the techniques to analyze the concentrations of drugs and their metabolites and various biomarkers in the biophases such as saliva, blood, urine, cerebrospinal fluid, bronchoalveolar lavage fluid, and various tissues. Based on such quantitative and/or qualitative information, population pharmacokinetic parameters of the drugs can be determined and these parameters can be used for the designing of optimal and individualized drug dosage regimen in patients. In particular, experimental techniques to be earned in this course include establishment of experimental hypoxia models of animals, such as guinea-pigs and rats, and cultured cells, and analysis of various inflammatory mediators and signaling factors produced in cells and tissues. Particular emphasis is placed also on safe and proper use of drugs such as xanthines and doxapram administered to neonates with apnea.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of experimental skills to produce animal models for pulmonary injury and apnea.
- 2) Understanding how to detect and identify pro-inflammatory mediators and signaling factors, and determine their biological activities.
- 3) Acquisition of experimental techniques to determine the concentration of drugs and their metabolites and surrogate biomarkers for diseases in biophases and their implication.
- 4) Understanding of chemical reactivities, biological functions, identification/detection methods of reactive oxygen species and their impacts to pathogenesis.

**Research Conducting Program:
Medical Information Sciences
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20660

(Required: 10 credits)

Supervisor: Koichiro Usuku, Jun Hirose
Program Schedule: year 1-4, every Thursday (6th period)
Site and Facilities: professor's room or seminar room at Department of Medical Information Sciences

【Course Description】 The aim of this Departmental Course is to learn how to use the progress of information communication technology in the medical field, develop talented medical practitioners and find the usefulness of alternative medicine. Research projects are mainly focused on learning basic technology and development of 1) an electronic medical record system that has various interfaces for entering medical records, 2) an suitable system for given disease susceptibility analysis, 3) database technology, internet technology, and eXtensible Markup Language and 4) a system that can evaluate clinical skills, effectiveness of alternative medicine and implement e-Learning system for educating medical practitioners and alternative medicine. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for medical informatics and communication technology, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the department and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.
1) Proposal of appropriate research projects on the basis of understanding the background on medical informatics
2) Understanding how to investigate problems in the field of disease susceptibility analysis
3) Logical/proper experimental design to identify the factors for progress in alternative medicine
4) Novel findings obtained by appropriate and proper analytical approaches for educating medical practitioners
5) Original and innovative findings that can contribute not only to better understanding for medical informatics but also to successful development of electronic health records system that is useful for education, research and medical practice

**Research Conducting Program:
Medical Information Sciences
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21470

(Elective/Required: 8 credits)

Supervisor: Koichiro Usuku, Jun Hirose
Program Schedule: year 1-4, every Thursday (5th-6th periods)
Site and Facilities: professor's room or seminar room at Department of Medical Information Sciences

【Course Description】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for medical informatics and communication technology, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the department and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the department and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.
1) Acquisition of experimental skills to produce electronic health record systems
2) Understanding how to investigate problems in the field of disease susceptibility analysis
3) Acquisition of experimental techniques to identify the factors for progress in alternative medicine
4) Understanding of technique that is useful for developing databases and internet communication
5) Acquisition of suitable technique to investigate educational system for medical practitioners, alternative medicine and medical economy

**Research Conducting Program:
Physiological function assessment
Departmental Course "Jissen" I**

Supervisors: Masaaki Nakamura, Mineshi Sakamoto
Program Schedule: Years 1-4

Site and Facilities: National Institute for Minamata Disease (Minamata City)

Subject Code 22230

(Required: 10 credits)

【Course Description】

- 1) The rapid development of brain imaging methods during the last few decades has made it possible to understand the brain function better. The aim of this course is to learn about brain function, especially using magnetoencephalography (MEG).
- 2) The risk of methylmercury exposure of the developing fetus brain is very high. We lecture about the mechanism of methylmercury (MeHg) transfer to the fetus via placenta, as well as distinct pattern of neuronal degeneration in the developing brain exposed to MeHg at various brain development phases, which provide important knowledge to evaluate the brain function.

【Evaluation for Grades and Credits】

Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge regarding scientific information on recent progress in the research field, and their ability in experimental planning and interpretation of the results obtained. The presentation including discussion in the laboratory and academic meetings is also taken into consideration to assess the level of achievement in PhD research.

【Evaluation Criteria】

Achievement will be evaluated according to the following criteria.

- 1) Understanding and knowledge of the principles and approach of several brain imaging methods, along with newer results of research.
- 2) Understanding of logical and proper experimental design to investigate use of brain imaging methods such as MEG.
- 3) Understanding of MeHg transfer to fetus via placenta, and distinct pattern of neuronal degeneration in the developing brain exposed to methylmercury at various brain development phases.
- 4) Understanding of the appropriate analysis method of the effects of methylmercury on brain function at different brain development phases and conducting the appropriate experimental design.

**Conducting Program:
Physiological function assessment
Departmental Course: "Jissen" II**

Supervisors: Masaaki Nakamura, Mineshi Sakamoto
Program Schedule: Years 1-4,

Site and Facilities: National Institute for Minamata Disease (Minamata City)

Subject Code 22240

(Required: 8 credits)

【Course Description】

The aim of this course is to learn the process of detection of a local region of injury or illness in the brain by analyzing sensory function by a practical case study using magnetoencephalography (MEG). We also lecture on methylmercury (MeHg) transfer to fetus via placenta, and the distinct pattern of neuronal degeneration in the developing exposure to MeHg at various brain development phases, which are important to evaluate the brain function of Minamata disease patients.

【Evaluation for Grades and Credits】

Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge regarding scientific information on recent progress in the research field, and their ability in experimental planning and interpretation of the results obtained. The presentation including discussion in the laboratory and academic meetings is also taken into consideration to assess the level of achievement in PhD research.

【Evaluation Criteria】

Achievement will be evaluated according to the following criteria.

- 1) Understanding and knowledge of the principles and approach of several brain imaging methods along with newer research results written in English.
- 2) Understanding of logical and proper experimental design to investigate use of brain imaging methods such as MEG.
- 3) Understanding of the appropriate analysis method on the effects of methylmercury on brain function at different brain development phases and conducting the appropriate experimental design.

**Research Conducting Program:
Advanced Cardiovascular Medicine
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22730

(Required: 10 credits)

Supervisor: Satoshi Yasuda, Wataru Shimizu, Toshihisa Anzai

Program Schedule: year 1-4, every Thursday (6 period)

Site and Facilities: Hospital and Research Institute at National Cerebral and Cardiovascular Center (NCVC)

【Course Description】

The aim of this course is to learn how to propose scientific hypothesis for the pathogenesis of acute coronary syndrome (ACS). The clinical database of NCVC, such as patients backgrounds, MDCT and MRI findings, will be analyzed to investigate the novel predictors of the development of ACS. Furthermore, significant determinants of the post-infarction complications and left ventricular (LV) remodeling will be clarified. Especially, the role of post-infarction inflammation and immune response in LV remodeling will be investigated by collaboration with the National Bio bank established in NCVC. Instruction for presentation at the scientific meetings and publication in the peer-reviewed journals will be provided.

【Evaluation for Grades and Credits】

Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research, and the ability to design the study and interpretation and criticism of the results obtained. Presentation at the internal meetings and the report are taken into consideration to assess the level of achievement in the PhD research. Presentation at the scientific meetings and publication in the scientific journals are also evaluated as the PhD research.

【Evaluation Criteria】

The achievement will be evaluated according to the following criteria.

- 1) Understanding the pathogenesis of ACS in relation to patients backgrounds.
- 2) Proposal of appropriate research projects regarding the predictors and pathophysiology of post-infarction complications.
- 3) Novel findings, regarding the determinants of LV remodeling, obtained by their own research.

**Research Conducting Program:
Advanced Cardiovascular Medicine
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22750

(Elective/Required: 8 credits)

Supervisor: Satoshi Yasuda, Wataru Shimizu, Toshihisa Anzai

Program Schedule: year 1-4, every Thursday (6 period)

Site and Facilities: Hospital and Research Institute at National Cerebral and Cardiovascular Center (NCVC)

【Course Description】

The aim of this course is to learn molecular diagnosis for inherited arrhythmia syndromes, such as congenital long QT syndrome, Brugada syndrome, progressive cardiac conduction defect, catecholaminergic polymorphic ventricular tachycardia, and short QT syndrome. The genotype-phenotype correlation will be analyzed using multicenter database of those inherited arrhythmias to elucidate the genotype-specific pathogenesis, management and therapy. Functional analysis of the mutant channel using the whole-cell patch clamp technique or transgenic mouse model will be studied in this Departmental Course. Whole genome studies including exome to identify new candidate genes or modifier genes using next generation sequencer will be also studied.

【Evaluation for Grades and Credits】

Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research, and the ability to design the study and interpretation and criticism of the results obtained. Presentation at the internal meetings and the report are taken into consideration to assess the level of achievement in the PhD research. Presentation at the scientific meetings and publication in the scientific journals are also evaluated as the PhD research.

【Evaluation Criteria】

The achievement will be evaluated according to the following criteria.

- 1) Understanding of molecular diagnosis for inherited arrhythmia syndromes, such as congenital long QT syndrome, Brugada syndrome, progressive cardiac conduction defect, catecholaminergic polymorphic ventricular tachycardia, and short QT syndrome.
- 2) Proposal of the genotype-specific pathogenesis, management and therapy by analyzing the genotype-phenotype correlation using multicenter database of those inherited arrhythmias.
- 3) Understanding of the functional analysis of the mutant channel using the whole-cell patch clamp technique or transgenic mouse.
- 4) Understanding of the whole genome studies including exome to identify new candidate genes or modifier genes using next generation sequencer.

**Research Conducting Program:
Gastroenterological Surgery
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20870

(Required: 10 credits)

Supervisor: Hideo Baba, Toru Beppu et al.

Program Schedule: year 1-4, every Monday (6th period)

Site and Facilities: seminar room and laboratories at Department of Gastroenterological Surgery

【Course Description】 The mechanisms of the disease caused by the functional and morphologic disorder in digestive organ will be addressed in this program. Furthermore, advanced surgical care such as minimally invasive surgery for benign disease and multi-modal treatment (surgery, chemotherapy and radiotherapy) for cancer will also be addressed in this program.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for gastroenterological surgery, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Integrated knowledge of each disease of digestive surgery
- 2) Integrated knowledge of digestive surgery treatments for each diseases
- 3) Integrated knowledge of the mechanism of carcinogenesis, invasion and metastasis of digestive cancer
- 4) Proposal of appropriate research projects on the basis of understanding the background on the gastroenterological surgery.

**Research Conducting Program:
Gastroenterological Surgery
Departmental Course "Jissen" II
(PhD Thesis Research)**

Subject Code 21680

(Required: 8 credits)

Supervisor: Hideo Baba, Toru Beppu et al.

Program Schedule: year 1-4, every Tuesday (6-7th period)

Site and Facilities: seminar room and laboratories at Department of Gastroenterological Surgery

【Course Description】 The methodology for analysis of the factors related to carcinogenesis and development of digestive cancer leading to the development of novel treatments will be addressed in this program. Furthermore, the methodology for analysis of biological response to surgical invasiveness and inflammation will be shed light on. Specifically, the experimental skill to analyze the gene alternation of cancer, develop the gene therapy, identify the cancer stem cells, investigate the expression of microRNA in cancer and clarify the mechanism of resistance of chemotherapy will be acquired in this program.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for gastroenterological surgery, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of experimental skills to analyze the factor related to carcinogenesis and development of digestive cancer using by clinical samples
- 2) Acquisition of experimental skill to detect the cancer specific genes
- 3) Acquisition of abilities to make a proper experimental design and analysis to investigate the proposed hypothesis for digestive cancer
- 4) Novel findings obtained by appropriate and proper analytical approaches.

Research Conducting Program : Thoracic Surgery Departmental Course “Jissen” I (PhD Thesis Research) Supervisor : Makoto Suzuki Program Schedule : year1-4, every Monday (6th period) Site and Facilities : Seminar room at the Department of Thoracic Surgery	Subject Code 20890 (Required: 10 Credits)
<p>【Course Description】 Recent advances of thoracic surgery depends on the following factors: 1) innovation of diagnostic imaging, 2) developments of optical devices and operative instruments, 3) evolving techniques for segmentectomy. Summarize these advances and extract issues with thoracic surgery. Second, Search literatures related to the issue and determine specific research project. Finally, the experimental results or clinical trials should be reported in international specific journals. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this departmental course.</p>	
<p>【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for thoracic surgery, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.</p>	
<p>【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.</p> <ol style="list-style-type: none"> 1) Understanding of state of art thoracic surgery. 2) Novel findings obtained by appropriate and proper analytical approaches. 3) Inventing new therapy or diagnostic technology for thoracic surgery. 	

Research Conducting Program : Thoracic Surgery Departmental Course “Jissen” II (Experimental Technique Learning) Supervisor : Makoto Suzuki Program Schedule : year1-4, every Wednesday (6th-7th periods) Site and Facilities : Seminar room at the Department of Thoracic Surgery	Subject Code 21700
<p>【Course Description】 Summarize advances of thoracic surgery and extract problem of these. Learn how to search literature. Understand the meaning of statistics in clinical research. Learn elementary skills of gene and protein experiments.</p>	
<p>【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student’s presentation and discussion at the laboratory and academic meetings.</p>	
<p>【 Evaluation Criteria 】 The achievement will be evaluated according to the following criteria.</p> <ol style="list-style-type: none"> 1) Understanding state of art thoracic surgery. 2) Acquisition of literature search skill. 3) Understanding the statistical meaning in your data. 4) Acquisition of elementary skills of gene and protein experiments. 5) Contriving logical/proper experimental design. 	

**Research Conducting Program:
Cardiovascular Surgery
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20860

(Required: 10 credits)

Supervisors: Toshihiro Fukui, Hisashi Sakaguchi

Program Schedule: year 1-4

Site and Facilities: seminar room and laboratories at Department of Cardiovascular Surgery

【Course Description】 The aim of this Departmental Course is to learn 1) new knowledge regarding diseases of the cardiovascular system, 2) recent surgical procedures for cardiovascular disease and 3) how to propose a new surgical procedure for cardiovascular disease. The hypothesis must then be proven experimentally. Latest literatures, for example, regarding blood flow disturbance, cardiac dysfunction, angiogenesis, and tissue regeneration are searched. Experimental design will be constructed to develop a novel approach for therapeutic angiogenesis and myocardial regeneration using angiogenic growth factors and various stem cells. Finally, the experimental results should be reported in international scientific journals in the fields of cardiovascular medicine, cardiovascular surgery, regenerative medicine. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】

Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for cardiovascular surgery, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】

The achievement will be evaluated according to the following criteria.

- 1) Understanding of latest knowledge regarding cardiovascular system and disease.
- 2) Understanding of physiological and molecular mechanisms for angiogenesis or tissue regeneration in cardiovascular system.
- 3) Proposal of appropriate research projects on the basis of understanding the cardiovascular abnormality.
- 4) Novel findings obtained by appropriate and proper analytical approaches.

**Research Conducting Program:
Cardiovascular Surgery
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21670

(Elective/Required: 8 credits)

Supervisors: Toshihiro Fukui, Hisashi Sakaguchi

Program Schedule: year 1-4

Site and Facilities: seminar room and laboratories at Department of Cardiovascular Surgery

【Course Description】 The aim of this class is to acquire the techniques to analyze cardiovascular system and abnormalities. Specifically, experimental techniques to be earned in this course include establishment of experimental models of animals including rat, mouse and dog, vascular anastomosis technique, angiogenic therapy and analysis of molecular markers. Advanced techniques to investigate angiogenesis or myocardial regeneration will be thoroughly studied in this Departmental Course.

【Evaluation for Grades and Credits】

Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】

The achievement will be evaluated according to the following criteria.

- 1) Acquisition of experimental skills to produce animal models for myocardial ischemia or leg ischemia.
- 2) Acquisition of experimental skills to anastomose vessels and to produce angiogenesis.
- 3) Acquisition of experimental techniques to culture progenitor cells for angiogenesis or myogenesis.
- 4) Understanding of physiological and molecular mechanism of angiogenesis or myogenesis.
- 5) Experimental protocol for angiogenesis or myogenesis.

**Research Conducting Program:
Breast and Endocrine Surgery
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20910

(Required: 10 credits)

Instructors: Hiroataka Iwase, Yutaka Yamamoto (Breast and Endocrine Surgery TEL: 373-5521)

Study place : the seminar room and laboratory of the Breast and Endocrine Surgery

【Content Description】

Surgical management and multi-modal treatment for the endocrine-related cancers or tumors, such as breast cancer, thyroid cancer, and other functional tumors, such as, parathyroid adenoma or hyperplasia with MEN (multiple endocrine neoplasia) and the functional tumors of adrenal gland, will be addressed in this practical series. Furthermore, the multimodal management of advanced cancer/recurrence breast cancer including chemotherapy, endocrine therapy and molecular targeting therapy will be discussed. In addition, the fundamental research works, such as the analyses of mechanism of breast cancer growth, especially estrogen dependent growth, and other genetic or serum markers for monitoring or predicting factors of breast cancer treatment, will be conducted by the instructors. The above-mentioned results of research will be published in an article and presented.

【Grading】

Grading will be based on active class participation, paper summaries or the final reports.

【Evaluation for Grades and Credits】

The evaluation of each person will be supported by each theme according to below points.

1. The clinical usefulness of prognostic and predictive factors for breast cancer treatment, especially for advanced/recurrent breast cancer will be discussed according to clinical research of patient's outcome.
2. The signal transduction of breast cancer growth, especially endocrine-dependent growth, will be discussed and the new treatment strategies for advanced breast will be analyzed.
3. The conventional knowledge related to the study theme will be discussed in the literature and practical research work. Appropriate experimental plan will be given to carry out the theme.

**Research Conducting Program:
Breast and Endocrine Surgery
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21720

(Elective/Required: 8 credits)

Instructors: Hiroataka Iwase, Yutaka Yamamoto (Breast and Endocrine Surgery TEL: 373-5521)

Study place : the seminar room and laboratory of the Breast and Endocrine Surgery

【Content Description】

Surgical management and multi-modal treatment for the endocrine-related cancers or tumors, such as breast cancer, thyroid cancer, and other functional tumors, such as, parathyroid adenoma or hyperplasia with MEN (multiple endocrine neoplasia) and the functional tumors of adrenal gland, will be addressed in this practical series. Furthermore, the multimodal management of advanced cancer/recurrence breast cancer including chemotherapy, endocrine therapy and molecular targeting therapy will be discussed. In addition, the fundamental research works, such as the analyses of mechanism of breast cancer growth, especially estrogen dependent growth, and other genetic or serum markers for monitoring or predicting factors of breast cancer treatment, will be conducted by the instructors. The above-mentioned results of research will be published in an article.

【Grading】

Grading will be based on active class participation, paper summaries or the final reports.

【Evaluation for Grades and Credits】

The evaluation of each person will be supported by each theme according to below points.

1. The clinical usefulness of prognostic and predictive factors for breast cancer treatment, especially for advanced/recurrent breast cancer will be discussed according to clinical research of patient's outcome.
2. The signal transduction of breast cancer growth, especially endocrine-dependent growth, will be discussed and the new treatment strategies for advanced breast will be analyzed.
3. The conventional knowledge related to the study theme will be discussed in the literature and practical research work. Appropriate experimental plan will be given to carry out the theme.
4. The action and dysfunction of the endocrine organs, such as thyroid, parathyroid, adrenal gland will be reported.
5. About the fundamental knowledge and the achievements related to the study theme, your documents will be published in English Journals.

Research Conducting Program:

Subject Code 22880

**Pediatric surgery and Transplantation
Departmental Course "Jissen" I
(PhD Thesis Research)**

(Required: 10credits)

Supervisor: Yukihiro Inomata

Program schedule: year 1 ~ 4 every Thursday 3-4 periods, every Friday 3-4 periods

Site and facilities: : seminar rooms and laboratories of Department of Pediatric Surgery

【Course Description】 The aim of this Departmental Course is to learn how to propose scientific hypothesis for the mechanisms of molecular pathogenesis of pediatric or neonatal surgical diseases, pathogenesis of hepatic failure, and to learn how to improve the outcome of liver transplantation. The hypothesis must be proven experimentally or clinically. On the basis of the results obtained, further experimental design or clinical works will be constructed to develop a novel approach for better treatment. Specific research projects to be executed should be determined by searching latest literatures related to the pediatric surgery or transplantation. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of the research work. Finally, the results should be reported in international scientific journals in the fields of pediatric surgery, general surgery, or transplantation. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their knowledge earned about scientific information on recent progress in the research for pediatric surgery and/or transplantation, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Proposal of appropriate research projects on the basis of understanding the background on the pediatric surgical diseases or organ failure like a liver.
- 2) Understanding how to investigate molecular pathogenesis and host defense for pediatric surgical diseases or organ transplantation.
- 3) Logical/proper experimental design to identify the congenital anomalies, pediatric surgical diseases, and pathologies in the situation of organ transplant.
- 4) Novel findings obtained by appropriate and proper analytical approaches.
- 5) Original and innovative findings that can contribute not only to better understanding for pediatric surgical diseases or organ failures, but also to successful development of diagnosis, prevention, and treatment for various diseases, including transplantation.

Research Conducting Program:

Subject Code 23010

**Pediatric surgery and Transplantation
Departmental Course "Jissen" II
(Experimental Technique Learning)**

(Elective/Required: 8 credits)

Supervisor: Yukihiro Inomata

Program schedule : year 1 ~ 4 every Monday 3 - 4 periods, every Tuesday 3 - 4 periods

Site and facilities: seminar rooms and laboratories in Department of Pediatric Surgery

【Course Description】 The aim of this class is to acquire the techniques to analyze the pathogenesis of pediatric surgical diseases. Specifically, experimental techniques to be earned in this course include establishment of experimental surgery in models of animals, such as mice and rats, and gene analysis related to specific diseases. The aim of Transplantation is to acquire the techniques to analyze host responses to transplant organs. Specifically, experimental techniques to be earned in this course include establishment of experimental model of organ transplantation, pharmacodynamics of the immunosuppressants, differentiation and analyze of the immuno-competent cells.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of experimental skills to produce animal models for pediatric surgical diseases
- 2) Understanding the clinical status of living donor liver transplantation
- 3) Understanding how to detect and identify the phenotype of specific model of congenital anomalies
- 4) Acquisition of experimental skills to produce animal models of transplantation.
- 5) Understanding of the techniques of gene-analysis to identify the pathogenesis of some congenital anomalies
- 6) Understanding how to detect and identify immuno-competent cells, related proteins and genes
- 7) Acquisition of abilities to make a proper experimental design and analysis to investigate the proposed hypothesis for pathogenesis of pediatric surgical diseases
- 8) Understanding of pharmacodynamics of immunosuppressants

Research Program Neurosurgery Department Course "Jissen" I, Course 1 (Ph.D. Thesis Research)	Subject Code 20920 (Required: 10 credits)
Supervisors: Jun-ichi Kuratsu, Shigetoshi Yano, Hideo Nakamura, Keishi Makino Program Schedule: Years 1-4, every Monday (4th period) Site and Facilities: Department of Neurosurgery	

【Course Description】 The aim of this course is to teach the mechanisms underlying the molecular pathogenesis of malignant brain tumors. Specifically, an understanding of the molecular mechanisms of tumorigenesis such as mutation of the p53 gene and IDH1/2, methylation of the promoter region of the MGMT gene, EGFR amplification and chromosome 1p/19q deletion will be gained. The correlation between these gene mutations and prognosis, and the role of chemokines such as MCP-1 in tumorigenesis will be addressed. A solid understanding of tumor immunology will be acquired.

【Evaluation, Grades and Credits】 Students will receive course grades and credits based on the course hours completed, their understanding and knowledge of course material, and their comprehension of scientific information and recent progress made in brain tumor treatment.

【Evaluation Criteria】
The reports of students who completed more than 75% of the course hours will be evaluated. Transcripts of lectures will be available electronically via the internet.

Student achievement will be evaluated based on the following criteria

1. An understanding of the molecular mechanisms of tumorigenesis
2. An understanding of the role of molecular pathogenesis such as p53 mutation, IDH1/2 mutation and chromosome 1p/19q deletion on tumorigenesis
3. An understanding of the mechanisms of gene modification such as methylation and amplification
4. An understanding of the role of chemokines produced by the brain tumor on tumorigenesis

Research Program Neurosurgery Department Course "Jissen" I, Course 2 (Ph.D. Thesis Research)	Subject Code 20920 (Required: 10 credits)
Supervisors: Jun-ichi Kuratsu, Takayuki Kawano Program Schedule: Years 1-4, every Monday (4th period) Site and Facilities: Department of Neurosurgery	

【Course Description】 This course teaches the mechanisms underlying the development of cerebral aneurysms, the molecular biology of moyamoya disease, and genetic abnormalities found in congenital anomalies of the central nervous system. Current molecular-targeting therapies, new-generation of chemotherapy, and interventional neurosurgery are topics to be studied.

【Evaluation, Grades and Credits】 Students will receive course grades and credits based on the course hours completed, their understanding and knowledge of course material, and their comprehension of scientific information and recent progress made in brain tumor treatment.

【Evaluation Criteria】
The reports of students who completed more than 75% of the course hours will be evaluated. Transcripts of lectures will be available electronically via the internet.

Student achievement will be evaluated based on the following criteria

1. An understanding of the mechanisms underlying the development of cerebral aneurysms
2. An understanding of the molecular biology of moyamoya disease
3. An understanding of molecular targeting therapies and of new-generation chemotherapies for cancer
4. An understanding of genetic abnormalities in congenital anomalies of the central nervous system
5. An understanding of the latest treatment strategies in interventional neurosurgery

Research Program**Subject Code 21730****Neurosurgery****Department Course "Jissen" II, Course 1
(Ph.D. Thesis Research)****(Elective/Required: 8 credits)**

Supervisors: Jun-ichi Kuratsu, Shigetoshi Yano, Hideo Nakamura, Keishi Makino
 Program Schedule: Years 1-4, every Monday (4th period)
 Site and Facilities: Department of Neurosurgery

【Course Description】 The aim of this course is to teach techniques for the analysis of gene mutations related to glioma. Specifically, the preparation of DNA and mRNA from cell lines and tissue specimens will be taught. In addition, students will learn how to (1) analyze gene sequences based on PCR assay of the p53 and IDH1, (2) analyze gene methylation based on methylation specific PCR for the MGMT, (3) analyze gene amplification of EGFR and chromosome 1p/19 deletion based on FISH assay. Experimental techniques taught in this course include Western blotting, immunohistochemistry, and in situ hybridization.

【Evaluation and Grades and Credits】 Students will receive course grades and credits based on the course hours completed and their understanding and knowledge of course material.

【Evaluation Criteria】
 The reports of students who completed more than 75% of the course hours will be evaluated. Transcripts of lectures will be available electronically via the internet.

Student achievement will be evaluated based on the following criteria

1. An understanding of how to analyze gene mutations in glioma
2. An understanding of how to prepare DNA and mRNA from cell lines and tissue specimens
3. An understanding of how to perform PCR assay to analyze p53 and IDH1 gene mutations and an understanding of the analysis of DNA sequences
4. An understanding of the method for methylation specific PCR to analyze MGMT promoter
5. An understanding of the method for FISH to analyze EGFR gene amplification and chromosome 1p/19q deletion.
6. An understanding of the method for Western blotting, immunohistochemistry, and in situ hybridization

Research Program**Subject Code 21730****Neurosurgery****Department Course "Jissen" II, Course 2
(Ph.D. Thesis Research)****(Elective/Required: 8 credits)**

Supervisors: Jun-ichi Kuratsu, Takayuki Kawano
 Program Schedule: Years 1-4, every Monday (4th period)
 Site and Facilities: Department of Neurosurgery

【Course Description】 The aim of this course is to teach techniques for the development of animal models of transient ischemia. The model induces transient occlusion of the rat middle cerebral artery. The rats are decapitated immediately after reperfusion or at selected times thereafter. Differences between necrosis and apoptosis after transient ischemic changes are studied. Activation or transcription factors related to the intracellular signal pathway are examined immunohistochemically and the mechanisms underlying the activation of precursor neural cells or neural stem cells by neurotrophic factors, and neural regeneration therapy are studied.

【Evaluation, Grades and Credits】 Students will receive course grades and credits based on the course hours completed and their understanding and knowledge of course material.

【Evaluation Criteria】
 The reports of students who completed more than 75% of the course hours will be evaluated. Transcripts of lectures will be available electronically via the internet.

Student achievement will be evaluated based on the following criteria

1. The ability to generate the animal model of transient ischemia
2. The ability to differentiate between necrosis and apoptosis after transient ischemic changes
3. An understanding of the immunohistochemistry of activation- or transcription factors related to the intracellular signaling pathway
4. An understanding of the mechanisms underlying the activation of precursor neural cells or neural stem cells by neurotrophic factors

**Research Conducting Program:
Orthopaedic
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22850

(Required: 10 credits)

Supervisor: Hiroshi Mizuta, Junji Ide, Eiichi Nakamura, Toru Fujimoto
Program Schedule: year 1-4, every Monday(6th period)
Site and Facilities: seminar room and laboratories at Department of Orthopaedics

【Course Description】 With a focus on the molecular mechanisms regulating the destruction, repair or regeneration of the musculoskeletal tissues as well as developing genetic approaches for their disorders, recent advances in basic research in this field will be introduced, while also providing instruction in establishing a hypothesis for each individual study and the process of verifying those hypotheses. In addition, the methodology required for the design of clinical trials for musculoskeletal disorders will be taught through the latest literature while citing specific example cases. Using the knowledge obtained, you will plan and actually carry out either experimental or clinical studies which will contribute to orthopaedic knowledge. We will also provide instruction on the methods for summarizing the results of such studies in both a written form as well for giving oral presentations.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge of scientific information on recent progress in the research related to their projects, and their ability to plan a study, and sufficiently interpret the results obtained. Research reports, presentations at academic conferences, and progress reports in laboratory meetings can be substituted for reports.

【Evaluation Criteria】 Evaluations will be made focusing on the following areas for each individual research project:

- 1) The latest knowledge corresponding to the study project has been acquired.
- 2) An appropriate study design has been planned and executed.
- 3) Novel findings that positively contribute to the field of orthopaedics have been obtained.

**Research Conducting Program:
Orthopaedic
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22980

(Elective/Required: 8 credits)

Supervisor: Hiroshi Mizuta, Junji Ide, Eiichi Nakamura, Toru Fujimoto
Program Schedule: year 1-4, every Thursday (6th-7th periods)
Site and Facilities: seminar room and laboratories at Department of Orthopaedics

【Course Description】 The aim of this class is to acquire a variety of techniques required for orthopaedic research using animal models and cultured cells. Specifically, experimental techniques to be earned in this course include the establishment of experimental models of animals, tissue culture, the processing of undecalcified bone specimens, histochemical and immunohistochemical analyses, electron microscopic analyses, molecular biological analyses, and biochemical and immunological analyses of extracellular matrices. In addition, we will provide instruction in the methodology for planning a study design for clinical trials, as well ethical considerations and medical statistics.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussions both in the laboratory and at academic meetings.

【Evaluation Criteria】 Grades will be evaluated focusing on the following areas for each individual research project:

- 1) A variety of experimental techniques necessary for orthopaedic research have been acquired.
- 2) A sufficient knowledge regarding the methodology for clinical studies of musculoskeletal disorders has been acquired.
- 3) For each research project, an appropriate study design has been planned and executed.

**Research Conducting Program :
Obstetrics and Gynecology
Departmental Course "Jissen" I**

Subject Code 22580

(Required: 10 credits)

Supervisor: Hidetaka Katabuchi, Takashi Ohba, Hironori Tashiro, Ritsuo Honda,
Yoshinori Okamura

Program Schedule: year 1-4

Site and Facilities: seminar room and laboratories at Department of Obstetric and Gynecology

[Course Description]

Obstetrics: The aim of this Departmental Course is to learn how to propose scientific hypothesis for the mechanisms of cellular function in human placenta, and identification of the protein(s) maintain cross talk between the cells that control human placental function. The hypothesis must then be proven experimentally. Specific research projects should be determined by searching latest literatures related to the placental physiology and pathology. Experimental design will be constructed to develop a novel approach to identify the molecules for recognition and degradation of placental human chorionic gonadotropin (hCG). Further studies will be constructed to study the distribution and function of the molecules, and the correlation with clinical findings. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of research. Finally, the experimental results should be reported in international scientific journals in the fields of Reproductive Physiology, Biology and/or Endocrinology. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

Gynecology: The aim of this Departmental Course is to learn how to propose scientific hypothesis for the carcinogenesis in gynecologic cancers including precancerous lesions (e.g. endometriosis), and to verify the hypothesis using the technique in molecular biology and pathology. Specific research projects should be determined by searching latest literatures related to the molecular biology and pathology. Experimental design will be constructed to develop a novel approach to identify using human tissue-materials and immortalized human ovarian surface epithelial cells in ovarian carcinogenesis, and using recombinant mice having murine *PTEN* mutation in endometrial carcinogenesis. Further studies will be constructed to study the distribution and function of the molecules, and the correlation with clinical findings. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of research. Finally, the experimental results should be reported in international scientific journals in the fields of Gynecology. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

[Evaluation for Grades and Credits] Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for recognition and degradation of placental gonadotropins, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

[Evaluation Criteria] The achievement will be evaluated according to the following criteria.

Obstetrics:

- 1) Proposal of appropriate research projects on the basis of understanding the background on the placental physiology and pathology.
- 2) Proposal of appropriate research projects on the basis of understanding the background on the physiological role of placental macrophage.
- 3) Original and innovative findings that can contribute not only to better understanding for microbial pathogenesis and host defense but also to successful development of diagnosis, prevention, and treatment of various diseases.

Gynecology:

- 1) Proposal of appropriate research projects on the basis of understanding the background on the normal ovarian and endometrial physiology.
- 2) Proposal of appropriate research projects on the improvement of understanding the ovarian and endometrial carcinogenesis.
- 3) Logical and proper experimental design to identify the pathogenic and host defense factors.
- 4) Original and innovative findings that can contribute not only to better understanding for pathogenesis but also to successful development of diagnosis, prevention, and treatment of ovarian and endometrial carcinomas.

**Research Conducting Program :
Obstetrics and Gynecology
Departmental Course "Jissen" II**

Subject Code 22700

(Required: 8 credits)

Supervisor: Hidetaka Katabuchi, Takashi Ohba, Hironori Tashiro, Ritsuo Honda,
Yoshinori Okamura

Program Schedule: year 1-4

Site and Facilities: seminar room and laboratories at Department of Obstetric and Gynecology

[Course Description]

Obstetrics: The aim of this class is to acquire the techniques to perform human *in vitro* fertilization and embryo transfer (IVF-ET). Experimental techniques to be earned in this course include the incubation of gametes / embryo, insemination, quality estimation and transfer of the embryo using experimental animals, such as mice. Particular emphasis is placed also on the establishment of co-culture system of embryo with feeder cell layer, intracytoplasmic sperm injection (ICSI). The students are also encouraged to take the embryologist's licenses. All of above will be thoroughly studied in this Departmental Course.

Gynecology : The aim of this class is to acquire the techniques to perform the research. Experimental techniques to be earned in this course include establishment of experimental models of animals and cultured cells, and analysis of various factors and host immune system. Particular emphasis is placed also on the establishment of culture system using immortalized human ovarian surface epithelial cells and/or macrophages, and the establishment of recombinant mice model, and advanced techniques of immunohistochemistry and molecular biology. All of above will be thoroughly studied in this Departmental Course.

[Evaluation for Grades and Credits] Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for IVF-ET, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

[Evaluation Criteria] The achievement will be evaluated according to the following criteria.

Obstetrics:

- 1) Proposal of appropriate research projects on the basis of understanding the background of IVF-ET program.
- 2) Logical / proper experimental design to improve the oocyte / embryo quality.
- 3) Novel findings obtained by appropriate and proper analytical approaches to improve the microenvironment of oocyte / embryo culture including co-culture system using human immortalized cell lines.

Gynecology:

- 1) Understanding how to culture cells and to breed animals.
- 2) Acquisition of experimental skills to analyze immunohistochemistry and molecular biology, to culture cells and to produce animal models for the gynecologic cancers or its precancerous lesions.
- 3) Acquisition of experimental techniques to analyze various factors including immune system (*e.g.*, macrophage).

**Research Conducting Program :
Urology
Departmental Course "Jissen" I**

**Subject Code 22820
(Required: 10 credits)**

Supervisor: Masatoshi Eto, Yoshiaki Kawano
Program Schedule: year 1-4
Site and Facilities: seminar room and laboratories at Department of Urology

[Course Description] As exemplified by cytokine therapy for renal cell carcinoma, BCG bladder instillation therapy for bladder cancer, and peptide vaccine therapy for prostate cancer, immunotherapy primarily tends to be effective against urological cancers. Although cancer treatment is now reaching a major turning point due to the emergence of molecular targeted drugs, actual response rate of those drugs falls below the outcome of clinical trials, and these drugs are far from being "miracle remedies" as it turns out they actually possess various problems including adverse effects. Therefore, to tackle those issues, course participants will establish multi-disciplinary therapy models including immunotherapy by using mouse models for urological cancers and analyzing the antitumor effects and immunological parameters with guidance by supervisors. Based on these research results, the participants will also be provided a guide on how to write research papers and give oral presentations.

[Evaluation for Grades and Credits] Grades will be awarded depending on experimental techniques acquired by the participants. Course reports can be substituted by academic articles, presentations at academic meetings or progress reports at journal clubs or lab meetings.

[Evaluation Criteria] Amongst followings, appropriate points for each participant's research project will be evaluated:

1. Experimental techniques of examining immunological parameters (e.g. cytotoxic activity, cytokine production).
2. Basic techniques for flow cytometry analysis.
3. Skills of general tissue culture and understanding of its principle.
4. Skills of gene expression analysis such as RT-PCR or northern blotting. Understanding of those principles.
5. Ability to employ appropriate approaches, to plan experiments and to evaluate data upon a provided project.

**Research Conducting Program :
Urology
Departmental Course "Jissen" II**

**Subject Code 22950
(Required: 8 credits)**

Supervisor: Masatoshi Eto, Yoshiaki Kawano
Program Schedule: year 1-4
Site and Facilities: seminar room and laboratories at Department of Urology

[Course Description] Lectures will be given regarding diagnosis, pathogenesis and treatment of urological cancer such as renal cell carcinoma, urothelial carcinoma, and prostate cancer. The latest data as for diagnostic methods, pathogenesis, surgical treatments, radiotherapy, chemotherapy, immunotherapy, endocrine therapy and molecular targeted therapy will be shown, and unsolved problems will be discussed. Based on those issues, course participants will be given a research project and be guided to take appropriate approaches and experimental methods (e.g. tissue culture, gene expression analysis, protein analysis, analysis of protease activity and immunohistochemistry).

[Evaluation for Grades and Credits] Grades will be awarded depending on experimental skills acquired by the participants. Course reports can be substituted by academic articles, presentations at academic meetings or progress reports at journal clubs or lab meetings.

[Evaluation Criteria] Amongst followings, appropriate points for each participant's research project will be evaluated:

1. Understanding of current issues of urological cancers.
2. Fundamental skills of experiments essential for basic research of urological cancers.
3. Essential skills for clinical research of urological cancers including statistical analysis.
4. Ability to employ appropriate approaches, to plan experiments and to evaluate data upon a provided project.

**Research Conducting Program:
Ophthalmology
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22830

(Required: 10 credits)

Supervisor: Hidenobu Tanihara and Toshihiro Inoue

Program Schedule: year 1-4,

Site and Facilities: seminar room and laboratories at Department of Ophthalmology

【Course Description】 Since two major blindness disease including retinal diseases (diabetic retinopathy, age-related macular degeneration (AMD), etc) and glaucoma are caused by retinal cell death, neuro-protection and neuro -regeneration as a new strategies are needed. The aim of this Departmental Course is to learn how to investigate the mechanisms of molecular pathogenesis of these ocular diseases. We aim to demonstrate that how several molecules associated with cell death, neuro-protection and neuro-regeneration change its expression, by using some animal models of ocular disease such as glaucoma, ischemic-reperfusion, AMD. On the basis of the results obtained, further experimental design will be constructed to develop a novel approach. Finally, the experimental results should be reported in international scientific journals in the fields of microbiology, biochemistry, molecular biology, cell biology, and/or infectious diseases. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for molecular pathogenesis of ocular disease, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】

The achievement will be evaluated according to the following criteria.

- 1) Understanding how to investigate molecular pathogenesis for ocular blindness diseases.
- 2) Proposal of appropriate research projects on the basis of understanding the background on the molecular mechanisms relevant to visual-threatening diseases.
- 3) Logical/proper experimental design to identify the pathogenic factors.
- 4) Novel findings obtained by appropriate and proper analytical approaches.

**Research Conducting Program:
Ophthalmology
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22960

(Elective/Required: 8 credits)

Supervisor: Hidenobu Tanihara and Toshihiro Inoue

Program Schedule: year 1-4,

Site and Facilities: seminar room and laboratories at Department of Ophthalmology

【Course Description】 The aim of this class is to acquire the techniques to analyze the molecular biology to various ocular diseases. Specifically, experimental techniques to be earned in this course include establishment of experimental models of animals, such as mice and rats, and cultured cells, and analysis of various signaling factors and molecules produced in cells and tissues. Particular emphasis is placed also on safe and proper handling of various pathogens (culture methods etc.), analytical methods for gene expression (RT-PCR, Northern blotting, in situ hybridization, etc), all of which will be thoroughly studied in this Departmental Course.

【Evaluation for Grades and Credits】

Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of experimental skills to extract DNA and RNA from serum.
- 2) Understanding the principle and method of PCR.
- 3) Understanding of analyzing gene expression by use of RT-PCR, northern blotting and in situ hybridization.
- 4) Novel findings obtained by appropriate and proper analytical approaches.

**Research Conducting Program:
Otolaryngology-Head and Neck Surgery
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22840

(Required: 10 credits)

Supervisor: Eiji yumoto, Tetsuji sanuki

Program Schedule: year 1-4,

Program Schedule: We contact it by the number of the student attending a lectures appropriately.

【Course Description】 As the recurrent laryngeal nerve is mainly consisted of motor nerve fibers, the ability for recovery should be high when it is injured. However, the function of injured recurrent laryngeal nerves is rarely recovered completely. Regeneration of relatively thick nerves such as the sciatic nerve and facial nerve has been studied before, but that of the recurrent laryngeal nerve has not been examined. We previously found and reported that some neurotrophic factors facilitate the regeneration of the recurrent laryngeal nerve, and that the effects of the neurotrophic factors on the nerve regeneration are different by the degree of the nerve injury. In this subject,

- ① To analyze the process of nerve regeneration on the site of nerve injury and nucleus ambiguus from the view point of expression and function of neurotrophic factors, using animal models in which the recurrent laryngeal nerve was given various degree of injury, applying the technique of electron microscope, immunohistology and molecular biology.
- ② To examine the recovery of the regenerating process in case a neurotrophic factor is administered.
To summarize results of research in an article and to guide how to make oral presentation.

【Keywords】 recurrent laryngeal nerve, nerve regeneration, neurotrophic factor

【Class Style】 PowerPoint will be used in lectures, and active participation in the discussion is encouraged. Extra classes or video lectures are considered for those who are regularly absent for unavoidable reasons.

【Textbooks】 Textbooks are not specified, and handouts will be distributed.

【Evaluation for Grades and Credits】

Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. In addition, they can exchange it with a report with an article, society announcement.

【Evaluation Criteria】

An examination by the report will be performed for the person who attended more than 2/3 of the experiment. The report evaluates the following items.

- 1) Acquisition of skill on the electrophysiological and immunohistological experiment about the nervous system of larynx
- 2) Proper experimental design to research theme about larynx nervous system re-rule.
- 3) Drawing up an appropriate experiment plan for the research theme that you set and carrying it out
- 4) Acquisition of new findings on the nervous system of larynx.

**Research Conducting Program:
Otolaryngology-Head and Neck Surgery
Departmental Course "Jissen" II
(PhD Thesis Research)**

Subject Code 22970

(Elective/Required: 8 credits)

Supervisor: Eiji yumoto, Ryosei Minoda

Program Schedule: year 1-4,

Program Schedule: We contact it by the number of the student attending a lectures appropriately.

【Course Description】

Hearing loss is induced by various causes such as aging, noise, viral infection. It is believed that hair cell regeneration once disappeared was impossible. However, recently we proved that hair cells regenerate if we over-express athol gene in cochlea utilizing adenovirus vector, which is important for hair cell generation in embryonic stage.

- ① We will train handling technique and breeding technique of guinea pigs, rats and mouse, and tissue preparation technique of vestibular organs and cochleae.
- ② We will train ex-vivo organ culture and gene transfer by electroporation.

【Keywords】 hair cells, adenovirus vectors, electroporation

【Class Style】PowerPoint will be used in the lectures, and active participation in the discussion is encouraged. Extra classes or video lectures are considered for those who are regularly absent for unavoidable reasons.

【Textbooks】 Textbooks are not specified, and handouts will be distributed.

【Evaluation for Grades and Credits】

Students will be evaluated by attendance rate, oral presentations and reports regarding planning of a research and results of a research. A published own papers and a presentation in a meeting will be utilized for the evaluation instead of the reports if they want..

【Evaluation Criteria】

Students whose attendance rates are over 2/3 can take examination by a report. The reports will be reevaluated for the following items;

- 1) Understanding of handling of small animals and guideline of animal experiments.
- 2) Understanding of surface preparation technique.
- 3) Understanding of cells cultures and organ cultures.
- 4) Understanding of gene transfer technique.

**Research Conducting Program:
Oral & Maxillofacial Surgery
Departmental Course "Jissen" I
(PhD Thesis Research)**

SubjectCode22860

(Required: 10 credits)

Supervisor: Hideki Nakayama, Akimitsu Hiraki
Program Schedule: year 1-4, every Wednesday (4th period)
Site and Facilities: seminar room and laboratories at Department of Oral & Maxillofacial Surgery

【Course Description】 The aim of this Departmental Course is to learn how to propose scientific hypothesis for the mechanisms of tumor metastasis of squamous cell carcinoma (SCC). The hypothesis must then be proven experimentally. On the basis of the results obtained, further experimental design will be constructed to develop a novel approach for prevention and treatment of SCC. Specific research projects to be executed should be determined by searching latest literatures related to the tumor metastasis and histogenesis. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of research. Finally, the experimental results should be reported in international scientific journals in the fields of oncology, histopathology, molecular biology, cell biology, and/or cancer. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for tumor pathogenesis and metastasis, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Proposal of appropriate research projects on the basis of understanding the background on the tumor histogenesis and tumor metastasis.
- 2) Understanding how to investigate molecular pathogenesis.
- 3) Logical/proper experimental design to identify the pathogenic and metastatic factors.
- 4) Novel findings obtained by appropriate and proper analytical approaches.
- 5) Original and innovative findings that can contribute not only to better understanding for tumor histogenesis and metastasis but also to successful development of diagnosis, prevention, and treatment of SCC.

**Research Conducting Program:
Oral & Maxillofacial Surgery
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22990

(Elective/Required: 8 credits)

Supervisor: Hideki Nakayama, Akimitsu Hiraki
Program Schedule: year 1-4, every Wednesday (1th-2th periods)
Site and Facilities: seminar room and laboratories at Department of Oral & maxillofacial Surgery

【Course Description】 The aim of this class is to acquire the techniques to analyze tumor histogenesis and metastasis. Specifically, experimental techniques to be earned in this course include establishment of experimental metastatic models of animals, such as nude mice, and cultured cells, and analysis of tumor growth signaling factors and tumor metastatic molecules produced in cells and tissues. Particular emphasis is placed also on safe and proper handling of various pathogens (culture methods etc.), identification and analysis of protein, analytical methods for DNA and RNA, and advanced techniques to investigate intracellular signal transduction, all of which will be thoroughly studied in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of experimental skills to produce animal models for SCC metastasis.
- 2) Understanding how to detect and identify tumor protein, and determine their biological activities.
- 2) Acquisition of experimental techniques to produce recombinant genes and proteins of various SCC factors and metastatic molecules, so that their structures and functions can be accurately analyzed and understood.
- 4) Understanding of chemical reactivities, biological functions, identification/detection methods of tumor genes.
- 5) Acquisition of experimental skills to investigate signal transduction mechanisms in the metastatic animal models.

Research Conducting Program: Dermatology and Plastic Surgery Departmental Course "Jissen" I (PhD Thesis Research)	Subject Code 22570
(Required: 10 credits)	
Supervisor: Hironobu Ihn, Masatoshi Jinnin, Satoshi Fukushima, Shinichi Masuguchi, Takamitsu Makino, Toshikatsu Igata, Asako Ichihara, Takamitsu Johnno, Azusa Miyashita Program Schedule: year 1-4 Site and Facilities: Seminar room at Department of Dermatology and Plastic Surgery	

【Course Description】 The aim of this Departmental Course is to learn how to collect information for experiments about inflammatory skin diseases and skin tumors, including the epidemiological approach. On the basis of the results obtained, we will discuss the problems and design experimental procedures. Furthermore, we will develop a novel approach for the defense mechanism, aging and carcinogenesis of skin, by using the ultraviolet irradiation model mouse. In addition, pathological, biochemical, and molecular biological techniques will be studied to analyze the changes in the skin condition of some inflammatory diseases and tumors. Finally, the experimental results should be reported in scientific journals in the field of Dermatology.

【Evaluation for Grade】 Students are evaluated for their course grades and credits based on the reports and attendance.

【Evaluation Criteria】 The report evaluates the following items.

- 1) The latest knowledge of inflammatory skin diseases and the skin tumors is acquired, and novel results are obtained.
- 2) A molecular biological technique for analyzing the appearance of disease mechanism of the skin disorder is understood.
- 3) Method of a pathology and molecular biology experiments concerning the skin defense mechanism has been acquired.
- 4) An appropriate research topic is set for the skin disease defense mechanism or the carcinogenesis mechanism.
- 5) Knowledge related to the set research topic is acquired by the student, and an appropriate design of experiment is planned and executed.

Research Conducting Program: Dermatology and Plastic Surgery Departmental Course "Jissen" II (PhD Thesis Research)	Subject Code 22690
(Elective/Required: 8 credits)	
Supervisor: Hironobu Ihn, Masatoshi Jinnin, Satoshi Fukushima, Shinichi Masuguchi, Takamitsu Makino, Toshikatsu Igata, Asako Ichihara, Takamitsu Johnno, Azusa Miyashita Program Schedule: year 1-4 Site and Facilities: Seminar room at Department of Dermatology and Plastic Surgery	

【Course Description】 The aim of this course is to acquire pathological, immunohistochemical, PCR techniques, and cell culture from skin biopsy specimens for skin disease research. Moreover, particular emphasis is placed on safe and proper handling of experimental model mice with skin tumors induced by ultraviolet exposure. Results of the above-mentioned study are presented orally, and should be reported in scientific journals.

【Evaluation for Grade】 Students are evaluated for their course grades and credits based on the reports and attendance.

【Evaluation Criteria】 The report evaluates the following items.

- 1) Skin pathology and immunohistochemical technique are understood.
- 2) The cell culture from skin biopsy sample is understood.
- 3) The PCR method is understood.
- 4) Animal experiments concerning skin tumor generation are understood.
- 5) Experimental procedures are acquired to the set research topic, and an appropriate design of experiment is planned and executed.

Research Conducting Program:
Agressology
Departmental Course "Jissen" I
(PhD Thesis Research)

Subject Code 20540

(Required: 10 credits)

Supervisor: Yoshihiro Kinoshita

Program Schedule: year 1-4, every Thursday (6th-7th periods)

Site and Facilities: ICU on the 6th floor of the west wing of the Hospital

【Course Description】 The aim of this Departmental Course is to learn how to propose scientific hypothesis for the mechanisms of severe body damage and host defense. The mechanism must then be proven by clinical research. On the basis of the results obtained, further study will be performed to develop a novel approach for prevention and treatment of shock. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for shock and host defense mechanism, and ability for interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Proposal of appropriate research projects on the basis of understanding the agressology.
- 2) Understanding how to perform clinical researches.
- 3) Understanding how to prove clinical problems.
- 4) Understanding for the previous important findings and guideline.

Research Conducting Program:
Agressology
Departmental Course "Jissen" II
(Experimental Technique Learning)

Subject Code 21350

(Elective/Required: 8 credits)

Supervisor: Yoshihiro Kinoshita

Program Schedule: year 1-4, every Thursday (6th-7th periods)

Site and Facilities: ICU on the 6th floor of the west wing of the Hospital

【Course Description】 The aim of this class is to acquire the techniques to complete a scientific paper in the field of intensive care. Students are also required to acquire the ability for oral presentation.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their research skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Understanding how to propose the relation between a hypothesis and a result.
- 2) Understanding for the benefit and the weak point of the research.
- 3) To find a new approach for the further study.
- 4) Making a appropriate study design or a experimental plan.

Research Conducting Program:
Anesthesiology
Departmental Course "Jissen" I
(PhD Thesis Research)

Subject Code 22870

(Required: 10 credits)

Supervisor: Tatsuo Yamamoto

Program Schedule: year 1-4, every Thursday (4th period)

Site and Facilities: seminar room and laboratories at Department of Anesthesiology

【Course Description】 The aim of this Departmental Course is to learn how to propose scientific hypothesis for the mechanisms of pain transmission and cardiovascular resuscitation. The hypothesis must then be proven by clinical or basic experiment. On the basis of the results obtained, further experimental design will be constructed to develop a novel approach for pain therapy or for cardiopulmonary resuscitation. Specific research projects to be executed should be determined by searching latest literatures related to the specific fields. Finally, the experimental results should be reported in international scientific journals. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for the specific fields, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Proposal of appropriate research projects on the basis of understanding the background on the field of anesthesiology.
- 2) Understanding how to investigate the mechanisms of pain transmission and cardiovascular resuscitation.
- 3) Logical/proper experimental design to identify the scientific hypothesis.
- 4) Novel findings obtained by appropriate and proper analytical approaches.
- 5) Original and innovative findings that can contribute not only to better understanding for anesthesiology but also to successful development of new paradigm for pain treatment and cardiovascular resuscitation.

Research Conducting Program:
Anesthesiology
Departmental Course "Jissen" II
(Experimental Technique Learning)

Subject Code 23000

(Elective/Required: 8 credits)

Supervisor: Tatsuo Yamamoto

Program Schedule: year 1-4, every Thursday (3rd-4th periods)

Site and Facilities: seminar room and laboratories at Department of Anesthesiology

【Course Description】 The aim of this class is to acquire the techniques to analyze pain transmission and cardiovascular resuscitation. Specifically, experimental techniques to be earned in this course include establishment of experimental pain models of animals, such as mice and rats, and dog experimental cardiovascular resuscitation model. Particular emphasis is placed also on the attitude of pharmacological and physiological experiment.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of experimental skills to produce animal models.
- 2) Understanding how to evaluate the level of pain in the animal model.
- 3) Understanding how to evaluate the neural state after cardiovascular resuscitation.

**Research Conducting Program:
International Medical Cooperation
Departmental Course "Jissen" I**

Subject Code 20950

(Required: 10 credits)

Instructors: Yoshio Haga, Takeshi Takahashi, Shigeki Takemoto
Program Schedule: year 1-4, every Tuesday (6th period)
Site and Facilities: seminar room at Kumamoto University or conference room at
National Hospital Organization Kumamoto Medical Center

【Course Description】

In a primary lesson, we will instruct prerequisite conditions to conduct clinical research, including 1) ethical guidelines that researchers must obey; 2) how to set up research hypothesis and how to select research design; 3) how to build research protocol; 4) basic knowledge of biostatistics.

In a detailed lesson, we will instruct our experience in clinical research concerning infection control and outcome research.

【Evaluation for Grades and Credits】

We will evaluate students for their course grades and credits based on the course hours completed, and their ability to understand lectures by scientific reports and other literatures.

【Evaluation Criteria】

We will evaluate students in the light of their understandings as follows;

- 1) Type of ethical guideline that researchers must obey in each study design
- 2) Type of study design; its advantage and disadvantage
- 3) How to collect clinical data and how to analyze them
- 4) Level of evidence

**Research Conducting Program:
International Medical Cooperation
Departmental Course "Jissen" II**

Subject Code 21760

(Elective/Required:8 credits)

Instructors: Yoshio Haga, Takeshi Takahashi, Shigeki Takemoto
Program Schedule: year 1-4, every thursday (6th or 7th period)

【Course Description】

We will practice critical appraisal for English original articles, using an Excel template.

【Evaluation for Grades and Credits】

We will evaluate students for their course grades and credits based on the course hours completed, and their ability to understand lectures by scientific reports and other literatures.

【Evaluation Criteria】

We will evaluate students in the light of their understandings as follows;

- 1) True endpoint and surrogate endpoint
- 2) Odds ratio, relative risk, relative risk reduction, absolute risk reduction, and number needed to treat
- 3) Point estimation and 95% confidence interval
- 4) How to write "Discussion" in English paper

**Research Conducting Program:
Molecular Cell Biology
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22480

(Required: 10 credits)

Supervisors: Teru Ogura, Kunitoshi Yamanaka, Masatoshi Esaki
Program Schedule: year 1-4, every Monday (6th period)
Site and Facilities: small conference rooms at IMEG and laboratories at Dept. of Molecular Cell Biology

【Course Description】 The aim of this Departmental Course is to learn how to propose scientific hypotheses for the regulation of cell homeostasis and growth including dynamics and quality control of proteins, biogenesis and maintenance of organelles, cell cycle, and cell division. The hypothesis must be proven experimentally. Experiments should include isolation and characterization of mutants of model organisms such as *E. coli*, yeast, and worms, analysis of expression and intracellular localization of gene products, identification of interacting proteins, and *in vitro* biochemical and spectrometric analysis of purified proteins. The experimental results should be presented in scientific meetings, and finally should be published in international scientific journals in the field of molecular cell biology to fulfill requirements for PhD thesis.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, understanding and knowledge about scientific information on recent progress in the research field of the regulation of cell growth and homeostasis, ability to plan experiments, and ability to interpret and criticize the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Ability to propose novel hypotheses based on understanding the recent progress and finding unsolved issues on regulatory mechanisms of cell homeostasis and growth.
- 2) Understanding how to investigate mechanisms of cell homeostasis and growth and ability to propose proper research projects.
- 3) Proper experimental design to achieve the proposed research projects.
- 4) Novel findings, logical discussion, and publication of the research results concerning mechanisms of cell homeostasis and growth.

**Research Conducting Program:
Molecular Cell Biology
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22600

(Elective/Required: 8 credits)

Supervisors: Teru Ogura, Kunitoshi Yamanaka, Masatoshi Esaki
Program Schedule: year 1-4, every Thursday (6th-7th periods)
Site and Facilities: small conference rooms at IMEG and laboratories at Dept. of Molecular Cell Biology

【Course Description】 The aim of this class is to acquire the techniques to analyze mechanisms of cell homeostasis and growth and to understand such methodologies. Experimental techniques to be acquired and methodologies to be understood in this course include forward and reverse genetics to isolate mutants, methods of gene cloning, procedures of gene knockout and RNA interference, methods to visualize intracellular localization of gene products, procedures of large scale expression and purification of proteins, and biochemical and spectrometric methods to analyze purified proteins *in vitro*.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, ability to interpret experimental results, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Ability to understand recent progress in the field of mechanisms of cell homeostasis and growth and to find out unsolved issues.
- 2) Understanding how to address the issues on mechanisms of cell homeostasis and growth experimentally and ability to interpret experimental results.
- 3) Understanding principles, effectiveness and limitations of various experimental methods.
- 4) Planning and achievement of experiments with proper choice and combination of methods to address the issues.

**Research Conducting Program:
Kidney Development
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22490

(Required: 10 credits)

Supervisor: Ryuichi Nishinakamura, Satomi Tanaka, Atsuhiko Taguchi
Program Schedule: year 1-4, every Tuesday (7th period)
Site and Facilities: seminar room and laboratories at Department of Kidney Development

【Course Description】 The aim of this Departmental Course is to learn how to propose scientific hypothesis for the mechanisms of organogenesis, especially kidney development. The hypothesis must then be proven experimentally. On the basis of the results obtained, further experimental design will be constructed to develop a novel approach for regenerating the organs. Specific research projects to be executed should be determined by searching latest literatures related to organogenesis such as kidney development. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of research. Finally, the experimental results should be reported in international scientific journals in the fields of developmental biology, molecular biology, cell biology, and/or kidney diseases. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for organogenesis, especially kidney development, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Proposal of appropriate research projects on the basis of understanding the background on organogenesis, especially kidney development.
- 2) Understanding how to investigate molecular mechanisms in kidney development.
- 3) Logical/proper experimental design to identify mechanisms in kidney development.
- 4) Novel findings obtained by appropriate and proper analytical approaches.
- 5) Original and innovative findings that can contribute not only to better understanding of kidney development but also to successful development of regenerative treatments.

**Research Conducting Program:
Kidney Development
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22610

(Elective/Required: 8 credits)

Supervisor: Ryuichi Nishinakamura, Satomi Tanaka, Atsuhiko Taguchi
Program Schedule: year 1-4, every Thursday (5th-6th periods)
Site and Facilities: seminar room and laboratories at Department of Kidney Development

【Course Description】 The aim of this class is to acquire the techniques to analyze organogenesis, especially kidney development. Specifically, experimental techniques to be earned in this course include establishment of genetically engineered mice, and analysis of gene functions both in vivo and in vitro. Particular emphasis is placed also on proper handling of embryonic stem cells, in situ hybridization, immunostaining, organ culture of the kidney, and overexpression and knockdown of genes of interest in cultured cells, all of which will be thoroughly studied in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of experimental skills to produce and analyze genetically engineered animals.
- 2) Understanding how to identify abnormalities and genetic interactions in the knockout mice.
- 3) Acquisition of experimental techniques, including in situ hybridization, section immunostaining, organ culture, overexpression and knockdown in cultured cells, so that the functions of genes of interest can be accurately analyzed and understood.
- 4) Acquisition of experimental skills to investigate signal transduction mechanisms in the kidney development.

**Research Conducting Program:
Brain Morphogenesis
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20420

(Required: 10 credits)

Supervisor: Kenji Shimamura and Jun Hatakeyama
Program Schedule: year 1-4, every Tuesday (6th period)
Site and Facilities: seminar room and laboratories at Department of Brain Morphogenesis

【Course Description】 The aim of this course is to understand the classical as well as recent findings and concepts in the field of developmental biology, in order to define research projects and scientific hypothesis for the mechanisms underlying development and evolution of the vertebrate brain. Current specific subjects of interest are regional specification, morphogenesis, and cell lineage of the embryonic brain. Proper experimental plans to address the issues raised by these subjects and to prove the working hypotheses are settled accordingly. Multi-disciplinary approaches (molecular biology, biochemistry, cell biology, anatomy, histology, genetics, bioimaging, and embryology) are employed. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of research. Finally, the experimental results are presented at domestic as well as international meetings and subjected to international scientific journals in the fields of developmental biology and neurobiology. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on their understanding and knowledge obtained about notions of recent progress in the research for developmental biology and neurobiology, and ability for establishing issues to address, planning of experiments, and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to some of the following criteria.

- 1) Proposal of appropriate research projects on the basis of understanding the mechanisms of brain development.
- 2) Understanding how to investigate developmental biology and neurobiology in general.
- 3) Ability to design proper experiments and the logics to elucidate the mechanisms underlying brain development.
- 4) Novel findings obtained by proper analytical approaches.
- 5) Original and innovative findings that can contribute to the field of developmental biology and neurobiology.

**Research Conducting Program:
Brain Morphogenesis
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21230

(Elective/Required: 8 credits)

Supervisor: Kenji Shimamura and Jun Hatakeyama
Program Schedule: year 1-4, every Thursday (6th-7th periods)
Site and Facilities: seminar room and laboratories at Department of Brain Morphogenesis

【Course Description】 The aim of this class is to acquire the techniques to investigate mechanisms that regulate development of the vertebrate brain. Experimental techniques to be earned in this course include morphological and histological analyses of the developing neural tissues as well as expression of genes and their products. Experimental embryology such as manipulation of the living embryos, and cell and organ cultures derived from the embryonic brain, and genetic analysis using transgenic animals are expertise of our division. The basic molecular biological methods such as DNA analysis, plasmid construction, are also included. In addition, latest technologies are also encouraged to be studied by actively reading recent literature and attending to appropriate training courses. These skills and techniques will be thoroughly studied and trained in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to some of the following criteria.

- 1) Acquisition of experimental skills to perform proper genetic as well as surgical manipulations of the living embryos.
- 2) Understanding how to analyze phenotypes derived from embryological or genetic manipulations.
- 3) Understanding how to analyze functions of genes involved in regionalization and morphogenesis of the brain.
- 4) Acquisition of experimental techniques to produce recombinant genes and proteins to reveal their roles in development of brain tissues.
- 5) Understanding of relevance and significance of the results obtained from experiments for normal development.

**Research Conducting Program:
Cell Modulation
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22510

(Required: 10 credits)

Supervisor: Takumi Era

Program Schedule: The first half year 1-4, every Friday (1th period)

Site and Facilities: conference room and laboratories at Department of Cell Modulation, IMEG

【Course Description】 The aim of this Departmental Course is to learn how to propose scientific hypothesis for the mechanisms of differentiation of pluripotent stem cells such as embryonic stem (ES) and induced pluripotent stem (iPS) cells. The hypothesis must then be proven experimentally. On the basis of the results obtained, further experimental design will be constructed to develop a novel approach for manipulation of ES-, iPS- and/or tissue stem cells. Specific research projects to be executed should be determined by searching latest literatures related to stem cell, development and regenerative medicine. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of research. Finally, the experimental results should be reported in international scientific journals in the fields of stem cell-, developmental-, molecular-, cell-, and/or molecular biology. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for the stem cell, Regenerative medicine and development mechanism, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Proposal of appropriate research projects on the basis of understanding the background on stem cell biology and developmental mechanisms.
- 2) Understanding how to investigate molecular basis of the stem cell regulation and differentiation.
- 3) Logical/proper experimental design to identify the factors that play an essential role in stem cell regulation.
- 4) Novel findings obtained by appropriate and proper analytical approaches.
- 5) Original and innovative findings that can contribute not only to better understanding for stem cell regulation but also to successful development of manipulation of pluripotent- and tissue stem cells.

**Research Conducting Program:
Cell Modulation
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22630

(Elective/Required: 8 credits)

Supervisor: Takumi Era

Program Schedule: The second half year 1-4, every Thursday (3rd-4th periods)

Site and Facilities: conference room and laboratories at Department of Cell Modulation, IMEG

【Course Description】 The aim of this class is to acquire the techniques to analyze mouse embryos. Specifically, experimental techniques to be earned in this course include establishment of immunostaining, molecular and biochemical analyses for mouse embryos. Particular emphasis is placed also on establishment of knock-out mice and analytical methods for knock-out mice, and advanced techniques to induce ES/iPS cells into tissue stem cells and to manipulate ES/iPS cells by the methods of molecular biology, all of which will be thoroughly studied in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of experimental skills to handle the mouse embryos.
- 2) Understanding how to do the histological analysis and stain the sections of mouse embryos.
- 3) Acquisition of experimental techniques to produce recombinant genes, so that their structures and functions can be accurately analyzed and understood.
- 4) Understanding of theme of the experiments and the plane of the experiments
- 5) Acquisition of experimental skills to make a hypothesis and to prove a hypothesis using proper experiments.

**Research Conducting Program:
Cell Maintenance
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22520

(Required: 10 credits)

Supervisor: Satoshi Tateishi
Program Schedule: year 1-4, every Friday (1st period)
Site and Facilities: seminar room and laboratories at Department of Cell Genetics

【Course Description】 The aim of this Departmental Course is to learn how to propose scientific hypothesis for the regulatory mechanisms of cell cycle, cell division and repair for damaged DNA. The hypothesis must then be proven experimentally. On the basis of the results obtained, further experimental design will be constructed to develop a novel approach for prevention and treatment of cancer. Specific research projects to be executed should be determined by searching latest literatures related to the cell cycle checkpoint, DNA repair, apoptosis (cell death) and cellular senescence. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of research. Finally, the experimental results should be reported in international scientific journals in the fields of molecular biology, biochemistry, cell biology, cancer and/or genetic diseases. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for cell cycle checkpoint and DNA repair, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.
1) Proposal of appropriate research projects on the basis of understanding the background on the mechanisms of cell cycle checkpoint, DNA repair, cellular senescence, apoptosis (cell death) and cellular senescence.
2) Understanding how to investigate mechanisms of cell cycle checkpoint and tumor suppressor genes.
3) Novel findings obtained by appropriate and proper analytical approaches.
4) Original and innovative findings that can contribute for prevention, and treatment of cancer.

**Research Conducting Program:
Cell Maintenance
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22640

(Elective/Required: 8 credits)

Supervisor: Satoshi Tateishi
Program Schedule: year 1-4, every Thursday (6th-7th periods)
Site and Facilities: seminar room and laboratories at Cell Genetics

【Course Description】 The aim of this class is to acquire the techniques to analyze DNA replication, recombination and repair using cultured mammalian cells. Specifically, experimental techniques to be earned in this course include identification and classification of disease using cultured cells from patient suffered from genetic disease defective for DNA repair. Particular emphasis is placed also on measurement for various DNA repair activities, purification of DNA repair enzyme and phenotypic analysis of mutant mice defective for certain DNA repair mechanism. Advanced techniques to investigate intracellular signal response for DNA damages, all of which will be thoroughly studied in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.
1) Acquisition of experimental skills to produce animal models for DNA repair.
2) Understanding how to detect and identify post-translational modifications of proteins following DNA damaging treatment of cultured cells, and determine their biological significance.
3) Acquisition of experimental techniques to produce recombinant genes and proteins of DNA replication, cell cycle checkpoint and DNA repair.
4) Acquisition of experimental techniques to analyze tumor formation in mutant mice.
5) Acquisition of experimental skills to explore the contribution of DNA repair and cell cycle control genes to maintenance of stem cells in mice.

**Research Conducting Program:
Cell Differentiation
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22530

(Required: 10 credits)

Supervisor: Minetaro Ogawa
Program Schedule: year 1-4, every Monday (6th period)
Site and Facilities: laboratories at Department of Cell Differentiation

【Course Description】 The aim of this departmental course is to learn how to conduct research on the developmental processes of the hematopoietic and vascular systems. The latest literatures are first examined to understand current status of the research fields. On the basis of the knowledge obtained by searching the literatures, specific research projects are set up to elucidate the molecular and cellular mechanisms underlying (1) establishment of the multiple potentials and self-renewal capability of hematopoietic stem cells and (2) development of the higher order architecture of the vascular system. The study tool includes FACS purification of specific cell populations, in vitro differentiation of embryonic stem cells, genetically-engineered mice, as well as general molecular and cell biological approaches. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of research. Finally, the experimental results are reported in international scientific journals in the fields of hematology, vascular biology, cell biology, and/or developmental biology. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this departmental course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on their understanding and knowledge earned about scientific information on recent progress in the research for the mechanisms of hematopoietic and vascular development, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Methodologies for identification and functional examination of stem cells are well understood.
- 2) Genetical and cell biological approaches to investigate the hematopoietic and vascular development are learned.
- 3) Methodologies for regulation of in vitro differentiation of embryonic stem cells are well understood.
- 4) A research project is properly set up to elucidate the mechanisms of hematopoietic and vascular development.
- 5) Logical and proper experimental design is set up and performed to solve the problems.
- 6) Novel findings on the development of hematopoietic and vascular systems are obtained.
- 7) Research findings are properly presented and discussed in an academic environment.

**Research Conducting Program:
Cell Differentiation
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22650

(Elective/Required: 8 credits)

Supervisor: Minetaro Ogawa
Program Schedule: year 1-4, every Thursday (6th-7th periods)
Site and Facilities: laboratories at Department of Cell Differentiation

【Course Description】 The aim of this class is to acquire the techniques to investigate the mechanisms of developmental processes of the hematopoietic and vascular systems. Specifically, experimental techniques to be earned in this course include flow cytometry and cell sorting, in vitro colony formation assay of hematopoietic progenitor cells, long-term bone marrow cell culture, bone marrow cell transplantation, in vitro differentiation of hematopoietic and vascular cells from embryonic stem cells, and other cellular and molecular methodologies to analyze hematopoiesis and vascular development. These techniques are thoroughly studied and put into practice on a specific research project aimed at elucidation of the mechanisms of hematopoietic and vascular development.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Methods for purification of stem cells by using flow cytometry are mastered.
- 2) Methods for functional identification of hematopoietic stem cells are mastered.
- 3) Cellular and molecular biological approaches to analyze hematopoiesis and vascular development are learned.
- 4) Methods for in vitro differentiation of embryonic stem cells are mastered.
- 5) A research project is properly set up to elucidate the mechanisms of hematopoietic and vascular development.
- 6) Logical and proper experimental design is set up and performed to solve the problems.

Research Conducting Program: Medical Cell Biology Departmental Course "Jissen" I (PhD Thesis Research)	Subject Code 22560 (Required: 10 credits)
Supervisor: Mitsuyoshi Nakao, Noriko Saitoh, Shinjiro Hino Program Schedule: year 1-4, every Monday (2nd period) Site and Facilities: seminar room and laboratories at Department of Medical Cell Biology	

【Course Description】 The aim of this Departmental Course is to provide the molecular basis of epigenetic cell regulation in development and human diseases. The term epigenetics is defined as "heritable changes in gene expression that occur without a change in DNA sequence". This is involved in determining cell identity in development, regeneration, aging and cancer. Students will perform medical science-oriented research by studying how cells establish, maintain or erase their identities by formation of transcriptionally active or inactive chromatin at specific genes. On the basis of the hypothesis and the results obtained, further experimental design will be constructed to discover a novel evidence for epigenetic cell regulation. Specific research projects to be executed should be determined after acquiring information from database and latest literatures related to the epigenetics. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of research. Finally, the experimental results should be reported in international scientific journals as well as conferences in the fields of cell biology, molecular biology, biochemistry and genetics. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about recent progress in the research for epigenetic cell regulation, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Understanding significance of epigenetics in life science.
- 2) Understanding relationship between epigenetics and human diseases.
- 3) Logical/proper experimental design to identify the mechanism of epigenetic cell regulation.
- 4) Novel findings obtained by appropriate and proper analytical approaches.
- 5) Original and innovative findings that can contribute not only to better understanding for epigenetic cell regulation but also to successful development of diagnosis, prevention, and treatment of human diseases.

Research Conducting Program: Medical Cell Biology Departmental Course "Jissen" II (Experimental Technique Learning)	Subject Code 22680 (Elective/Required: 8 credits)
Supervisor: Mitsuyoshi Nakao, Noriko Saitoh, Shinjiro Hino Program Schedule: year 1-4, every Monday (1st-2nd periods) Site and Facilities: seminar room and laboratories at Department of Medical Cell Biology	

【Course Description】 This class covers the techniques to analyze the epigenetic cell and gene regulation. Specifically, experimental techniques to be earned in this course include various assays in cell biology, molecular biology, biochemistry and genetics, using cultured cells and experimental animals such as mice. Particular emphasis is placed on functional analysis of genes and proteins that are involved in epigenetic regulation important for development, regeneration, aging and cancer. Advanced techniques to investigate nuclear structure and function, and translational medical researches based on epigenetic studies for diagnosis, prevention and treatment of human diseases are also covered. All of above will be thoroughly studied in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of experimental skills in cell biology, molecular biology, biochemistry and genetics.
- 2) Understanding the role of epigenetic mechanisms in physiology and human diseases.
- 3) Ability to design appropriate experiments and acquisition of techniques to investigate epigenetic cell regulation using recombinant DNAs and proteins for various factors.
- 4) Acquisition of experimental skills to investigate epigenome and chromatin in cultured cells and animals.

**Research Conducting Program:
AIDS Research I
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22270

(Required: 10 credits)

Supervisor: Masafumi Takiguchi
Program Schedule: year 1-4, every Thursday (6th period)
Site and Facilities: generally in the seminar room and laboratories at "AIDS Research I"

【Course Description】 The course is structured to expose students to the latest and important discoveries in immunology and virology and discuss how to formulate a hypothesis on the underlying mechanisms. The program will emphasize on how to test a hypothesis experimentally by studying cells and molecules involved in antiviral immunity and immune regulations. The focus will be on, but not limited to, identifying genes coding for antigens and functional molecules that play a role in antiviral immune responses and to studying the gene expression, the structures of the gene products, and their tissue localization. Based on their empirical findings, students will design experimental systems, using molecular, cellular, and developmental biology techniques, to understand the molecular functions of newly identified genes in the antiviral immune system and viral pathogenesis. They will further explore the possibility of application to immunotherapy. Students are expected to prepare written and oral reports.

【Evaluation for Grades and Credits】 Grades will be based upon attendance, understanding literatures relevant to students' research and the ability to evaluate them, students' overall performance and the quality of project design, implementation, oral presentations, and written reports. A manuscript prepared for publication and presentations at the lab meetings or domestic/ international conferences may be substituted for written assignments.

【Evaluation Criteria】 Students will be evaluated on:

- 1) their understanding of on antigen processing and recognition and their original findings on the subjects.
- 2) their understanding of viral antigens recognized by the immune system and immune responses against the antigens and their original findings on the subjects.
- 3) their understanding of basic research and clinical applications for the regulation of immune responses and their original findings.
- 4) their knowledge of previous literature relevant to their research and their ability to form reasonable hypotheses and implement their experimental plans.

**Research Conducting Program:
AIDS Research I
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22370

(Elective/Required: 8 credits)

Supervisor: Masafumi Takiguchi
Program Schedule: year 1-4, every Monday (6th-7th periods)
Site and Facilities: generally in the seminar room and laboratories at "AIDS Research I"

【Course Description】 The course will emphasize on experimental methods, including various cellular immunology, biochemical, and molecular techniques necessary for immune analysis of human and mice. Students will learn how to isolate and identify immune cells and to examine immune responses by antigen presenting cells and T lymphocytes, both *in vivo* and *in vitro*. The course will also cover molecular and biochemical methods to analyze immune molecules and antigens and introduce students to techniques for cellular infection.

【Evaluation for Grades and Credits】 Grades will be based upon attendance, students' experimental techniques and skills learned during the course, and laboratory reports. A manuscript prepared for publication and presentations at the lab meetings or domestic/ international conferences may be substituted for written assignments.

【Evaluation Criteria】 Students will be evaluated on:

- 1) their skills to isolate immune cells and analyze their morphology and functions.
- 2) their skills to investigate the structures and functions of proteins involved in the immune responses.
- 3) their skills to examine the gene structure and function of genes expressed in the immune system.
- 4) their knowledge of viral infection and experimental techniques for infection.
- 5) their ability to form reasonable hypotheses and implement their experimental plans.

**Research Conducting Program
AIDS Research II
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22280

(Required: 10 credits)

Supervisor: Shuzo Matsushita
Program Schedule: year 1-4, every Tuesday (6th period)
Site and Facilities: seminar room and laboratories at "AIDS Research II"

【Course Description】 Learning from literatures which use samples from HIV-1 infected individuals (clinical cases or animal models), or in vitro models students are supposed to propose a research hypothesis and to set a necessary experimental procedure for research on the pathogenesis and intervention of HIV-1 infection. Latest reports concerning the relationship between anti-HIV immune response such as neutralizing antibody and cytotoxic T-cell and the evolution of the virus will be reviewed. Making use of these, participants are supposed to analyze the role of anti-HIV immune response in the viral pathogenesis and the mechanism of escape from immunity. Then the research strategy should be tested by making use of experimental system using cell biology, molecular biology and immuno-chemical techniques. In addition, researches concerning the application to new treatment strategy such as immune-therapy and the development of vaccine that induces the neutralizing antibody also serve as a goal. On the basis of the results obtained, further experimental design will be constructed to develop a novel approach for prevention and treatment of HIV-1 infection. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of research. Finally, the experimental results should be reported in international scientific journals in the fields of microbiology, biochemistry, molecular biology, and/or infectious diseases. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed. Their understanding and knowledge earned about scientific information on recent progress in the research for pathogenesis and host defense mechanism of HIV-1 infection, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Understanding the pathogenesis and up-dated treatment strategy against HIV-1 infection and the current issue of the anti-retroviral therapy.
- 2) Understanding the role of anti-HIV immune response in the viral pathogenesis.
- 3) Proposal of appropriate research projects concerning an analysis of pathogenesis and development of prevention and treatment of HIV-1 infection.
- 4) Logical/proper experimental design to accomplish the proposed research project. Original and innovative findings that can contribute not only to better understanding pathogenesis but also to development of prevention and treatment of HIV-1 infection.

**Research Conducting Program
AIDS Research II
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22380

(Elective/Required: 8 credits)

Supervisor: Shuzo Matsushita
Program Schedule: year 1-4, every Thursday (6th-7th periods)
Site and Facilities: seminar room and laboratories at "AIDS Research II".

【Course Description】 The aim of this class is to acquire the techniques to analyze samples from HIV-1 infected individuals (clinical cases or animal models) or in vitro model origin to understand the pathophysiology of HIV-1 infection. For example, individual viral sequence is determined by automated sequencer after amplification of specific gene from the samples by PCR. The sequence data are subjected to the phylogenic analysis. In addition, experiments using pseudoviruses and cell sorter analyses are performed with regard to the cell mediated immunity and the humoral immunity including neutralizing antibody. With these techniques research program will be conducted to contribute not only to better understanding pathogenesis but also to successful development of prevention and treatment of HIV-1 infection. Finally, students will be trained for documentation and oral presentation of the experimental results obtained

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of experimental skills with respect to genetic and biological aspects and obtaining new findings.
- 2) Appropriate subject of study is proposed in regard to the pathogenesis of the HIV-1 infection and the development of prevention and treatment.
- 3) Whether the experimental design is appropriate to the subject of study proposed and executed properly.
- 4) Original findings that can contribute to understanding the pathogenesis of HIV-1 infection and successful development of prevention, and treatment of HIV-1 infection are obtained.

**Research Conducting Program:
AIDS Research III
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22290

(Required: 10 credits)

Supervisor: Seiji Okada

Program Schedule: year 1-4, every Wednesday (2nd period)

Site and Facilities: seminar room and laboratories at Division of Hematopoiesis, Center for AIDS Research

【Course Description】 The aim of this Departmental Course is to learn how to propose scientific hypothesis for the mechanisms of the interaction between hematopoietic-immune system and viral infection. The hypothesis must then be proven experimentally. On the basis of the results obtained, further experimental design will be constructed to develop a novel approach for prevention and treatment of viral diseases such as HIV-1 and Hepatitis C. Specific research projects to be executed should be determined by searching latest literatures related to the hematopoietic-immune system and viral infection. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of research. Finally, the experimental results should be reported in international scientific journals in the fields of hematology, immunology, molecular biology, cell biology, and/or infectious diseases. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for microbial pathogenesis and host defense mechanism, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Proposal of appropriate research projects on the basis of understanding the background on the hematopoietic-immune system and viral infection.
- 2) Understanding how to investigate the human infectious diseases and cancer using animal models.
- 3) Logical/proper experimental design to identify the interaction between hematopoietic-immune system and viral infection.
- 4) Novel findings obtained by appropriate and proper analytical approaches. (Molecular biology to animal model)
- 5) Original and innovative findings that can contribute to better understanding for hematopoietic-immune system and viral infection. .

**Research Conducting Program:
AIDS Research III
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22390

(Elective/Required: 8 credits)

Supervisor: Seiji Okada

Program Schedule: year 1-4, every Thursday (6th-7th periods)

Site and Facilities: seminar room and laboratories at Division of Hematopoiesis, Center for AIDS Research

【Course Description】 The aim of this class is to acquire the techniques to analyze interaction between hematopoietic-immune system and viral infection. Specifically, experimental techniques to be earned in this course include establishment of proper experimental animal models for human hematopoietic-immune system and viral infection. Particular emphasis is placed also on safe and proper handling of various pathogens in P2 and P3 facility, identification and analysis of human hematopoietic and immune system, analytical methods for viral infection (HIV-1, HCV), HIV-1 accessory molecules (Nef, Vif, Vpr, etc), development of well-characterized HIV-1 infection models with cultured cells and experimental animals, and advanced techniques to investigate intracellular signal transduction, all of which will be thoroughly studied in this Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of experimental skills to analyze the interaction between hematopoietic-immune system and viral infection.
- 2) Understanding and acquisition of experimental skills to produce proper animal models for human hematopoietic-immune system, human cancer and infectious diseases.
- 3) Acquisition of experimental techniques how to detect and identify hematopoietic and immune function *in vitro* and *in vivo*.
- 4) Designing and proceedings the Logical/proper experiment to identify the interaction between hematopoietic-immune system and viral infection.

**Research Conducting Program
AIDS Research IV
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22300

(Required: 10 credits)

Supervisor: Shinya Suzu
Program Schedule: year 1-4, every Wednesday (2nd period)
Site and Facilities: seminar room and laboratories at "AIDS Research IV"

【Course Description】 The molecular process by which HIV-1 infection leads to the development of AIDS is still poorly understood, of which understanding is quite important to finally eradicate AIDS. In this program, the major focus is to unravel the molecular mechanism of HIV-1 pathogenesis and its relationship with dysfunctions and phenotypical changes in hematopoietic cell components. The experimental techniques or approaches will be cell biology, molecular biology, genetic engineering, protein chemistry, and immunochemical analyses. More specific aim is to identify the interplay between HIV-1 proteins and host proteins, and to clarify how the interplay contributes to host cells or viruses themselves, through several examples. Another specific aim is to identify chemicals and/or peptides that target HIV-1 proteins and evaluate them in terms of their anti-HIV-1 capability, through several examples. The instructions, including the planning of experimental design, experiments themselves, the appropriate interpretation of the results obtained, the submission of paper, and oral presentation, all of which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed. Their understanding and knowledge earned about scientific information on recent progress in the research for pathogenesis and host defense mechanism of HIV-1 infection, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated based on their own subject and according to the following criteria.

- 1) The latest knowledge and original findings related to the pathogenesis of HIV-1 proteins
- 2) The latest knowledge and original findings related to host proteins/factors for HIV-1
- 3) The latest knowledge and original findings related to anti-HIV-1 drugs/chemicals/peptides
- 4) Enough knowledge about proposed project, and appropriate experimental design for their fulfillments.

**Research Conducting Program
AIDS Research IV
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22400

(Elective/Required: 8 credits)

Supervisor: Shinya Suzu
Program Schedule: year 1-4, every Thursday (6th & 7th periods)
Site and Facilities: seminar room and laboratories at "AIDS Research IV".

【Course Description】 The aim of this program is to learn techniques, which are necessary to clarify the HIV-1 pathogenesis and the identification/evaluation of anti-HIV-1 chemicals/peptides. The specific techniques will be cell biology (e.g. analyses of cell functions), molecular biology (e.g. intracellular signal transduction analysis), genetic engineering (e.g. mutant cDNA preparation/expression), protein chemistry (e.g. protein-protein interaction analysis), and immunochemical analyses (e.g. immuno-fluorescence)

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated based on their own subject and according to the following criteria.

- 1) Skill on cell biology (e.g. phenotypical analyses with hematopoietic cells)
- 2) Skill on molecular biology (e.g. intracellular signal transduction analyses)
- 3) Skill on genetic engineering (e.g. mutant cDNA preparation/expression)
- 4) Skill on protein chemistry (e.g. protein-protein interaction analysis)
- 5) Skill on immunochemical analyses (e.g. immuno-fluorescence)

**Research Conducting Program
AIDS Research V
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22310

(Required: 10 credits)

Supervisor: Takamasa Ueno
Program Schedule: year 1-4, every Tuesday (6th period)
Site and Facilities: seminar room and laboratories at Center for AIDS Research

【Course Description】 The course is structured to expose students to the recent and important discoveries in HIV/AIDS biology as well as human antiviral immune responses and discuss how to perform research studies. The program will emphasize on how to raise their own scientific questions, to propose hypotheses, and to design experimental strategies to answer the questions by analyzing cells, proteins, and genes involved in antiviral immunity and viral pathogenesis. The focus will be on, but not limited to, functional aspects of human T cells, molecular basis of antigen recognition, as well as HIV accessory proteins. Based on their own findings, students are expected to write scientific manuscripts to be submitted to internationally recognized journals in the fields and give oral and poster presentations in academic conferences. All academic and scientific activities listed above are PhD course requirements and will be conducted under the supervision of the instructor.

【Evaluation for Grades and Credits】 Grades will be based on attendance and overall performance in understanding and critically reviewing scientific literature, and quality of experimental design, findings, and presentations. Manuscripts for scientific papers and presentations at domestic/international conferences will be counted towards the overall course grade.

【Evaluation Criteria】 Students will be evaluated by the following criteria:

- 1) their understandings of background and their research agendas in their own research interests.
- 2) their understandings of the role of anti-HIV immune responses and viral pathogenesis.
- 3) their ability to formulate scientific questions and hypotheses.
- 4) their ability to implement strategic experimental design, accomplish research projects, and draw logical conclusions by evaluating their own experimental results.

**Research Conducting Program
AIDS Research V
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22410

(Elective/Required: 8 credits)

Supervisor: Takamasa Ueno
Program Schedule: year 1-4, every Thursday (6th & 7th periods)
Site and Facilities: seminar room and laboratories at Center for AIDS Research

【Course Description】 The course is structured for students to learn experimental methods to address their scientific questions and test hypotheses. The program will emphasize on experimental techniques for viral replication, viral pathogenesis, human immune responses, flow-cytometric analysis of cellular functions, biochemical analysis of recombinant proteins, as well as gene technologies. The course will also cover how to work safely with biohazardous materials such as HIV.

【Evaluation for Grades and Credits】 Grades will be based on attendance and overall performance in experimental techniques and skills learned during the course. Manuscripts for scientific papers and presentations at domestic/international conferences and intra-laboratory meetings will be counted towards the overall course grade.

【Evaluation Criteria】 Students will be evaluated on the following criteria:

- 1) their skills and knowledge to work safely with biologically hazardous materials.
- 2) their skills and knowledge of viral replication and pathogenesis.
- 3) their skills and knowledge to isolate and maintain cells involved in antiviral immune responses.
- 4) their skills and knowledge to analyze functional aspects of cells, proteins, and genes.
- 5) their skills and knowledge to prepare and analyze recombinant proteins and their functions.

**Research Conducting Program
AIDS Research VII
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22330

(Required: 10 credits)

Supervisor: Yasuo Ariumi
Program Schedule: year 1-4, every Tuesday (6th period)
Site and Facilities: seminar room and laboratories at AIDS Research VII

【Course Description】 The course is structured to expose students to the recent and important discoveries in HIV-1 biology (HIV-1 structure, viral replication, and the related host factors) as well as HIV-1/AIDS pathogenesis and discuss how to perform research studies. The program will emphasize on how to raise their own scientific questions, to propose hypotheses, and to design experimental strategies to answer the questions based on the cell biological, biochemical and molecular biological aspects involved in HIV-1 life cycle and HIV-1 pathogenesis. Based on their own findings, students are expected to write scientific manuscripts to be submitted to internationally recognized journals in the fields and give oral and poster presentations in academic domestic and/or international conferences.

【Evaluation for Grades and Credits】 Grades will be based on attendance and overall performance in understanding and critically reviewing scientific literature, and quality of experimental design, findings, and presentations. Manuscripts for scientific papers and presentations at domestic and/or international conferences will be counted towards the overall course grade.

【Evaluation Criteria】 Students will be evaluated by the following criteria:

- 1) Understandings of background and their research agendas in their own research interests.
- 2) Understandings of the role of HIV-1 life cycle and HIV-1 pathogenesis.
- 3) Ability to formulate scientific questions and hypotheses.
- 4) Ability to implement strategic experimental design, accomplish research projects, and draw logical conclusions by evaluating their own experimental results.

**Research Conducting Program
AIDS Research VII
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22430

(Elective/Required: 8 credits)

Supervisor: Yasuo Ariumi
Program Schedule: year 1-4, every Thursday (6th & 7th periods)
Site and Facilities: seminar room and laboratories at AIDS Research VII

【Course Description】 The course is structured for students to learn experimental methods to address their scientific questions and test hypotheses. The program will emphasize on experimental techniques for HIV-1 replication, and viral pathogenesis, human cell culture, HIV-1 infection study in the P3 facility, analysis of subcellular localization using confocal laser scanning microscopy, biochemical analysis of protein-protein interaction, as well as gene technologies, such as molecular cloning, DNA sequencing, PCR technique, and RNA isolation.

【Evaluation for Grades and Credits】 Grades will be based on attendance and overall performance in experimental techniques and skills learned during the course. Manuscripts for scientific papers and presentations at domestic/international conferences and laboratory meetings will be counted towards the overall course grade.

【Evaluation Criteria】 Students will be evaluated on to the following criteria:

- 1) Skills and knowledge of HIV-1 biology, biochemical and cell biological techniques.
- 2) Skills and knowledge of human cell culture
- 3) Skills and knowledge to prepare and analyze recombinant proteins and their functions.
- 4) Skills and knowledge to work safely with bio hazardous materials such as HIV-1.

**Research Conducting Program:
AIDS Research IX
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22350

(Required: 10 credits)

Supervisor: Shinichi Oka

Program Schedule: year 1-4, every Tuesday (5th-6th period)

Site and Facilities: seminar room at ACC of National Center for Global Health and Medicine

【Course Description】

The aim of this program is to learn how to make protocols for clinical studies to resolve current clinical problems. Based on their findings, students are expected to write scientific manuscripts to be submitted to internationally recognized journals and give oral or poster presentations in academic conferences.

【Evaluation for Grades and Credits】

Grades will be based on attendance and overall performance in understanding and critically reviewing scientific literature, and quality of experimental design, findings, and presentations. Manuscript for scientific papers and presentations at academic conferences will be counted.

【Evaluation Criteria】

Students will be evaluated by the following criteria:

- 1) their understandings of research agenda in their own interests.
- 2) their understandings of clinical data and analyzing technique.
- 3) their ability to formulate scientific questions and hypotheses.
- 4) their accomplishment of research projects.

**Research Conducting Program:
AIDS Research IX
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22450

(Elective/Required: 8 credits)

Supervisor: Shinichi Oka

Program Schedule: year 1-4, every Wednesday (5th periods)

Site and Facilities: laboratories at ACC of National Center for Global Health and Medicine

【Course Description】

The aim of this program is to learn how to diagnose, treat, and prevent complications related to AIDS. Students will learn how to make protocols for clinical studies to resolve these clinical problems.

【Evaluation for Grades and Credits】

Grades will be based on attendance and overall performance in experimental techniques and skills learned during the course. Manuscript for scientific papers and presentations at academic conferences and intra-laboratory meetings will be counted.

【Evaluation Criteria】

Students will be evaluated by the following criteria:

- 1) their knowledge of clinical complications related to AIDS
- 2) their knowledge of how to diagnose, treat, and prevent complications related to AIDS
- 3) their accomplishment of research projects

**Research Conducting Program:
AIDS Research X
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22360

(Required: 10 credits)

Supervisor: Hiroyuki Gatanaga

Program Schedule: year 1-4, every Wednesday (6th period)

Site and Facilities: seminar room at ACC of National Center for Global Health and Medicine

【Course Description】

Students will learn how to analyze HIV mutations and changes of viral loads in infected patients and discuss their clinical significance. The program will emphasize on how to raise their own scientific questions, to propose hypotheses, and to design experimental strategies to answer the questions by analyzing clinical samples. Based on their findings, students are expected to write scientific manuscripts to be submitted to internationally recognized journals and give oral or poster presentations in academic conferences.

【Evaluation for Grades and Credits】

Grades will be based on attendance and overall performance in understanding and critically reviewing scientific literature, and quality of experimental design, findings, and presentations. Manuscript for scientific papers and presentations at academic conferences will be counted.

【Evaluation Criteria】

Students will be evaluated by the following criteria:

- 1) their understandings of clinical backgrounds and their research agenda in their own interests.
- 2) their understandings of HIV clinical pathogenesis and analyzing technique.
- 3) their ability to formulate scientific questions and hypotheses.
- 4) their accomplishment of research projects.

**Research Conducting Program:
AIDS Research X
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22460

(Elective/Required: 8 credits)

Supervisor: Hiroyuki Gatanaga

Program Schedule: year 1-4, every Thursday (6th & 7th periods)

Site and Facilities: laboratories at ACC of National Center for Global Health and Medicine

【Course Description】

The aim of this program is to learn the optimization of antiretroviral therapy to each infected and tailor-made medicine in HIV treatment. Students will learn and analyze both of viral factors and host (patient) factors which influence the effects of antiretroviral therapy.

【Evaluation for Grades and Credits】

Grades will be based on attendance and overall performance in experimental techniques and skills learned during the course. Manuscript for scientific papers and presentations at academic conferences and intra-laboratory meetings will be counted.

【Evaluation Criteria】

Students will be evaluated by the following criteria:

- 1) their skills and knowledge of the viral factors which influence the effects of antiretroviral therapy.
- 2) their skills and knowledge of the host factors which influence the effects of antiretroviral therapy.
- 3) their accomplishment of research projects

**Research Conducting Program:
AIDS Research XI
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22740

(Required: 10 credits)

Supervisor: Tetsuro Matano

Program Schedule: year 1-4, every Tuesday (6th period)

Site and Facilities: Seminar room and laboratories at Infectious Disease Surveillance Center

【Course Description】

The course is structured to expose students to the latest findings on virus-host immune interaction in HIV infection and the current progress in AIDS vaccine development. Students will have a chance to perform virological and immunological analyses in primate AIDS models. The program will emphasize on how to design and perform scientific experiments to elucidate the requisites for HIV control, contributing to development of an effective AIDS vaccine. Based on their findings, students are expected to write scientific manuscripts to be submitted to internationally-recognized journals and give oral or poster presentations in academic conferences.

【Evaluation for Grades and Credits】

Grades will be based on attendance and overall performance in understanding of scientific literature, experimental design and implementation, and manuscript preparation for scientific papers. Publication of scientific reports and presentation at academic conferences and laboratory meetings will be counted.

【Evaluation Criteria】

Students will be evaluated by the following criteria:

- 1) their understandings of virus-host immune interaction in HIV infection.
- 2) their understandings of the current progress in AIDS vaccine development.
- 3) their ability to formulate scientific questions and hypotheses.
- 4) their accomplishment of research projects.

**Research Conducting Program:
AIDS Research XI
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22760

(Elective/Required: 8 credits)

Supervisor: Tetsuro Matano

Program Schedule: year 1-4, every Thursday (6th-7th periods)

Site and Facilities: Seminar room and laboratories at Infectious Disease Surveillance Center

【Course Description】

The aim of this program is to learn how to perform virological and immunological analyses in HIV and simian immunodeficiency virus (SIV) infection. Students will learn how to analyze viral genome diversity and host cellular/humoral immune responses, and will have a chance to join vaccine trials in primate AIDS models. Students will learn how to make protocols for basic studies toward AIDS vaccine development.

【Evaluation for Grades and Credits】

Grades will be based on attendance and overall performance in experimental techniques and skills learned during the course. Publication of scientific reports and presentation at academic conferences and laboratory meetings will be counted.

【Evaluation Criteria】

Students will be evaluated by the following criteria:

- 1) their knowledge on viral genome diversity in HIV/SIV infection.
- 2) their knowledge on host cellular/humoral immune responses in HIV/SIV infection.
- 3) their skills to perform virological and immunological analyses in primate AIDS models.
- 4) their knowledge on AIDS vaccine trials.
- 5) their accomplishment of research projects.

**Research Conducting Program:
AIDS Research XII
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22770

(Required: 10 credits)

Supervisor: Kazuhisa Yoshimura
Program Schedule: year 1-4, every Thursday (6th period)
Site and Facilities: seminar room and laboratories at "AIDS Research Center, NIID"

【Course Description】 The aim of this course is to learn how working hypotheses have been proposed and confirmed regarding recent important progresses in HIV/AIDS including the action mechanism of anti-HIV-1 drugs and/or neutralizing antibodies, and the mechanism of resistance for drugs and/or antibodies, by showing several examples. Students are expected to search latest literatures about (i) functional molecules of host and virus components involved in viral replication, (ii) anti-HIV drugs, (iii) neutralizing antibodies, and (iv) the mechanism of resistance for drugs and/or antibodies. On the basis of findings obtained, experimental design will be constructed to develop novel anti-HIV therapies and anti-HIV drugs for clinical applications using molecular and pharmacological approach. Finally, the experimental results should be orally presented in academic meetings and reported in international scientific journals. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and evaluation skills of recent publications related to each research project, ability for experimental planning/execution and interpretation of the results obtained, and reports presented at laboratory and academic meetings. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated for each research project according to the following criteria.

- 1) Acquisition of latest findings and advances in life cycle of HIV-1.
- 2) Acquisition of latest findings and advances in anti-HIV drugs, neutralizing antibodies, and mechanisms of resistance.
- 3) Acquisition of experimental skills to culture HIVs and cells.
- 4) Acquisition of experimental skills to produce recombinant HIVs.
- 5) Proposal of appropriate experimental design and execution for conducting research.

**Research Conducting Program:
AIDS Research XII
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22900

(Elective/Required: 8 credits)

Supervisor: Kazuhisa Yoshimura
Program Schedule: year 1-4, every Tuesday (6th-7th periods)
Site and Facilities: seminar room and laboratories at "AIDS Research Center, NIID"

【Course Description】 The aim of this course is to acquire virological, biochemical, and molecular-biological techniques analyzing microbiological study of HIV-1 infection which cause AIDS and related diseases. Specifically, experimental techniques to be learned in this course include WST-8 assay, TZM-bl-assay, and p24Ag ELISA for the titration of HIV, and PCR cloning, sequence analysis, and phylogenetic analysis for classification of HIV-1 genomes. In addition, experiments using pseudo-typed viruses and cell sorter analyses are performed. All techniques in the above-mentioned assays are conducted in this course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated for each research project according to the following criteria.

- 1) Acquisition of experimental skills to use clinical isolates.
- 2) Acquisition of experimental skills with respect to genetic and biological aspects.
- 3) Acquisition of experimental skills to analyze the action mechanism of anti-HIV drugs and neutralizing antibodies.
- 4) Acquisition of experimental skills to analyze the replication kinetics of HIV with mutations.
- 5) Appropriate experimental design and execution of conducting research.

**Research Conducting Program:
AIDS Research XIII
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22780

(Required: 10 credits)

Supervisor: Yorifumi Sato
Program Schedule: year 1-4 every Wednesday (3rd period)
Site and Facilities: laboratories at "AIDS Research XIII"

【Course Description】

The aim of this course is to understand the fundamental knowledge regarding virology, molecular cell biology, immunology, and genomic biology. Students make a presentation and have a discussion using the latest scientific paper to learn how the major scientific discovery was initiated, how to generate scientific hypothesis, and how to prove that experimentally. We aim to enable student make his or her own research project with help of supervisor. The students would understand their research project very well, make their own experimental plan, and perform that efficiently. In addition, students will be able to evaluate and discuss their findings and then make a scientific paper.

【Evaluation for Grades and Credits】

Students will be evaluated based on study hours of this course as well as their ability and performance to understand and evaluate the scientific papers used in this course. Students will also be evaluated by the performance of their research project.

【Evaluation Criteria】

- 1) Understanding about recent major finding about virology, molecular cell biology, immunology, and genomic biology. Also, performance of their own research project regarding these research fields.
- 2) Knowledge and understanding for the fundamental and latest notion about retroviral life cycle, persistent infection, and pathogenesis.
- 3) Experimental findings regarding retroviral latency.
- 4) Overall performance and understanding of scientific research project.

**Research Conducting Program:
AIDS Research XIII
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22910

(Elective/Required: 8 credits)

Supervisor: Yorifumi Sato
Program Schedule: year 1-4 every Thursday (6th-7th period)
Site and Facilities: laboratories at "AIDS Research XIII"

【Course Description】

This course aims to give the students the basic experimental skill for virology, molecular cell biology, and immunology. The students would use and apply these techniques to make progress in their research project regarding retroviral latency. This process will enable the students to learn about the methods of scientific research. Supervisor will support the student to make a scientific paper and presentation about their research findings.

【Evaluation for Grades and Credits】

Students will be evaluated based on study hours of this course as well as their learning of experimental skills, interpretation and presentation regarding the his or her own research. Evaluation can be performed by their presentation in the laboratory meeting instead of making report.

【Evaluation Criteria】

- 1) Experimental skills for cell culture, DNA extraction purification, PCR, and DNA sequencing.
- 2) Ability to apply the fundamental experimental techniques to their research project. In addition, the finding of their research project.
- 3) Experimental skills for handling of viral infected cells and analysis of provirus.
- 4) Performance about their research project, such as experimental skills and planning.

**Research Conducting Program:
Reproductive Engineering
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20370

(Required: 10 credits)

Supervisor: Naomi Nakagata

Program Schedule:

Site and Facilities: seminar room and laboratories at Division

of Reproductive Engineering, Center for Animal Resources & Development (CARD)

【Course Descriptio】 The aim of this Departmental Course is to learn the reproductive physiology and the reproductive engineering techniques. In particular, you are expected to understand the following.

1. Mouse early development
 - 1) Spermatogenesis
 - 2) Oogenesis
 - 3) Ovulation
 - 4) Fertilization
 - 5) Early cleavage
2. Reproductive engineering techniques
 - 1) In vitro fertilization
 - 2) Freezing of embryos, oocytes and sperm
 - 3) Cold storage of embryos and sperm
 - 4) Embryo transfer

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for the reproductive physiology and the reproductive engineering techniques. The presentation including discussions at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Proposal of appropriate research projects on the basis of understanding the background on the reproductive physiology and the reproductive engineering techniques.
- 2) Understanding how to investigate the reproductive engineering techniques in mice.
- 3) Logical/proper experimental design using reproductive engineering techniques to apply for mice.
- 4) Novel findings obtained by appropriate and proper analytical approaches.

**Research Conducting Program:
Reproductive Engineering
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21180

(Elective/Required: 8 credits)

Supervisor: Naomi Nakagata

Program Schedule:

Site and Facilities: seminar room and laboratories at Division

of Reproductive Engineering, Center for Animal Resources & Development (CARD)

【Course Description】 The aim of this class is to acquire the reproductive engineering techniques to apply for mice. Specifically, experimental techniques to be earned in this course include the following.

- 1) In vitro fertilization
- 2) Freezing embryos, oocytes and sperm
- 3) Cold storage of embryos and sperm
- 4) Embryo transfer
- 5) Other new reproductive engineering techniques

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted with the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of experimental skills to do the basic reproductive engineering techniques in mice.
- 2) Acquisition of the main reproductive engineering techniques (In vitro fertilization, freezing of embryos, oocytes and sperm, cold storage of embryos and sperm, embryo transfer) to apply for mice.
- 3) Understanding the reproductive engineering techniques and their application for mice.
- 4) Development of the new reproductive engineering techniques in mice.

**Research Conducting Program:
Bioinformatics
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 22710

(Required: 10 credits)

Supervisor: Masatake Araki
Program Schedule: year 1-4, every Tuesday (6th period)
Site and Facilities: seminar room and laboratories at Division of Bioinformatics, IRDA

【Course Description】 The aim of this Departmental Course is to understand the important role of various disease model mice in the fields of medical and pharmaceutical science, and to learn essential skill of gene technology and molecular biology. For this purpose, several examples of disease model mice should be presented in seminar. Some of gene trap mouse lines to be analyzed should be determined by screening for specific research projects. Then precise analysis of trapped gene and mouse phenotypes should be done. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of research. Finally, the experimental results should be reported in international scientific journals. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge learned about scientific information on recent progress in the research for gene technology and molecular biology, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of an understanding of English papers for research project in the fields of gene technology and molecular biology.
- 2) Understanding how to generate transgenic mice and knockout mice.
- 3) Understanding of basic technology of experimental genetics.
- 4) Appropriate research project and experimental design to analyze disease model mice.
- 5) Novel findings obtained by the analysis of disease model mouse phenotypes.

**Research Conducting Program:
Bioinformatics
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 22720

(Elective/Required: 8 credits)

Supervisor: Masatake Araki
Program Schedule: year 1-4, every Monday (6th-7th periods)
Site and Facilities: seminar room and laboratories at Division of Bioinformatics, IRDA

【Course Description】 The aim of this class is to understand the importance of disease model mouse by explain the principle and meaning of gene trap method. Experimental techniques in the fields of experimental genetics, biochemistry and molecular biology should be learned in this course in order to analyze trapped gene and mouse phenotype. Specifically, (i) annotation of trapped gene by 5'-RACE, inverse PCR and plasmid rescue, (ii) analysis of genotype and phenotype of gene trap mice by southern blot, northern blot, immunoassay and so on, (iii) how to use Embryonic Stem (ES) cells and early stage embryo of mouse, all of which will be studied in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Understanding how to use mouse resource database.
- 2) Acquisition of how to annotate trapped genes.
- 3) Acquisition of how to analyze of genotype and phenotype of disease model mice.
- 4) Acquisition of how to use ES cells and early stage embryo of mouse.
- 5) Appropriate research project and experimental design to analyze disease model mice.

**Research Conducting Program:
Radioisotope science
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 20470

(Required: 10 credits)

Supervisor: Akihiro Kojima
Program Schedule: year 1-4, every Friday (1th period)
Site and Facilities: seminar room and laboratories at Radioisotope Research Center

【Course Description】 The aim of this course is to learn the latest quantitative methods on recent nuclear medicine imaging techniques and the usefulness of innovative imaging instruments and image-processing software developed as imaging modalities for a basic experiment and/or clinical application based on those methods. Furthermore, various problems that hamper the accurate quantification of radioactivity in the body using SPECT and PET will be explored and the development of a new method to solve these problems will be required. The performance of this method developed will be examined in some computer simulated models and experimental phantom studies. If the usefulness and effectiveness of this method is confirmed through the calculation or experiment, further research will be required for the application of clinical imaging. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for PhD thesis, are conducted in this Departmental Course.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for microbial pathogenesis and host defense mechanism, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Acquisition of a mastery of conventional techniques related to the aim of the research theme through references, and planning a proper experimental design and carrying it into execution.
- 2) Acquisition of the latest knowledge and, newer theoretical and/or experimental results for quantitative nuclear medicine imaging.
- 3) Acquisition of the latest knowledge and, newer theoretical and/or experimental results for quantitative approaches using SPECT and PET for small animals (mouse and rat) and humans.

**Research Conducting Program:
Radioisotope science
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21280

(Elective/Required: 8 credits)

Supervisor: Akihiro Kojima
Program Schedule: year 1-4, every Friday (1th-2th periods)
Site and Facilities: seminar room and laboratories at Radioisotope Research Center

【Course Description】 The aim of this course is to acquire the effective molecular imaging techniques with radioisotopes to make dynamics of drugs, quantification of physiological functions, and finding of lesions easier for small animals (mouse and rat) and humans. For the study of the clinical radioisotope imaging, 3-D anthropomorphic phantom models and computer simulations will be employed in SPECT and PET to investigate the improvement of quantitative accuracy on the measurement of physiological functions. The students will be required to present the results of this research on the filed of nuclear medicine.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Planning a proper basic experiment for the purpose of the research proposed and execution of the experiment according to the plan.
- 2) Understanding of the latest imaging techniques on investigation of molecular imaging with radioisotopes
- 3) Obtaining of some original results for the further basic study related on the development of a scintigraphic imaging method and image-data processing & analysis method, or for the clinical application of their methods

**Research Conducting Program:
IRCMS—I
Departmental Course “Jissen” I
(PhD Thesis Research)**

Subject Code 25010

(Required: 10 credits)

Supervisor: Hitoshi Takizawa

Program Schedule: 1-4 years, every Monday (4th period)

Site and Facilities: in the seminar room and the laboratory at International Research Center for Medical Sciences

【Course Description】 The course is intended to expose students to the latest and important findings in the field of immunology and hematology, and discuss the background of the discoveries, how the hypothesis was formulated, and how the questions were addressed experimentally. The students will have research projects on the response of human or mouse hematopoietic stem cells to hematopoietic stress such as infection, autoimmunity, ageing, and learn experimental approaches/techniques of molecular, cellular, and developmental biology, that are required to address the questions raised in their project. In parallel, they will learn the state-of-the art technologies and apply them to develop novel analysis for the project upon need. Students are expected to learn how to present their own results, and to publish it in a scientific journal.

【Evaluation for Grades and Credits】 Grades will be determined based upon attendance to the seminar, the ability to understand and criticize the literatures relevant to the student's project, the ability to design/plan experiments and interpret the results, as well as progress report in lab meetings and oral presentation in scientific meetings. A manuscript prepared for publication and presentations at the lab meetings or domestic/ international conferences may be substituted for written assignments.

【Evaluation Criteria】 Students will be evaluated on the following topics:

- 1) their knowledge on conventional and the latest findings on immunology and hematology upon studying literatures.
- 2) their progress to learn conventional and novel experimental techniques positively.
- 3) their ability to formulate hypothesis and design/plan appropriate experiments for their research project.
- 4) their progress on their research project.

**Research Conducting Program:
IRCMS- I
Departmental Course “Jissen” II
(Experimental Technique Learning)**

Subject Code 25020

(Elective/Required: 8 credits)

Supervisor: Hitoshi Takizawa

Program Schedule: 1-4 years, every Thursday (4th period)

Site and Facilities: in the seminar room and the laboratory at International Research Center for Medical Sciences

【Course Description】 The course is intended to learn various experimental approaches/techniques with hematopoietic stem cell (HSC) biology, cell biology, and molecular biology, that are required to analyze hematopoietic cells including human and mouse HSCs. For instance, isolation of immune and hematopoietic cells using fluorescence activated cell sorting/analyzer, in vitro or in vivo functional analysis of HSCs, protein/gene analysis using molecular biology and genetic engineering, single cell analysis, animal experimentation such as HSC transplantation.

【Evaluation for Grades and Credits】 Grades will be determined based upon experimental techniques and skills learned during the course, and laboratory reports. A manuscript prepared for publication and presentations at the lab meetings or domestic/ international conferences may be substituted for written assignments.

【Evaluation Criteria】 Students will be evaluated on the following topics:

- 1) their knowledge on immunophenotype and function of HSCs, and progress on learning basic experimental techniques that are required for their HSC biology
- 2) their experimental skills on analysis of protein/gene involved in HSC maintenance.
- 3) their knowledge on lymphoid and hematopoietic tissues, and relevant experimental skills.
- 4) their experimental skills on general and HSC oriented mouse experimentation.
- 5) their ability to design/plan appropriate experiments for their research project and the progress.

**Research Conducting Program:
IRCMS-II
Departmental Course "Jissen" I
(PhD Thesis Research)**

Subject Code 25030

(Required: 10 credits)

Supervisor: Goro Sashida
Program Schedule: year 1-4, every Tuesday (6th period)
Site and Facilities: generally in the seminar room and laboratories at "IRCMS-II"

【Course Description】 The course is structured to expose students to the latest and important findings on hematopoiesis and hematological malignancies and discuss how to have a hypothesis on the underlying mechanisms. The program will emphasize on how to examine a hypothesis experimentally by studying hematopoietic stem cells involved in hematopoiesis and/or leukemia. We will focus to study genes that play a role in hematopoietic stem cells and/or leukemic stem cells and also examine the regulation of genes/oncogenes, the structures of the gene products, and their biological function in vivo. Based on their empirical findings, students will design experimental systems, using biological, molecular, and biochemical techniques to understand the molecular mechanisms of identified genes in hematopoietic stem cells and leukemic cells. Students are expected to prepare written and oral reports. This course does not contain any studies for retrovirus-induced malignancies (e.g. HTLV-induced T cell leukemia).

【Evaluation for Grades and Credits】 Grades will be based upon attendance, understanding literatures relevant to students' research and the ability to evaluate them, students' overall performance and the quality of project design, implementation, oral presentation, and written reports. A manuscript prepared for publication and presentations at the lab meetings or domestic/international conferences can be substituted for written assignments.

【Evaluation Criteria】 Students will be evaluated on:

- 1) their knowledge of hematopoiesis and hematopoietic malignancies.
- 2) their skills to isolate hematopoietic stem cells and analyze the functions.
- 3) their skills to isolate hematopoietic malignant cells/leukemic cells and analyze the functions of tumor formation.
- 4) their knowledge of previous literatures relevant to their research and their ability to form rational hypotheses.

**Research Conducting Program:
IRCMS- II
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 25040

(Elective/Required: 8 credits)

Supervisor: Goro Sashida
Program Schedule: year 1-4, every Thursday (6th period)
Site and Facilities: generally in the seminar room and laboratories at "IRCMS-II"

【Course Description】 The course will emphasize on experimental methods including cellular and molecular techniques analyzing hematopoietic cells in mice. Students will learn how to analyze and isolate hematopoietic stem cells and leukemic cells to examine their biological function in mice. This course also covers molecular and biochemical methods to determine the function of oncogenes for hematopoietic malignancies. This course does not contain any studies for retrovirus-induced malignancies (e.g. HTLV-induced T cell leukemia).

【Evaluation for Grades and Credits】 Grades will be based upon attendance, students' experimental techniques and skills learned during the course, and laboratory reports. A manuscript prepared for publication and presentations at the lab meetings or domestic/ international conferences may be substituted for written assignments.

【Evaluation Criteria】 Students will be evaluated on:

- 1) their knowledge of hematopoiesis and hematopoietic malignancies.
- 2) their skills to isolate hematopoietic stem cells and analyze the functions.
- 3) their skills to isolate hematopoietic malignant cells/leukemic cells and analyze the functions of tumor formation.
- 4) their ability to form reasonable hypotheses and perform their rational experimental plans.

**Research Conducting Program:
Metabolomics
Departmental Course "Jissen" II
(Experimental Technique Learning)**

Subject Code 21860

(Elective/Required: 8 credits)

Course Director: Yuichi Oike (Molecular Genetics TEL: 373-5140) oike@kumamoto-u.ac.jp
Instructors: Motohiro Takeya (Cell Pathology TEL: 373-5095) takeya@kumamoto-u.ac.jp
Kazuya Yamagata (Medical Biochemistry TEL: 373-5068) k-yamaga@kumamoto-u.ac.jp
Yukio Ando (Neurology TEL: 373-5893) andoy709@kumamoto-u.ac.jp
Shoukei Mitsuyama (Pharmacology and Molecular Therapeutics TEL: 373-5082) mitsuyam@kumamoto-u.ac.jp
Hiroyuki Nakanishi (Molecular Pharmacology TEL: 373-6807) hnakanis@kumamoto-u.ac.jp

Program Schedule: year 2-4, every Tuesday (6th-7th periods)
Site and Facilities: seminar room and laboratories at each Department

【Course Description】 The aim of this Jissen II is to acquire the techniques to analyze the molecular mechanisms of metabolic regulation of cells, via small-molecule metabolite profiling, i.e., metabolomics. This modern post-genome technology can greatly help us to obtain a better understanding of the molecular basis various diseases, e.g., metabolic syndromes, cancer, etc., which in turn can promote successful development of diagnostic and therapeutic endeavor for many diseases. In particular, such subjects to be earned in this course include a basic principle of bioinformatics established as proteomics/metabolomics (LC-MS/MS etc.), practical operation of analytical instruments (e.g., MS), and their advanced techniques for application to the analysis of various signaling and metabolic molecules derived from cultured and in vivo cells and tissues and even from clinical specimens.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their experimental skills and techniques acquired during this course, and reports submitted for evaluation. The report assessment can be substituted by the assessment of each student's presentation and discussion at the laboratory and academic meetings.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Understanding of the theoretical background and principle of methods for metabolomics analyses.
- 2) Understanding how to apply the MS analysis to the metabolomics, and acquiring the operation techniques with mass spectrometers.
- 3) Acquisition of techniques to prepare experimental models to observe generate metabolic and signaling responses of cells in culture and in tissues in vivo, in which chemical identification of a diverse array of low-molecular-weight metabolites and signaling molecules can be performed via the metabolomics analysis.
- 4) Capability for accurate experimental planning and evaluation of the results obtained from the metabolomics to better understand molecular mechanisms of physiology of cell regulation and pathogenesis of various diseases.

**Research Conducting Program:
Metabolic information epidemiology "Jissen" II**

Subject Code 21870

(Elective/Required: 8 credits)

Course director: Takahiko Katoh (Public Health TEL: 373-5112)

katoht@gpo.kumamoto-u.ac.jp

Instructors: Changnian Wei (Preventive and Environmental Medicine TEL: 373-5114)

cnwei@gpo.kumamoto-u.ac.jp

Manabu Ikeda (Psychiatry and Neuropathology TEL: 373-5184)

miked@kumamoto-u.ac.jp

Koichiro Usuku (Medical Information Technology and Administration TEL: 373-5789)

space-usk@fc.kuh.kumamoto-u.ac.jp

Program Schedule: year 1-4, every Thursday (6th-7th periods)

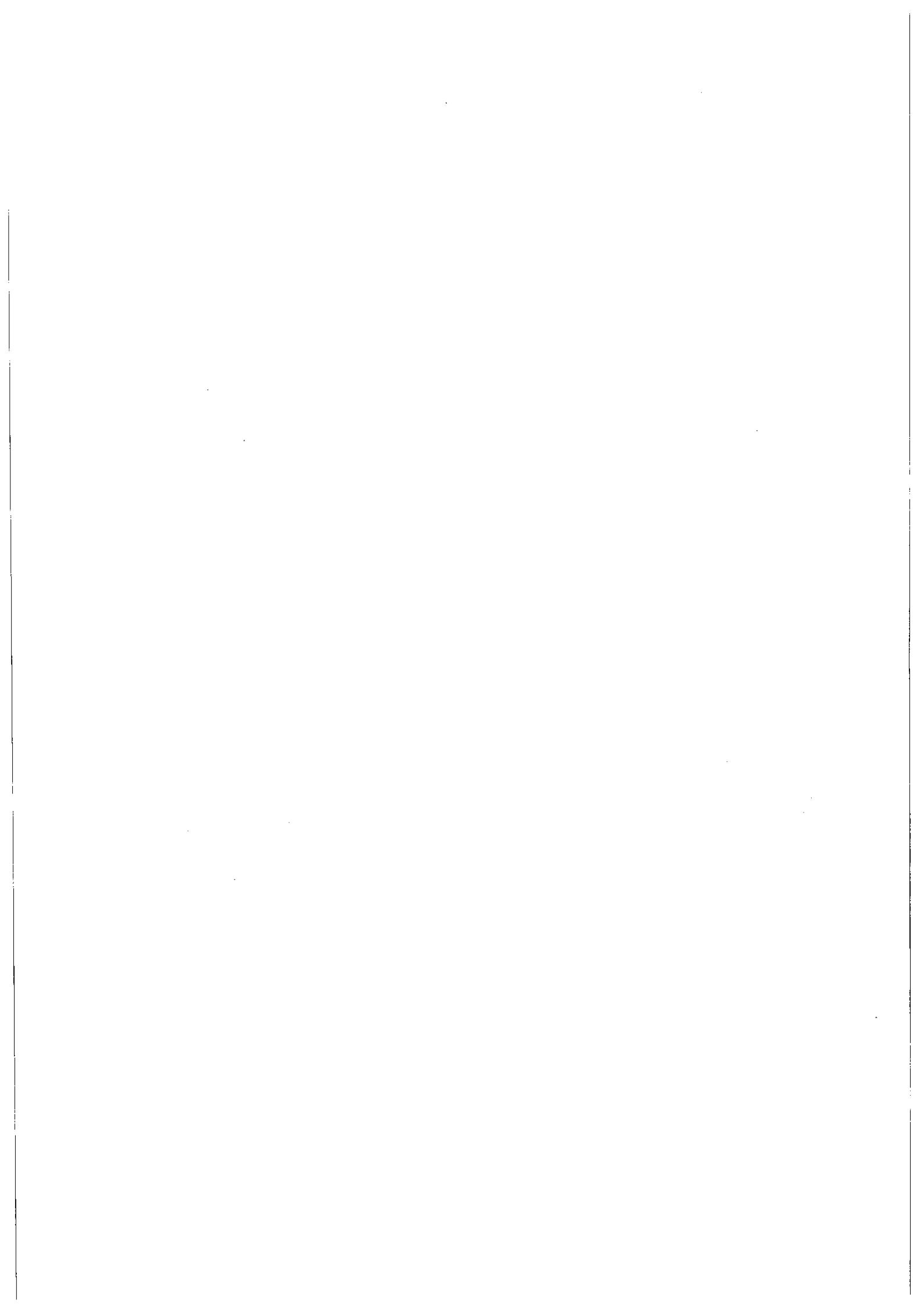
Site and Facilities: seminar room and laboratories

【Course Description】 As the ageing society progresses and medical expenses increase, reasonable use of medical expenditures is becoming a very important problem in. For this reason, the government has shifted its medical policy to the prevention of illness. As part of this plan, medical examinations carried out by communities (city, town and village) and insurance associations were changed greatly in 2008 according to the implementation of the "law of medical security for senior citizens". Especially, starting in 2013 the calculation of the latter period-senior citizen medical care support costs will be based on the rate of consultation and the rate of decrease of candidates for metabolic syndrome in each community. According to above situation, each community will have to place emphasis on disease prevention by the improvement of both the consultation rate and health guidance after medical examinations. In other words, the market for medical examinations and disease prevention is expected to expand, while medical costs will be controlled. The goal of this course is the acquisition of the ability to unify health guidance and the knowledge of the disease prevention through an understanding of and training in the "basics of metabolism" "cerebrovascular disease" and "dementia".

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for microbial pathogenesis and host defense mechanism, and ability for experimental planning and interpretation and criticism of the results obtained. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement in the PhD research.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Understanding how to read a scientific paper and basic knowledge of medical statistics, epidemiological methods, and metabolism.
- 2) Acquire the latest knowledge and understand the current conditions of lifestyle-related diseases through reviews of the literature of epidemiology research.
- 3) Acquire the latest knowledge about the medical examination system, medical examination effectiveness and the protection of personal information, and obtain new results in these fields.
- 4) Acquire the latest knowledge about medical information, medical economics, behavioral science and learning theory.
- 5) Acquire established knowledge related to a research theme through a review of the literature, then propose and carry out an appropriate research project.



11. Departmental Course

“Practice(jissen)” III

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**Clinical Practice Conducting Program:
Diagnostic Imaging
Departmental Course "Jissen" III**

Subject Code 21880

(Required: 8 credits)

Supervisor: Yasuyuki Yamashita, Mika Kitajima

Program Schedule: year 1-4, every Tuesday 7:00 (A total of 15 studies);

Neuroradiology Conference; Head&Neck-Radiology Conference; Oral and Maxillofacial Surgery-Radiology Conference; Gastroenterological Surgery-Pathology-Radiology Conference; Thoracic Surgery-Pathology-Radiology Conference; Obstetrics and Gynecology-Radiology Conference

Site and Facilities: Diagnostic Radiology Conference Room 6F; Each Conference Room

【Course Description】 There is a different diagnostic imaging method according to diseases or internal organs. The aim of this Departmental Course is to learn how an ideal imaging method is different in diseases or internal organs studied, and to understand radiologic anatomy of various organs. According to specific organs (e.g., brain, head&neck, chest, abdomen, pelvis and musculoskeletal systems), some diagnostic imaging studies will be presented in the conference meeting using PowerPoint slides. Occasionally, lectures using video or e-learning contents may be presented.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge for diagnostic imaging, ability for clinical study interpretation, and their reports submitted. The presentation including discussion at the conference meetings is also taken into consideration.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Understanding and knowledge of the ideal method of diagnostic imaging according to specific diseases and organs.
- 2) Understanding and knowledge of radiologic anatomy of various organs.
- 3) Proposal and execution of appropriate research projects in imaging studies.

**Research Conducting Program:
Surgical therapeutics for Cancer
Departmental Course "Jissen" III
(PhD Thesis Research)**

Subject Code 21890

(Required: 8 credits)

Course Director: Hideo Baba (Gastroenterological Surgery TEL: 373-5213) hdebaba@kumamoto-u.ac.jp
Instructors: Makoto Suzuki (Thoracic Surgery TEL: 373-5533) smakoto@kumamoto-u.ac.jp
Hideki Nakayama (Oral and Maxillofacial Surgery TEL: 373-5288) hinakaya@fc.kuh.kumamoto-u.ac.jp
Eiji Yumoto (Otolaryngology-Head and Neck Surgery TEL: 373-5255) yu6167@gpo.kumamoto-u.ac.jp
Hiroshi Mizuta (Orthopaedic and Neuro-Musculoskeletal Surgery TEL: 373-5223) mizuta@kumamoto-u.ac.jp
Hirohisa Iwase (Breast and Endocrine Surgery TEL: 373-5521) hiwase@kumamoto-u.ac.jp
Hidetaka Katabuchi (Gynecology TEL: 373-5269) buchik@kumamoto-u.ac.jp
Masatoshi Etoh (Urology TEL: 373-5237) etom@kumamoto-u.ac.jp
Hironobu Ihn (Dermatology TEL: 373-5230) ihn-der@kumamoto-u.ac.jp
Yukihiro Inomata (Pediatric Surgery TEL: 373-5616) yino@fc.kumamoto-u.ac.jp
Junichi Kuratsu (Neurosurgery TEL: 373-5219) jkuratsu@kumamoto-u.ac.jp

Program Schedule: year 1-4

Site and Facilities: seminar room and laboratories at each department, award and consultation room of University hospital, chemotherapy center

【Course Description】 In the current program, we will provide the opportunity to experience some clinical cases and to acquire the knowledge and skills of latest surgical treatments in each department for various types of cancer as follows: digestive cancer, lung cancer, head and neck tumor, oral cancer, breast cancer, bone soft part tumor, gynecologic tumor, genitourinary system tumor, skin cancer and pediatric cancer. You can learn not only the techniques of surgical resection of primary tumor and lymph node dissection but also the knowledge of peri-operative chemoradiotherapy. Furthermore, you can experience the medical clinical training in each department to learn the peri-operative management, pre- or post operative adjuvant therapy for cancer. You can also be in charge of patients depending on department.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for surgical treatments for cancer, and ability for clinical study planning and interpretation and criticism of the results obtained. The presentation including discussion at academic meetings is also taken into consideration.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Integrated knowledge of surgical treatment for various cancer
- 2) Integrated knowledge of adaptation of the surgical cure, an operative method and complication
- 3) Integrated knowledge of perioperative management
- 4) Integrated knowledge of preoperative and postoperative adjuvant therapy.
- 5) Proposal and execution of appropriate research projects in clinical surgical treatment

【Lecture Schedule】 We receive practical training in 240 hours in total during three or four annual.

We choose a field in hope of training and receive practical training in X 30 days (240 hours in total) for eight hours. We can choose the field of plural number. About the details of the training, obey the instructions of the field charge teacher of each field.

**Clinical Practice Conducting Program:
Radiation Oncology
Departmental Course "Jissen" III**

Subject Code 21900

(Required: 8 credits)

Supervisor: Natsuo Oya

Program Schedule: year 1-4, every Tuesday (5th period)

Site and Facilities: Radiotherapy Planning Room , New Clinical Laboratory and Examination Center BF

【Course Description】 Recently, the clinical significance of radiotherapy has been widely recognized as an important strategy in multidisciplinary cancer treatment, as a minimally invasive and highly curative treatment, and one of the promising strategies in cancer palliation. Also, according to the recent progress in information technology, high-precision 3-D conformal external beam radiotherapy has been developed and entered clinical practice. The aim of this Departmental Course is to acquire the knowledge and techniques to treat cancer patients with radiotherapy, and to plan and perform a clinical research in radiation oncology. Students will learn radiation biology, radiation physics and clinical radiation oncology to understand the role of radiation therapy in multidisciplinary cancer treatment. By patients undergoing radiotherapy, the procedure of eligibility decision, the technique of radiotherapy field setting and dose fractionation planning, the technique of irradiation, will be discussed. In addition, the principle and method of high-precision 3-D conformal external beam radiotherapy, including stereotactic radiotherapy, intensity modulated radiotherapy and functional image-incorporating radiotherapy, will be also studied. The study results should be reported in international scientific journals in the fields of radiation oncology.

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about scientific information on recent progress in the research for radiation oncology, and ability for clinical study planning and interpretation and criticism of the results obtained. The presentation including discussion at academic meetings is also taken into consideration.

【Evaluation Criteria】 The achievement will be evaluated according to the following criteria.

- 1) Integrated knowledge of radiation biology and its clinical application.
- 2) Integrated knowledge of radiation physics and its clinical application.
- 3) Integrated knowledge of clinical radiation oncology and ability to make an appropriate eligibility decision and treatment planning.
- 4) Understanding and knowledge of the principle and method of high-precision 3-D conformal external beam radiotherapy.
- 5) Proposal and execution of appropriate research projects in clinical radiation oncology.
- 6) Proposal and execution of appropriate research projects in other radiotherapy techniques.

(Elective: 8 credits)

Course Director: Eiichi Araki (Metabolic Medicine TEL: 373-5169) earaki@gpo.kumamoto-u.ac.jp

Instructors:

Hisao Ogawa (Cardiovascular Medicine TEL: 373-5175) ogawah@kumamoto-u.ac.jp

Masashi Mukoyama (Nephrology TEL: 373-5164) mmuko@kumamoto-u.ac.jp

Hidenobu Tanihara (Ophthalmology TEL: 373-5247) tanihara@pearl.ocn.ne.jp

Toshihiro Fukui (Cardiovascular Surgery TEL: 373-5205) tfukui.cvs@gmail.com

Makoto Nakajima (Neurology TEL: 373-5893) nakazima04@gmail.com

Hidetaka Katabuchi (Obstetrics and Gynecology TEL: 373-5269) buchi@kumamoto-u.ac.jp

Takashi Ohba (Obstetrics and Gynecology TEL: 373-5269) tkohba@kumamoto-u.ac.jp

【Objectives】

This course aims understanding the latest knowledge and the technology in the diagnosis and the treatment of the various metabolic diseases.

【Content Description】

The importance of the diagnosis and treatment of the metabolic disorders and the lifestyle-related diseases is now increasing. In this class, the latest knowledge and the technology of the diagnosis and the treatment of each disease are acquired by taking charge of the cases of diabetes mellitus, dyslipidemia, angina pectoris, cardiac infarction, chronic kidney disease, diabetic nephropathy, diabetic retinopathy, cerebral infarction, cerebral hemorrhage, sterility, and the polycystic ovary syndrome, etc. on a clinical site.

【Keywords】 Lifestyle-related disease, diabetes mellitus, dyslipidemia, angina pectoris, myocardial infarction, chronic kidney disease, diabetic nephropathy, diabetic retinopathy, cerebral infarction, cerebral hemorrhage, sterility, polycystic ovary syndrome, and osteoporosis

【Class Style】 Clinical training

【Textbooks】 Textbooks are not specified, and handouts will be distributed if necessary.

【Recommended Readings】 Not specified.

【Office Hour】 If you have any questions on topics or schedule of the classes, please contact the instructors listed above.

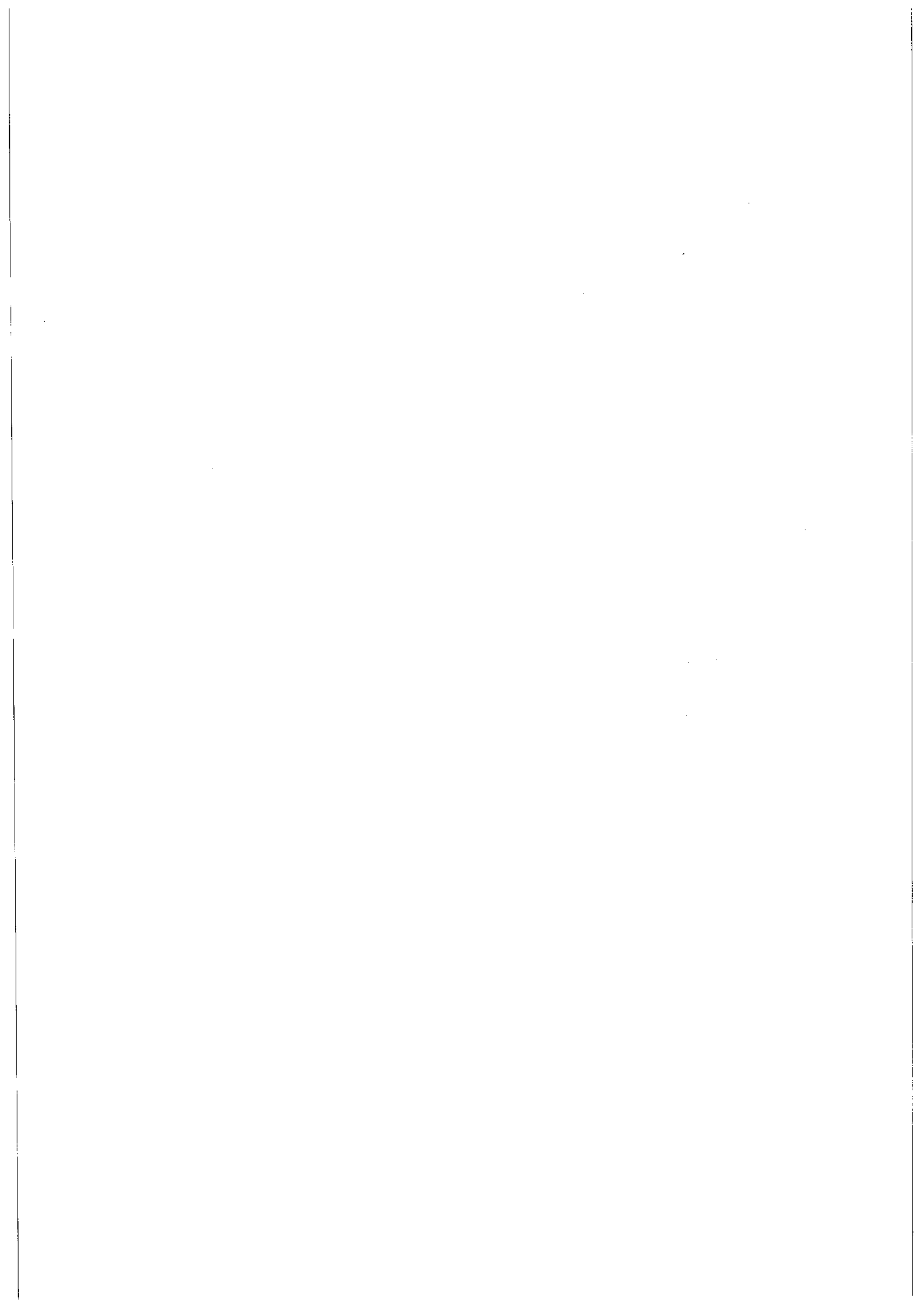
【Evaluation for Grades and Credits】 Grading will be based on active class participation, paper summaries, and the final report.

【Clinical Practice schedule】

Clinical practice will be done for 240 hours during grade 3 and grade 4.

The field which you hoped is selected, and 8 hours × 30 days are practiced to the standard (During 240 hours in total). It is also possible to select two or more fields.

According to instruction of the allotment teacher in each field of details of practice



12. Developmental Biology and Regenerative Medicine

Special Lecture "Tokuron" on Developmental Biology and Regenerative Medicine I	172
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The Course of Developmental Biology and Regenerative Medicine

Special Lecture "Tokuron" on Developmental Biology and Regenerative Medicine I

(Compulsory: 2 credits)

Subject Code 22140

Course director : Minetaro Ogawa (Cell Differentiation TEL: 373-6591) ogawamin@kumamoto-u.ac.jp
Instructors : Takumi Era (Cell Modulation TEL: 373-6589) tera @kumamoto-u.ac.jp
Kenji Shimamura (Brain Morphogenesis TEL: 373-6583) simamura@kumamoto-u.ac.jp
Teru Ogura (Molecular Cell Biology TEL: 373-6578) ogura@gpo.kumamoto-u.ac.jp
Kunitoshi Yamanaka (Molecular Cell Biology TEL: 373-6579) yamanaka@gpo.kumamoto-u.ac.jp
Hiroyuki Nakanishi (Molecular Pharmacology TEL: 373-5074) hnakanis@gpo.kumamoto-u.ac.jp
Kunimasa Ohta (Developmental Neurobiology TEL: 373-5293) ohta9203@gpo.kumamoto-u.ac.jp
Ryuichi Nishinakamura (Kidney Development TEL: 373-6615) ryuichi@kumamoto-u.ac.jp
Satomi Tanaka (Kidney Development TEL: 373-6617) stanaka@kumamoto-u.ac.jp
Mitsuyoshi Nakao (Medical Cell Biology TEL: 373-6800) mnakao@gpo.kumamoto-u.ac.jp

【Objectives】

Developmental and regenerative medicine aims at curing diseases by revealing molecular mechanisms of organ development. In this course, you learn basic concepts and techniques used in this field. This course serves as introductory for those in the Course of Developmental Biology and Regenerative Medicine, and will also be useful for those in other programs, as you obtain essential knowledge of cell differentiation and growth, cell adhesion and cell-cell interactions essential for the organogenesis, body patterning, developmental mechanism of organogenesis derived from ectoderm, endoderm and mesoderm and the molecular basis of epigenetic cell regulation in development and human diseases.

【Content Description】 Following topics including the most recent progresses will be shown and discuss in addition to reading original papers.

- Stem cell and regenerative medicine
- Development of hematopoietic stem cells
- Development and regeneration of the nervous system
- Cell lineage and developmental regulation of the nematode *C. elegans*
- *C. elegans* as a model for human diseases
- Membrane dynamics
- Neurogenesis and neural circuit formation
- Kidney development and regeneration
- Development of germ cells
- Epigenetic cell regulation in cell differentiation and transformation

【Keywords】

See course description, cell adhesion, neural induction, knockout mice, polarization and asymmetric cell division, programmed cell death, RNA interference, life span and aging, disease model, epigenetics, gene expression, chromatin, development and regeneration, stem cell, cancer, organogenesis, regionalization.

【Class Style】 PowerPoint and/or OHP will be used in the lectures, and active participation in the discussion is encouraged. Reports are considered for those who are regularly absent for unavoidable reasons.

【Textbooks】 Textbooks are not specified, and handouts will be distributed.

【Recommended Readings】

- "Essential Developmental Biology" (3rd edition by Slack JMW.) Blackwell Publishing (2012)
- "C. ELEGANS II" (ed. D.L. Riddle, T. Blumenthal, B.J. Meyer, & J.R. Priess) CSHL Press (1997)
- "EPIGENETICS" (edited by David Allis et al.) Cold Spring Harbor Laboratory Press (2007)

【Office Hour】 If you have any questions on topics or schedule of the classes, please contact the instructors listed above by e-mail.

【Evaluation for Grades and Credits】 Grading will be based on the student's understanding of the course subject matter as well as participation in class discussions. The students' understanding will be evaluated on the basis of reports or exams to be scored from 0 to 100 for each session. Final grades will be based on the average of the top 10 scores.

【Learning before classes】 It is recommended for you to read the syllabus and indicated text books in advance.

【Learning after classes】 It is recommended for you to review the handout materials distributed in the lectures and your notebooks well. If you want to ask any questions to the lecturers, "Office Hour" is available for you. It is also recommended to review the lectures by using e-learning contents if available.

【Lecture Schedule】 Please also refer to the timetable shown in the Section 5

Session	Date & time	Instructors	Topics
1. eE-O	Oct 8 (Thu) 4th period	Takumi Era	Pluripotent and tissue stem cells
2. eE-O	Oct 15 (Thu) 4th period	Takumi Era	Stem cell, disease and clinical application
3.	Oct 22 (Thu) 4th period	Minetaro Ogawa	Development of the hematopoietic system
4.	Oct 29 (Thu) 4th period	Minetaro Ogawa	Development of hematopoietic stem cells
5.	Nov 5 (Thu) 4th period	Kenji Shimamura	ES cells as a tool for developmental and regenerative neurobiology
6.	Nov 12 (Thu) 4th period	Kunitoshi Yamanaka	Cell lineage and developmental regulation of the nematode <i>C. elegans</i>
7.	Nov 19 (Thu) 4th period	Teru Ogura	<i>C. elegans</i> as a model for human diseases
8. eE-O	Nov 26 (Thu) 4th period	Hiroyuki Nakanishi	Membrane dynamics
9.	Dec 3 (Thu) no schedule	Annual Meeting of the Molecular Biology Society of Japan	
10.	Dec 10 (Thu) 4th period	Kunimasa Ohta	Neural stem cells, neurogenesis, and their clinical application
11.	Dec 17 (Thu) 4th period	Kunimasa Ohta	Neuronal circuit formation and regenerative medicine
12. eE-O	Jan 7 (Thu) 4th period	Ryuichi Nishinakamura	Development of the kidney
13. eE-L	Jan 14 (Thu) 4th period	Satomi Tanaka	Development of primordial germ cells
14. eE-O	Jan 21 (Thu) 4th period	Mitsuyoshi Nakao	Epigenetic medicine I
15. eE-O	Jan 28 (Thu) 4th period	Mitsuyoshi Nakao	Epigenetic medicine II

4th period : 15:00-16:30

The Course of Developmental Biology and Regenerative Medicine

Special Lecture "Tokuron" on Developmental Biology and Regenerative Medicine II

(Compulsory: 2 credits)

Subject Code 22150

Course Director :	Takaaki Ito	(Pathology TEL: 373-5086)	takaito@kumamoto-u.ac.jp
Instructors:	Hitoshi Niwa	(Stem Cell Biology TEL: 373-6620)	niwa@cdb.riken.jp
	Kanako Niimori	(Pathology TEL: 373-5086)	kitakana@kumamoto-u.ac.jp
	Fumio Endo	(Pediatrics TEL: 373-5188)	fendo@gpo.kumamoto-u.ac.jp
	Kimitoshi Nakamura	(Pediatrics TEL: 373-5188)	nakamura@kumamoto-u.ac.jp
	Yukio Ando	(Neurology TEL: 373-5686)	andoy709@kumamoto-u.ac.jp
	Hirofumi Jono	(Clinical Pharmaceutical Sciences TEL: 373-5823)	hjono@fc.kuh.kumamoto-u.ac.jp
	Hironobu Ihn	(Dermatology and Plastic Surgery TEL:373-5233)	ihn-der@kumamoto-u.ac.jp
	Eiji Yumoto	(Otolaryngology TEL:373-5255)	yu6167@gpo.kumamoto-u.ac.jp
	Ryosei Minoda	(Otolaryngology TEL:373-5253)	minoda@gpo.kumamoto-u.ac.jp
	Hisashi Sakaguchi	(Cardiovascular Surgery TEL:373-5205)	kouki134@gmail.com
	Yukihiro Inomata	(Pediatrics Surgery TEL: 373-5616)	yino@fc.kuh.kumamoto-u.ac.jp
	Seisuke Sakamoto	(Pediatric Surgery TEL:373-5616)	sakamoto-si@fc.kuh.kumamoto-u.ac.jp

【Objectives】

Developmental and regenerative medicine aims at curing diseases by revealing molecular mechanisms of organ development and the origin of diseases in order to develop a diagnosis and treatment for the diseases. Furthermore, this course will up-to-date with the present status of the regeneration medicines, the on going investigations on replacement of lost cells, tissues or organs. In this course, you will obtain essential knowledge on embryonic stem cells, tissue stem cells, their properties and application on regenerative medicine, mechanisms of development and repairs of epithelial tissues, methodologies in the regenerative medicine of sensory and circulatory organ, tissue injury and restoration surgery, genetic defects and their treatments, status and problems in transplant medicine.

【Content Description】

In this course, lectures on the following fields will be given:

- Regenerative medicine using embryonic stem cells and tissue stem cells
- properties and application of endodermal tissue stem cells
- growth, differentiation and abnormalities of epithelial cells
- damage, repair and mechanisms of tissue reconstitution
- pathological analyses of hereditary amyloidosis
- development of treatment for hereditary amyloidosis
- development and regeneration of skin (recovery of injury)
- denervation and reinnervation of the larynx
- regeneration of cochlear hair cells
- basic and clinic on vascular neogenesis
- treatment of ischemic heart disease
- pathological analysis and treatment of genetic diseases
- tissue and organ grafts in general, present status and problems of liver transplant

【Keywords】

ES cells, tissue stem cells, differentiation, proliferation, pancreas, liver, neural disease, cardiac disease, lung epithelium, larynx, the middle/inner ear, epidermis, cellular injury and restoration, regeneration, liver transplantation, genetic defects

【Class Style】

PowerPoint and/or OHP will be used in the lectures, and active participation in the discussion is encouraged. Reports are considered for those who are regularly absent for unavoidable reasons.

【Textbooks】

Textbooks are not specified, and handouts will be distributed.

【Recommended Readings】

- “Essential Developmental Biology, 3rd edition” by Slack JMW., Blackwell Publishing, 2012.

【Office Hour】

If you have any questions on topics or schedule of the classes, please contact the instructors listed above.

【Evaluation for Grades and Credits】

Grading will be based on active class participation, paper summaries, and the final report.

Grading will be based on the student's understanding of the course subject matter. The students' understanding will be evaluated on the basis of papers and quizzes related to the topics dealt with in class to be scored from 0 to 100.

Final grades will be based on the average score of the papers and quizzes as well as participation in class discussions.

【Learning Before classes】 It is recommended for you to read a syllabus and indicated text books in advance.

【Learning After classes】 It is recommended for you to review the handout materials distributed in the lectures and your notebooks well. If you want to ask any questions to the lecturers, "Office Hour" is available for you. It is also recommended to review the lectures by using e-learning contents if available.

【Lecture Schedule】 Please also refer to the timetable shown in the Section 5

【1st grade】

Session Date & time	Instructors	Topics
1. Feb 15 (Mon) 4th period	Hitoshi Niwa	self-renewal of pluripotent stem cells
2. Feb 22 (Mon) 4th period	Hitoshi Niwa	differentiation of pluripotent stem cells
3. Feb 29 (Mon) 4th period	Takaaki Ito	growth, differentiation and morphological abnormalities of epithelial cells
4. Mar 7 (Mon) 4th period	Takaaki Ito (Kanakano Niimori)	mechanism of neural differentiation and its involvement in cancer differentiation and proliferation
5. Mar 14 (Mon) 4th period	Fumio Endo (Kimitoshi Nakamura)	Regenerative medicine for diseases of childhood

【2nd grade】

Session Date & time	Instructors	Topics
6. Feb 15 (Mon) 4th period	Yukio Ando	pathological analyses of hereditary amyloidosis
7. Feb 22 (Mon) 4th period	Hirofumi Jono	development of treatment for hereditary amyloidosis
8. eE-0 Feb 29 (Mon) 4th period	Hironobu Ihn	development and regeneration of skin (recovery of injury)
9. eE-0 Mar 7 (Mon) 4th period	Eiji Yumoto	neuropathy and treatment of larynx paralyse
10. eE-0 Mar 14 (Mon) 4th period	Ryosei Minoda	regeneration of cochlear hair cells

【3rd grade】

Session Date & time	Instructors	Topics
11. eE-0 Feb 4 (Thur) 4th period	Hisashi Sakaguchi	Basic and clinic on vascular neogenesis
12. eE-0 Feb 18 (Thur) 4th period	Hisashi Sakaguchi	Treatment of ischemic heart disease
13. Mar 3 (Thur) 4th period	Fumio Endo (Kimitoshi Nakamura)	Pathological analysis and treatment of genetic diseases
14. Mar 10 (Thur) 4th period	Yukihiro Inomata	present status and problems of organ transplants
15. Mar 17 (Thur) 4th period	Yukihiro Inomata (Seisuke Sakamoto)	liver grafts from brain-dead and living donor

4th period : 15:00–16:30

Development and regenerative medicine**Subject code 22160****Lecture Series "Tokuron": Transplantation immunology****(Required: 2 credits)**

Course Director: Yasuharu Nishimura (Immunogenetics TEL: 373-5310) mxnishim@gpo.kumamoto-u.ac.jp
Instructors: Satoru Senju (Immunogenetics TEL: 373-5313) senjusat@gpo.kumamoto-u.ac.jp
Atsushi Irie (Immunogenetics TEL: 373-5313) airie@gpo.kumamoto-u.ac.jp
Kazuhiko Maeda (Immunology TEL: 373-5135) kazmaeda@gpo.kumamoto-u.ac.jp
Yukihiro Inomata (Transplantation TEL: 373-5616) yino@fc.kuh.kumamoto-u.ac.jp

【Objectives】

The aims of the lecture "Transplantation Immunology" are to understand the followings: (1) The mechanism of rejection in allo-transplantation, (2) Allo-antigens that induce allo-reactivity, (3) The structure and function of human major histocompatibility complex (HLA), (4) Basic immunology and clinical immuno-regulation therapy to avoid graft-rejection, (5) Current status and future direction of transplantation medicine

【Content Description】

To treat the patients with functionally impaired cells, tissues, and organs, transplantation of the cells, tissues, or organs obtained from donors is broadly carried out. Basic research on the regenerative medicine, where cells or tissues derived from allogeneic somatic stem cells or pluripotent stem cells are used, is in progress and the application to clinical medicine is expected.

Immune system has originally developed as a defense system to exclude exogenous pathogenic microbes, foreign materials, and toxins. There are structural differences of proteins, lipids, and sugars between different individuals of the same species, due to genetic polymorphism. Therefore, following the transplantation of a graft obtained from an allogeneic donor, the recipient immune system is activated by such polymorphic molecules and work to reject the graft. Among such allogeneic antigens, Major Histocompatibility Antigens encoded by Major Histocompatibility Complex (MHC) gene are the strongest in stimulating allo-reactive immune response. MHC are the trans-membrane proteins and their role is to present oligo peptides derived from protein antigens to T cells. They are highly polymorphic and exist in the cyclostomes and higher vertebrates. T cells and B cells of the immune system recognize MHC and other allogeneic antigens and reject allogeneic cells.

In the lectures, we will explain the molecular mechanisms of rejection of allogeneic cells by immune system and the characteristics of allogeneic antigens. We will also lecture on the basic and clinical immunology related to the methodology to avoid such rejection. In addition, we will provide the latest information on the issue of clinical transplantation and regenerative medicine.

We will lecture on the transplantation immunology at the level of cells, tissues, and organs, from the viewpoint of both basic and clinical medicine, including recent advances in the research by the instructors.

【Keywords】 organ and cell transplantation medicine, allogeneic antigens, human leukocyte antigen (HLA), minor histocompatibility antigens, rejection, allogenicity, Graft versus Host Reaction (GVHR), immune-suppression therapy, immune suppressants, immunological tolerance

【Class Style】 PowerPoint and/or OHP will be used in the lectures, and active participation in the discussion is encouraged. Extra classes or video lectures are considered for those who are regularly absent for unavoidable reasons.

【Textbooks】 Textbooks are not specified, and handouts will be distributed.

【Recommended Readings】

- "The Immune System" by Peter Parham. Garland Publishing Inc. New York and London, 2004
- "Janeway's Immunobiology Seventh Edition" by Kenneth Murphy, Paul Travers, Mark Walport. Garland Science, Taylor & Francis Group LLC. New York and Abingdon, 2008.
- "A history of transplantation immunology" (Leslie Brent) Academic Press 1997

【Office Hour】 If you have any questions on topics or specific research fields, please contact the instructors listed above by telephone, e-mail, or visiting them at the laboratories.

【Evaluation for Grades and Credits】 Achievement of the Objectives will be evaluated by active class participation and the reports of which the theme will be specified after the lectures. Grading will be based on the student's understanding of the course subject matter. The students' understanding will be evaluated on the basis of the reports and brief examinations related to the topics dealt with in the class to be scored from 0 to 100. Final grades will be based on the average of the best 10 scores of the reports and brief examinations as well as the participation in class discussions.

【Learning before classes】 It is recommended for you to read a syllabus and indicated recommended readings in advance.

【Learning after classes】 It is recommended for you to review the handout materials distributed in the lectures and your notebooks well. If you want to ask any questions to the lecturers, "Office Hour" is available for you. It is also recommended to review the lectures by using e-learning contents if available.

【Lecture Schedule】 Please also refer to the timetable shown in Section 5.

The e-learning contents are available for the sessions marked with "e". In some cases, the session that is not marked with "e" will be done by utilizing e-learning system, as soon as the e-learning contents are ready for use. Therefore, you must check the updated syllabus cited on the home page of the Graduate School of Medical Sciences, Kumamoto University to check the current status of the session before you take a session. If you cannot obtain enough information from the home page, please make contact with the instructors of the sessions.

There are six types of e-learning, those marked with "eE0", "eEL", "eJ0", "eJL", "eEJ-0" and "eEJ-L". To know the meanings of these six markings and to learn how to use e-learning system, please see the section explaining about the e-learning system in this syllabus.

Session	Date & time	Instructors	Topics
1 eJ-0 eE-0 eEJ-0	Oct. 5 (Mon) 4th period	Yasuharu Nishimura	Structure and function of HLA class I
2 eE-0 eEJ-0	Oct. 19 (Mon) 4th period	Yasuharu Nishimura	Structure and function of HLA class II
3	Oct. 26 (Mon) 4th period	Atsushi Irie	Polymorphism of MHC and T cell- activation signals
4 eEJ-L	Nov. 2 (Mon) 4th period	Satoru Senju	Recognition of alloantigens by T cells
5 eJ-0 eE-0 eEJ-0	Nov. 9 (Mon) 4th period	Yasuharu Nishimura	HLA and anti-tumor immunity
6	Nov.16 (Mon) 4th period	Atsushi Irie	Major and minor histocompatibility antigens
7 eE-0	Nov.30 (Mon) 4th period	Satoru Senju	Immune response and dendritic cells
8 eE-0	Dec. 7 (Mon) 4th period	Satoru Senju	Pluripotent stem cells and immune therapy
9 eE-0	Dec. 14 (Mon) 4th period	Atsushi Irie	Graft versus Host reaction (GVHR)
10 eE-L	Dec. 21 (Mon) 4th period	Kazuhiko Maeda	Immune-suppression
11 eE-0	Jan. 4 (Mon) 4th period	Kazuhiko Maeda	Transplantation immunology and NF- κ B
12 eE-0	Jan. 18 (Mon) 4th period	Kazuhiko Maeda	Transplantation immunology and Stem cell
13 eE-0	Jan. 25 (Mon) 4th period	Kazuhiko Maeda	Steroid receptors and immune-suppression
14	Feb. 1 (Mon) 4th period	Yukihiro Inomata	Transplantation in Japan and the world
15	Feb. 8 (Mon) 4th period	Yukihiro Inomata	Liver transplant from living donor

**The Course of Developmental Biology and Regenerative Medicine
Special Lecture "Tokuron" on Bioethics**

**(Compulsory: 2 credits)
Subject code 22170**

Course Director: Yasuhiro Kadooka

【Objectives】

The special lecture on bioethics will deal with ethical issues involved in developmental biology and regenerative medicine, which may be applications of organ transplantation, human stem cell research, iPS cell research, genetic diagnosis and therapy, and so on. This course is aimed to provide life science researchers with adequate knowledge and understanding concerning major bioethical issues to help them conduct researches appropriately. Specific objectives of the lecture include:

1. To recognize various ethical, legal, and social issues and implications (ELSI) and classic cases in the field of bioethics.
2. To understand intrinsic problems involved in healthcare and medical research and discuss their significance.
3. To acquire fundamental theoretical knowledge about biomedical ethics.
4. To write and present their own bioethical arguments in a plausible manner.
5. To read and critically analyze papers published in international journals in ethics and bioethics.

【Content Description】

Research Ethics and Ethics Committee

Highly Advanced Medicine: Brain Death and Organ Transplantation, regenerative medicine and human cloning, Genetic medicine, Assisted Reproductive Technology and Enhancement, and Neuroethics.

Science and Society: Professionalism of Life Science Researchers, Social responsibilities of Scientists, and Science Communication and dual-use research

【Keywords】 Bioethics, Research Ethics, Professionalism, Social Responsibility

【Class Style】

The course will consist of lectures concerning important bioethical issues and principles, small group discussion, and students' presentation. Participating students are required to critically read bioethical papers and present their own arguments. Various pedagogic strategies will be utilized including lectures, video, and e-learning. E-learning concerning research ethics (CITI e-learning system) will also be used.

【Textbooks】 Textbooks are not specified and handouts are provided.

【Recommended Readings】

- Carl Mitcham (Editor in Chief) *Encyclopedia of Science, Technology, and Ethics*. Volume 1-4, Macmillan Reference USA, Thomson/Gale, 2005.
- Bonnie Steinbock (Edition) *The Oxford handbook of Bioethics*. Oxford University Press, 2007.
- Timothy F. Murphy *Case Studies in Biomedical Research Ethics*. The MIT Press, 2004.
- Karen F. Greif, Jon F. Merz *Current Controversies in the Biological Science*. The MIT Press, 2007.
- V. Ravitsky, A. Fiester, A. L. Caplan (eds). *The Penn Center Guide to Bioethics* (171-180), New York: Springer Publishing Company, 2009.

【Office Hour】 Questions regarding the course will be handled by telephone, e-mail and direct meeting. (Contact number is 096-373-5534 and e-mail address is y-kad@kumamoto-u.ac.jp.)

【Evaluation for Grades and Credits】 Students are evaluated for their course grades and credits based on the course hours completed, their understanding and knowledge earned about information in the research for bioethics, ability of summarizing and presenting bioethical deliberation of their own themes, and quality of hand-in report essays. Grading will be based on the student's understanding of the course subject matter. The students' understanding will be evaluated on the basis of short essays.

【Learning Before classes】 It is recommended for you to read a syllabus and indicated text books in advance.

【Learning After classes】 It is recommended for you to review the handout materials distributed in the lectures and your notebooks well. If you want to ask any questions to the lecturers, "Office Hour" is available for you. It is also recommended to review the lectures by using e-learning contents if available.

【Lecture Schedule】 All lectures will be held by Yasuhiro Kadooka

Session	Topics	Date & time
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【First grade】 Research Ethics

CITI e-learning system will be used for research ethics education.

【Second grade】 Advanced Medicine One-day intensive course will deal with following 5 topics. The date will be announced when determined.

6. Organ Transplantation
7. Regenerative medicine and cloning
8. Genetics and enhancement
9. Artificial reproductive technology
10. Neuroethics

【Third grade】 Science and Society One-day intensive course will deal with following 5 topics. The date will be announced when determined.

11. Professionalism
12. Social Responsibilities of Scientists
13. Scientific communication
14. Society and medicine 1 (healthcare policy, etc.)
15. Society and medicine 2 (Public health, etc.)

The Course of Developmental Biology and Regenerative Medicine

Practice "Enshuu" on Developmental Biology and Regenerative Medicine I

(Elective: 2 credits)

Subject Code 22180

Course Director: Minetaro Ogawa (Cell Differentiation TEL:373-6591) ogawamin@kumamoto-u.ac.jp

Instructors:

Mitsuyoshi Nakao (Medical Cell Biology TEL: 373-6800)

mnakao@gpo.kumamoto-u.ac.jp

Yasuharu Nishimura (Immunogenetics TEL: 373-5310)

mxnishim@gpo.kumamoto-u.ac.jp

Takaaki Ito (Pathology and Experimental Medicine TEL: 373-5086)

takaito@kumamoto-u.ac.jp

Yukihiro Inomata (Pediatric Surgery TEL: 373-5616)

yino@fc.kuh.kumamoto-u.ac.jp

Fumio Endo (Pediatrics TEL: 373-5191)

fendo@gpo.kumamoto-u.ac.jp

Eiji Yumoto (Otolaryngology-Head and Neck Surgery TEL: 373-5255) yu6167@gpo.kumamoto-u.ac.jp

【Objectives】

Developmental and regenerative medicine is an extremely interdisciplinary science that involves embryology, cell biology, molecular biology, genetics, immunology, histology, reconstructive surgery, bioethics and other broad fields of biosciences. Characterizing pathological conditions and etiology and developing medical treatment for diseases from the viewpoint of developmental biology, as well as establishing regenerative medicine in an effort to repair ageing and injured tissues and organs, may need to surmount various critical problems that should be related to above interdisciplinary fields. Based on the knowledge learned in the special lectures "Tokuron", this practice intends to enhance the ability of approaching solution of problems from a multilateral perspective by advancing quest for an arbitrarily-selected issue through successive examinations of literatures and discussions.

【Content Description】

Topics of the practice may encompass full range of issues that are related to developmental biology and regenerative medicine.

【Keywords】

【Class Style】

Students form a small group and raise an issue related to developmental and regenerative medicine. (An example of the issue might be finding a way to recover kidney function avoiding relying on dialysis treatment.) Students then find obstacles to settlement of the issue and examine literatures cooperatively with the group members and make discussions in order to explore methodology and strategy to solve the raised problems. The instructors listed above appropriately support the group work to facilitate learning. Results of the study are summarized in a report. Students will also have opportunities for the presentation of the results.

【Textbooks】

【Recommended Readings】

【Office Hour】 If you have any questions on topics of the practice, please contact the instructors listed above.

【Evaluation for Grades and Credits】 Grading will be based on active participation in the group work as well as the final report and presentation. Focus of evaluation are (i) whether problems are appropriately raised from the selected issue, (ii) whether strategies to solve the problems are appropriately presented, (iii) whether both technical and ethical aspects are considered.

The Course of Developmental Biology and Regenerative Medicine

Practice "Enshuu" on Developmental Biology and Regenerative Medicine II

(Elective: 2 credits)

Subject Code 22190

Course Director: Minetaro Ogawa (Cell Differentiation TEL:373-6591) ogawamin@kumamoto-u.ac.jp

Instructors:

Mitsuyoshi Nakao (Medical Cell Biology TEL: 373-6800)

mnakao@gpo.kumamoto-u.ac.jp

Yasuharu Nishimura (Immunogenetics TEL: 373-5310)

mxnishim@gpo.kumamoto-u.ac.jp

Takaaki Ito (Pathology and Experimental Medicine TEL: 373-5086)

takaito@kumamoto-u.ac.jp

Yukihiro Inomata (Pediatric Surgery TEL: 373-5616)

yino@fc.kuh.kumamoto-u.ac.jp

Fumio Endo (Pediatrics TEL: 373-5191)

fendo@gpo.kumamoto-u.ac.jp

Eiji Yumoto (Otolaryngology-Head and Neck Surgery TEL: 373-5255) yu6167@gpo.kumamoto-u.ac.jp

【Objectives】

Developmental and regenerative medicine is an interdisciplinary science that is rapidly evolving as a new field of life science. This practice consists of lectures from researchers who work on developmental biology and regenerative medicine in Japan and overseas. Researchers committed to cutting-edge research will be invited and present latest developments of their own. Students are encouraged to attend the seminars to acquire up-to-date knowledge of regenerative medicine and related fields that may not be covered in the special lectures "Tokuron".

【Content Description】

Topics of the seminars may encompass full range of issues that are related to developmental biology and regenerative medicine, including cell engineering, genetic engineering, biomedical materials, reproductive medicine and bioinformatics.

【Keywords】

【Class Style】

Students attend the seminars that are authorized by the course and write reports. The reports should include summary of the lectures and his/her own discussion about the topics. In principle, one hour seminar is suitable for one report.

【Textbooks】

【Recommended Readings】

【Evaluation for Grades and Credits】 Students are obligated to attend 15 or more lectures and submit reports. The attendance can be extended to four years at maximum. Grading will be based on the reports.

The Course of Developmental Biology and Regenerative Medicine

Practice "Enshuu" on Developmental Biology and Regenerative Medicine III (Elective: 2 credits)

Subject Code 22200

Course Director: Minetaro Ogawa (Cell Differentiation TEL:373-6591) ogawamin@kumamoto-u.ac.jp

Instructors:

Mitsuyoshi Nakao (Medical Cell Biology TEL: 373-6800)	mnakao@gpo.kumamoto-u.ac.jp
Yasuharu Nishimura (Immunogenetics TEL: 373-5310)	mxnishim@gpo.kumamoto-u.ac.jp
Takaaki Ito (Pathology and Experimental Medicine TEL: 373-5086)	takaito@kumamoto-u.ac.jp
Yukihiro Inomata (Pediatric Surgery TEL: 373-5616)	yino@fc.kuh.kumamoto-u.ac.jp
Fumio Endo (Pediatrics TEL: 373-5191)	fendo@gpo.kumamoto-u.ac.jp
Eiji Yumoto (Otolaryngology-Head and Neck Surgery TEL: 373-5255)	yu6167@gpo.kumamoto-u.ac.jp

【Objectives】

During the process of conducting research on developmental and regenerative medicine, it is necessary to present research findings and discuss with other scientists at domestic and international conferences. This practice aims at expanding capability to make a productive discussion on a subject presented by other researchers and to present and discuss own findings in an effective manner at an academic conference.

【Content Description】

Topics of the practice may encompass full range of issues that are related to developmental biology and regenerative medicine.

【Keywords】

【Class Style】

Students attend domestic or international conferences on developmental biology, regenerative medicine and other related research fields. In addition to discuss on the subjects presented by other researchers, students will present findings obtained from their own research in poster or oral sessions. The instructors listed above appropriately support discussions and preparations of presentation. Students finally write a report that includes the state of achievement of the activities at the conferences.

【Textbooks】

【Recommended Readings】

【Evaluation for Grades and Credits】 Students are obligated to attend and make a presentation in domestic or international conferences on developmental biology and regenerative medicine. Length of the activities at the conferences should be 4 days or more in sum total. Student should present their own research findings at least once in any of the conferences they attend. The attendance can be extended to four years at maximum. Grading will be based on the final report.

The Course of Developmental Biology and Regenerative Medicine
Practical Training "Jisshuu" on Developmental Biology and Regenerative Medicine
(Elective: 2 credits)
Subject code 22210

Course director : Minetaro Ogawa (Cell Differentiation TEL: 373-6591) ogawamin@kumamoto-u.ac.jp
Instructors : Kiyomi Tamura (Cell Differentiation)
Kenji Shimamura (Brain Morphogenesis TEL: 373-6583) simamura@kumamoto-u.ac.jp
Jun Hatakeyama (Brain Morphogenesis)
Kunimasa Ohta (Developmental Neurobiology TEL: 373-5293) ohta9203@gpo.kumamoto-u.ac.jp
Mitsuyoshi Nakao (Medical Cell Biology TEL: 373-6800) mnakao@gpo.kumamoto-u.ac.jp
Noriko Saitoh (Medical Cell Biology)
Shinjiro Hino (Medical Cell Biology)
Yasuharu Nishimura (Immunogenetics TEL: 373-5310) mxnishim@gpo.kumamoto-u.ac.jp
Satoru Senju (Immunogenetics)
Atsushi Irie (Immunogenetics)
Takaaki Ito (Pathology and Experimental Medicine TEL: 373-5086) takaito@kumamoto-u.ac.jp
Kanao Niimori (Pathology and Experimental Medicine)
Kohki Hasegawa (Pathology and Experimental Medicine)
Hiroyuki Nakanishi (Molecular Pharmacology TEL: 373-5074) hnakanis@gpo.kumamoto-u.ac.jp
Kazuaki Umeda (Molecular Pharmacology)
Koji Kikuchi (Molecular Pharmacology)
Yasuhisa Sakamoto (Molecular Pharmacology)
Kazuhito Tomizawa (Molecular Physiology TEL: 373-5050) tomikt@kumamoto-u.ac.jp
Wen-Jie Song (Sensory and Cognitive Physiology TEL:373-5056) song@kumamoto-u.ac.jp
Ryuichi Nishinakamura (Kidney Development TEL:373-6615) ryuichi@kumamoto-u.ac.jp
Teru Ogura (Molecular Cell Biology TEL:373-6578) ogura@kumamoto-u.ac.jp
Masatoshi Esaki (Molecular Cell Biology)

【Objectives】

Various experimental methods and techniques are applied in the field of developmental biology and regenerative medicine, which is an interdisciplinary research based on cell biology, molecular biology, immunology and histology. For researchers in the field, it is required to learn such experimental methods and techniques practically. Even for researcher outside the field, it is important to understand a background of the experimental methods and techniques, since it gives us a multilateral viewpoint and would support to resolve various problems in specific research fields. Principles and practical procedures for several important experimental methods and techniques were trained in practical training of Developmental Biology and Regenerative Medicine.

【Content Description】

Following methods and techniques are trained:

- Ultrastructural analysis: Scanning electron microscopy (Brain Morphogenesis)
- Cell motility analysis: Time-lapse imaging of living culture cells (Molecular Pharmacology)
- Stem cell culture: Induction of immunocytes from ES cells (Immunogenetics)
- Tissue culture: Handling of developing neural tissues and cells (Developmental Neurobiology)
- Histological analysis: Histological stain and its interpretation (Pathology and Experimental Medicine)
- Flow cytometric analysis: Fractionation and isolation of cells by FACS (Cell Differentiation)
- Quantitative PCR: Isolation of RNA/DNA and quantification by PCR (Medical Cell Biology)
- Behavior analysis: Operant conditioning test, Open field test, Fear-conditioning test (Molecular Physiology)
- Fluorescence microscopy: Two-photon fluorescence microscopy for neurons (Sensory and Cognitive Physiology)
- Gene transfection: Lipofection, Western blot (Kidney Development)
- Protein purification: Induction of protein expression in bacteria, protein purification (Molecular Cell Biology)

In this course, sessions in Practical Training of Metabolism and Cardiovascular Medicine could also be selected.

【Key Words】

Scanning electron microscope, Time-lapse fluorescence microscopy, FACS (Fluorescence-activated cell sorter), Quantitative PCR, ES cells, Cell Culture, Primary culture, Two-photon fluorescence microscopy, Isolation of RNA and DNA, Behavior analysis, Gene transfection, Protein purification

【Class Style】

Each training course will be held in a laboratory in charge. First, the principle of a method or a technique will be lectured, then practical handling will be trained. Results and discussions must be summarized in a report.

【Textbook】 Textbooks are not specified, and handouts for each practice will be distributed

【Recommended Readings】 Not specified.

【Office Hour】 If you have any questions on topics or schedule of the classes, please contact the instructors listed above.

【Evaluation for Grades and Credits】

Students must participate in at least 8 sessions and submit reports for each session. Grading will be based on the student's understanding of the subject matter as well as activities in the classes. The students' understanding will be evaluated on the basis of reports to be scored from 0 to 100 for each session. Final grades will be based on the average of the top 8 scores.

【Learning Before classes】 It is recommended for you to read a syllabus and indicated text books in advance.

【Learning After classes】 It is recommended for you to review the handout materials distributed in the lectures and your notebooks well. If you want to ask any questions to the lecturers, "Office Hour" is available for you. It is also recommended to review the lectures by using e-learning contents if available.

【Lecture Schedule】 Schedule of each session will be forwarded to you separately.

Session	Division in charge	Practical topics
1. Primary culture	(Developmental Neurobiology)	Neural cells and tissue isolation and culture
2. Differentiation of ES cells	(Immunogenetics)	Cell culture, Cell differentiation and its estimation
3. Timelapse microscopy	(Molecular Pharmacology)	Low fluorescence cell culture and image processing
4. Histological analysis	(Pathology and Experimental Medicine)	Fixation, section, stain and image processing
5. SEM	(Brain Morphogenesis)	Sample preparation, observation and image processing
6. FACS	(Cell Differentiation)	Cell labeling and fractionation
7. Quantitative PCR	(Medical Cell Biology)	Nucleic acid extraction and quantification
8. Behavior analysis	(Molecular Physiology)	Operant conditioning test
9. Fluorescence microscopy	(Sensory and Cognitive Physiology)	Two-photon fluorescence microscopy
10. Gene transfection	(Kidney Development)	Lipofection, Western blot
11. Protein purification	(Molecular Cell Biology)	Induction of protein expression, protein purification

(Practical Training of Metabolic Medicine)

1. Introduction of epidemiology	Public Health	Basic statistical analysis
2. Introduction of metabolic analysis	Neurology	Metabolic disease
3. Metabolic analysis 1	Pharmacology and Molecular Therapeutics	Blood flow measurement
4. Metabolic analysis 2	Medical Biochemistry	ELISA
5. Metabolic analysis 3	Molecular Genetics	Whole body metabolism, CT
6. Metabolic analysis 4	Cardiovascular Medicine	Cardiovascular disease model
7. Histological analysis	Cell Pathology	IHC, EM
8. Oxidative stress analysis	Microbiology	Reactive oxygen species

13. Endocrinology and Metabolism Course

The Course of Metabolism and Cardiovascular Medicine
Practical training of Metabolism and Cardiovascular Medicine

Subject code 22250
(Elective: 2 credit)

Course director : Yuichi Oike (Molecular Genetics) TEL: 373-5142 oike@gpo.kumamoto-u.ac.jp
Instructors : Takahiko Katoh (Public Health) TEL: 373-5112 katoht@gpo.kumamoto-u.ac.jp
Kazuya Yamagata (Medical Biochemistry) TEL: 373-5068 k-yamaga@kumamoto-u.ac.jp
Shokei Mitsuyama (Pharmacology and Molecular Therapeutics) TEL: 373-5082 mitsuyam@kumamoto-u.ac.jp
Motohiro Takeya (Cell Pathology) TEL: 373-5095 takeya@kumamoto-u.ac.jp
Yukio Ando (Neurology) TEL: 373-5893 andoy709@kumamoto-u.ac.jp
Hisao Ogawa (Cardiovascular Medicine) TEL: 373-5175 ogawah@kumamoto-u.ac.jp
Tomohiro Sawa (Department of Microbiology) TEL: 373-5320 sawat@kumamoto-u.ac.jp

【Objectives】

Various experimental methods and techniques are applied in the field of Metabolism and Cardiovascular Medicine, which is an interdisciplinary research based on epidemiology, internal medicine, pathology, pharmacology, histology and cell biology. For researchers in the field, it is required to learn such experimental methods and techniques practically. Even for researcher outside the field, it is important to understand a background of the experimental methods and techniques, since it gives us a multilateral viewpoint and would support to resolve various problems in specific research fields. Principles and practical procedures for several important experimental methods and techniques were trained in practical training of Metabolism and Cardiovascular Medicine.

【Content description】

Following methods and techniques are trained:

- Introduction of epidemiology: Epidemiological and statistical analysis (Public Health)
- Introduction of metabolic analysis: Method of analyzing metabolic disease (Neurology)
- Metabolic analysis 1: Blood pressure and cardiac rate (Pharmacology and Molecular Therapeutics)
- Metabolic analysis 2: Blood insulin (Medical Biochemistry)
- Metabolic analysis 3: Whole body metabolism, CT (Molecular Genetics)
- Metabolic analysis 4: Cardiovascular disease model (Cardiovascular Medicine)
- Histological analysis: Histopathology, Immunohistochemistry (Cell Pathology)
- Oxidative stress analysis: Measurements of reactive oxygen species (Microbiology)

In this course, sessions in Practical training of Developmental Biology and Regenerative Medicine also could be selected.

【Key words】

Metabolic syndrome, obesity, epidemiology, statistics, mouse, insulin, hypertension, cardiovascular disease, oxidative stress, pathology, proteomics, immunohistochemistry, transmission electron microscopy,

【Class Style】

Each training course will be held in a laboratory in charge. First, the principle of a method or a technique will be lectured, then practical handling will be trained. Results, which will be discussed, must be summarized in a report.

【Textbook】 Textbooks are not specified, and handouts for each practice will be distributed

【Recommended Readings】 Not specified.

【Office Hour】 If you have any questions on topics or schedule of the classes, please contact the instructors listed above.

【Evaluation for Grades and Credits】

Grading will be based on active class participation and discussion and the final report. In the report, results and comments concerning at least 8 sessions could be summarized in one or two A4 sheets.

【Lecture Schedule】 Schedule of each session will be forwarded to you separately.

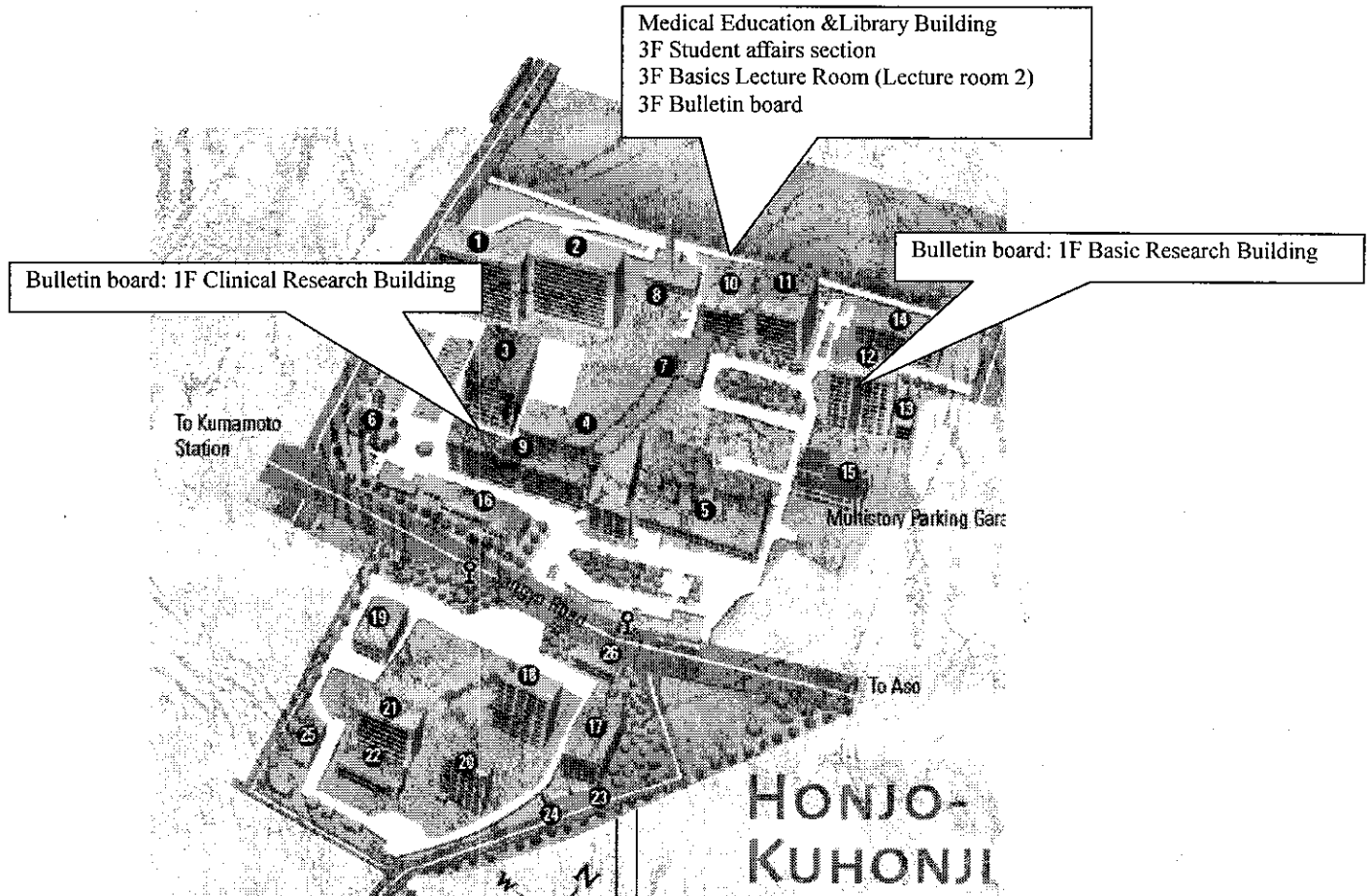
Session	Division in charge	Practical topics
1. Introduction of epidemiology	Public Health	Basic statistical analysis
2. Introduction of metabolic analysis	Neurology	Metabolic disease
3. Metabolic analysis 1	Pharmacology and Molecular Therapeutics	Blood flow measurement
4. Metabolic analysis 2	Medical Biochemistry	ELISA
5. Metabolic analysis 3	Molecular Genetics	Whole body metabolism, CT
6. Metabolic analysis 4	Cardiovascular Medicine	Cardiovascular disease model
7. Histological analysis	Cell Pathology	IHC, EM
8. Oxidative stress analysis	Microbiology	Reactive oxygen species

(Practical training of Developmental Biology and Regenerative Medicine)

1. Primary culture	(Developmental Neurobiology)	Neural cells and tissue isolation and culture
2. Differentiation of ES cells	(Immunogenetics)	Cell culture, Cell differentiation and its estimation
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6. FACS	(Cell Differentiation)	Cell labeling and fractionation
7. Quantitative PCR	(Medical Cell Biology)	Nucleic acid extraction and quantification
8. Behavior analysis	(Molecular Physiology)	Operant conditioning test
9. Fluorescence microscopy	(Sensory and Cognitive Physiology)	Two-photon fluorescence microscopy
10. Gene transfection	(Kidney Development)	Lipofection, Western blot
11. Protein purification	(Molecular Cell Biology)	Induction of protein expression, protein purification

14. Campus map and lecture room location

Honjo Campus



1. West Tower
2. East Tower
3. Central Examination Building
4. Outpatient Examination and Clinical Research Building
5. Administration Building
6. Yamazaki Hall
7. Former Emergency Building
8. Facility Management Building
9. Clinical Research Building
10. Medical Educational & Library Building
11. General Medical Research Building
12. Basic Research Building
13. The Center for Medical Education and Research
14. Dormitory for Nurses
15. Multistory Parking Garage 1
16. Multistory Parking Garage 2
17. Institute of Resource Development and Analysis (Center for Animal Resources & Development)
18. Center for AIDS Research, Institute of Resource Development and Analysis
19. Lecture Building
20. Institute of Molecular Embryology and Genetics
21. Institute of Resource Development and Analysis (Gene Technology Center / Radioisotope Center)
22. Academic Common Honjo-1
23. Club Room
24. Club Room
25. Club Room
26. Higo Iiku Monument Hall

