Academic Year 2015

The Graduate School of Medical Sciences
Kumamoto University
(Master's Course)

Syllabus

The Graduate School of Medical Sciences
Kumamoto University

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

For inquiry, please contact:
Student Affairs Section, Graduate School of Medical Sciences,
Kumamoto University
1-1-1 Honjo, Chuou-ku, Kumamoto-shi, Kumamoto 860-8556
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The objective and principle of the Graduate School of Medical Sciences, Kumamoto University

The Graduate School of Medical Sciences of Kumamoto University was established to produce researchers, educators and highly specialized professionals who have advanced medical and life-science knowledge, as well as critical thinking skills.

The Master's Course (Division of Medical Sciences) was established to provide graduates from universities, other than from medical, dental and veterinary schools (departments), and those who are recognized as having attainments equal to or greater than graduation, with a basic knowledge of medicine and life sciences. The course encourages them to become researchers and educators who are able to take on the new medical and health care challenges brought about by technological innovation. The course also aims to develop highly specialized professionals who have strong expertise, and who can play leading roles in the areas of medicine, health care and life sciences.

Master's 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 and one-on-one education. We do this to produce researchers, educators and highly specialized professionals who have sophisticated expertise, and who will be active in the fields of medical and life science.

1. Interdisciplinary knowledge needed to solve multidisciplinary problems relating to medical and life sciences
2. Special knowledge of advanced medical care that will allow the student to contribute to health promotion both inside and outside Japan
3. The ability to conduct research that covers the latest medical and life science advancements brought about by technological innovation

Feature 1

Kumamoto University has established the Center for AIDS Research, the Institute of Resource Development and Analysis and the Institute of Molecular Embryology and Genetics as its medical research centers. With these institutions as a core, advanced research is conducted especially in the fields of infection and immunology, medical embryology, medical genetics, the brain and neuroscience. Since these fields are broadly included in life science, we accept a wide range of persons from various faculties not limited to those of medical, dental and veterinary sciences. By providing them with distinctive education, we can foster unique human resources and facilitate the development of research.

Feature 2

Kumamoto University Hospital is actively engaged in highly-sophisticated medical treatment such as gene testing, gene therapy for various diseases (genetic disorder, cancer, AIDS and other infectious diseases) and organ transplantation including liver and kidney. To provide such medical treatment, not only doctors but specialists with advanced medical knowledge covering diverse fields are required and it is imperative to cultivate such specialists. In the Master's Course, we have built up an educational system to cultivate human resources who meet these needs through education concerning the fundamentals of highly-sophisticated medical treatment and clinical medicine.

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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 2. Please note that students must obtain 30 designated credits during the two years in this graduate school. Otherwise, their academic work shall not be deemed complete, even if their research and Master's 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 3) should be submitted to the Student Affairs Section, (Kyoumu-Tanto) at this graduate school office by April 13 (Mon). Students can change elective subjects until April 17 (Fri). It's not allowed to change after that.

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(A1～A7) and elective subjects listed in their application via a web browser of SOSEKI by April 13 (Mon).

3) **Departmental Course (compulsory subjects):** "A6 Exercises in Medical Sciences" and "A7 Study in Medical Science", described on page 2, are comprised of Journal club, learning of experimental planning and technique, practical experiments at the department students belong to, and it is necessary to complete master's thesis and the public presentation (the oral examination).
Application form for Departmental Course should be submitted to the Student Affairs Section as same as other subjects by April 13 (Mon). Students can change the application until May 7 (Thu). It's not allowed to change these subjects after May 7 (Thu).

4) **Lecture course timetable:** Lecture-style classes will be held in 90-minute sessions as indicated on page 4 and **attendance will be taken**. Lectures of all subjects will be given from Monday, April 6, 2015 to Monday, June 16, 2015. Lectures 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. 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).

5) **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 (the last page). Refer to it in advance or ask your academic advisor, if necessary.

6) **C1 Medical Experiment Course:** The elective subject, "C1 Medical Experiment Course" requires students to attend more than 8 lectures a year for credit. Attednance will be taken in all of these courses.

7) **C2 Medical and Life Science Seminar (Medical and Life Science Seminar and Learning from Experienced Doctors Seminar):** "Medical and Life Science Seminar" and "Learning from Experienced Doctors Seminar", require students to attend more than 8 lectures for credit before completion of their Thesis research. Write 1 essay based on 1 talk chosen from more than 8 lectures.
Length of the essays should be 250-500 words. Attednance 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)."Medical and Life Science Seminar" and "Learning from Experienced Doctors Seminar" 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.
Please refer to p32～p34 for the seminar schedule and report format.

8) Assessment of Academic Grades: Each course director in charge of a particular subject of the Lecture Series is responsible for the assessment of academic grades for the corresponding subject. If there is a disagreement between the course director and instructors of the class in regards to their information and instructions, please be aware that information provided by the course director 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.

9) 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 6(Mon). If you change your e-mail address, please let us know your new e-mail address as soon as possible.

2. Lecture course/subject and credit

1) Curriculum outline

Subjects	Credits	Subjects	Credits
A Compulsory subjects		**B Elective Subjects**	
A1 Morphological Human Physiology (p.9)	2	B1 Clinical Pathology (p.19)	1
A2 Functional Human Physiology (p.10)	2	B2 Infection and Immunology (p.20)	1
A3 General Social Medicine (p.12)	2	B3 Metabolic Informatics (p.21)	1
A4 General Clinical Medicine (p.13)	2	B4 Neuroscience (p.23)	1
A5 Bioethics (p.15)	1	B5 Heredity Reproduction Medicine (p.25)	1
A6 Exercises in Medical Sciences (p.37～112)	8	B6 Medical Informatics (p.27)	1
		B7 Introduction for Laboratory Animal Experiments (p.28)	1
A7 Study in Medical Science (p.37～112)	8		
		B8 Basic Radiology (p.30)	1
		C1 Medical Experiment Course (p.31)	1
		C2 Medical and Life Science Seminar (p.32) (Medical and Life Science Seminar and Learning from Experienced Doctors Seminar)	1

2) Requirements

Compulsory subject	25 credits	
Elective subject	5 credits	or more
Total	30 credits	or more

1)Note: "A6 Exercises in Medical Sciences" and "A7 Study in Medical Science", described on page 2, are comprised of Journal club, learning of experimental planning and technique, practical experiments at the department students belong to, and it is necessary to complete master's thesis and the public presentation (the oral examination).

2) Note: 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.

Fill out the form of the next page, "3. Registration Application", and submit it to the Student Affair Section by April 13 (Mon). Students should also input the subjects to SOSEKI (Kumamoto University School Affairs Information System) by April 13 (Mon).

3. Registration Application

(Master's course) Registration Application

<To be submitted to Student Affairs Section **by April 13 (Mon)**>

Please Circle to pick out the number equal to or greater than the specified, the courses you wish to take from among the electives below.
Please refer to the syllabus for the courses contents of each subject. Note that the change of elective, it is assumed that (Friday) April 17, it is not permitted thereafter. The major field name, by the field to education related to medical science and medical science exercises exercise, you found until Wednesday, May 7 will change, but it is not recognized after that. In after having consulted enough to supervisors always, please be determined.

Dean, The Graduate School of Medical Sciences

Supervisor stamp
Year entered :
Name :
Student number :
E-mail address :
Department :

select 5 subjects or more subjects from 10 subjects following.

A1 Morphological Human Physiology
A2 Functional Human Physiology
A3 General Social Medicine
A4 General Clinical Medicine
A5 Bioethics
A6 Exercises in Medical Sciences
A7 Study in Medical Science

B1 Clinical Pathology
B2 Infection and Immunology
B3 Metabolic Informatics
B4 Neuroscience
B5 Heredity Reproduction Medicine
B6 Medical Informatics
B7 Introduction for Laboratory Animal Experiments
B8 Basic Radiology

C1 Medical Experiment Course
C2 Medicial and Life Science Seminar
(Medical and Life Science Seminar and
Learning from Experienced Doctors Seminar)

4. Lecture course timetable for Master's course (2015)

	Week / Priod	1	2	3	4	5	6	7	8	9	10	11
		4/6 ~ 4/10	4/13 ~ 4/17	4/20 ~ 4/24	4/27 ~ 5/1	5/4 ~ 5/8	5/11 ~ 5/15	5/18 ~ 5/22	5/25 ~ 5/29	6/1 ~ 6/5	6/8 ~ 6/12	6/15 ~ 6/19
Mon.	1	C1 Medical Experiment Course	C1 Medical Experiment Course	A1 Morphological Human Physiology	※Holiday	※Holiday	A3 General Social Medicine		B5 Heredity Reproduction Medicine		B8 Basic Radiology	B7 Introduction for Laboratory Animal Experiments
	2			A2 Functional Human Physiology			A3 General Social Medicine		B2 Infection and Immunology			
	3			A1 Morphological Human Physiology			A4 General Clinical Medicine	B3 Metabolic Informatics		B6 Medical Informatics		
	4			A2 Functional Human Physiology			A4 General Clinical Medicine	B4 Neuroscience		B1 Clinical Pathology		
Tue.	1			A1 Morphological Human Physiology		※Holiday	A3	B5 Heredity Reproduction Medicine		B8 Basic Radiology		B7 Introduction for Laboratory Animal Experiments
	2			A2 Functional Human Physiology			A3	B2 Infection and Immunology				
	3			A1 Morphological Human Physiology			A4	B3 Metabolic Informatics		B6 Medical Informatics		
	4			A2 Functional Human Physiology			A4	B4 Neuroscience		B1 Clinical Pathology		
Wed.	1				※Holiday	※Holiday						
	2		A2 Functional Human Physiology				A3	B2 Infection and Immunology				
	3			B8 Basic Radiology			B8 Basic Radiology					
	4			B8 Basic Radiology			B8 Basic Radiology					
Thu.	1	Health examination	A1 Morphological Human Physiology		A3 General Social Medicine			B5 Heredity Reproduction Medicine		B8 Basic Radiology		
	2		C1 Medical Experiment Course	A5 Bioethics	A5 Bioethics							
	3		A1 Morphological Human Physiology		A4 General Clinical Medicine			B3 Metabolic Informatics		B6 Medical Informatics		
	4		A2 Functional Human Physiology		A4 General Clinical Medicine			B4 Neuroscience		B1 Clinical Pathology		
Fri.	1	C1 Medical Experiment Course	A1 Morphological Human Physiology		A3 General Social Medicine			B5 Heredity Reproduction Medicine		B8 Basic Radiology		
	2		A2 Functional Human Physiology		A3 General Social Medicine			B2 Infection and Immunology				
	3		A1 Morphological Human Physiology		A4 General Clinical Medicine			B3 Metabolic Informatics		B6 Medical Informatics		
	4		A2 Functional Human Physiology		A4 General Clinical Medicine			B4 Neuroscience		B1 Clinical Pathology		

"B8 Basic Radiology" consists of lectures (4th week) and the RI practice (6th week).
The students, who complete this B8 subject, will be allowed to perform the RI experiments without additional training.
※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.

1st priod 8:45~10:15
2nd priod 10:30~12:00
3rd priod 13:15~14:45
4th priod 15:00~16:30
Other seminars are irregularly opened from 17:30.

A1~A5 : Compulsory subjects
B1~B8 : Elective subjects

5. Screening criterion of a Master's thesis and assessment criterion for the final examination

For an applicant who has obtained designated school credits and has submitted a Master's thesis, screening and final examination will be given.

Screening criterion of a Master's thesis

1) The thesis should sufficiently dissert the research background, objectives of the research, experimental methodology, result of experiments and its interpretation, discussion including bibliographic consideration, should also be included.
2) The Master's thesis should be prepared in accordance with the required documentation methodology.
   As for the details, please refer the Website for the Graduate School of Medical Sciences, which is listed below as a link.
   The Website for the Graduate School of Medical Science
   (http://www.medphas.kumamoto-u.ac.jp/medgrad/keijiban/gakuitansyuku.html)

   Period of Submission
   Beginning ～ middle of December
   Public Presentation(Oral examination)
   1) Period End of January～ Beginning of February
   2) Presentation 20 minutes, Discussion 10 minutes

How to prepare the Master's thesis

1) The thesis should be written in Japanese or English.
2) The Japanese title should accompany with the translated title in English, and vice versa.
3) A table of contents should be printed according to the order below. Figures and tables should be appropriately inserted.
   ① Summary (prepare in one page)
   ② List of Abbreviations
   ③ Background and Objective of Study
   ④ Method
   ⑤ Results
   ⑥ Discussion (including bibliography)
   ⑦ Conclusion
   ⑧ Acknowledgments
   ⑨ References
   ⑩ List of conference presentation

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 has specialized knowledge in the field of his/her research.
4) The examinee has basic knowledge about fields related to his/her research.

Compulsory subjects
(9 credits)
A1～A5

Lecture Series : A1 Morphological Human Physiology **Subject Code 10010**

(Required : 2 credits)

Course Director: Takaichi Fukuda(Anatomy TEL:373-5038) tfukuda@kumamoto-u.ac.jp
Instructors : Tomohiko Wakayama(Histology TEL:373-5047)
Takahisa Imamura(Molecular Pathology TEL:373-5306) taka@kumamoto-u.ac.jp
Akio Fujiwara(Cell Pathology TEL:373-5095) fuji-y@kumamoto-u.ac.jp
Takaaki Ito(Pathology and Experimental Medicine TEL:373-5086) takaito@kumamoto-u.ac.jp
Takashi Ohba(Obstetrics and Gynecology TEL:373-5269) tkohba@kumamoto-u.ac.jp
Takumi Era(Cell Modulation TEL:373-6589) tera@kumamoto-u.ac.jp
Kenji Shimamura(Brain Morphogenesis TEL:373-6583) simamura@kumamoto-u.ac.jp
Minetaro Ogawa(Cell Differentiation TEL:373-6591) ogawamin@kumamoto-u.ac.jp

【Objectives】
To provide students with opportunities to gain an understanding of human anatomy and histology.

【Content Description】
The course systematically examines the normal structures of the human body through visual as well as microscopic observations.

【Keywords】
Anatomy, histology, phylogeny

【Class Style】 PowerPoint and/or an overhead projector will be used in lectures and active participation in discussions is encouraged.

【Textbooks】 No textbooks have been specified but handouts summarizing lectures will be distributed.

【Recommended Readings】

【Office Hours】
Students who have questions about the lectures, etc. may contact the instructors listed above by phone or e-mail, or visit their offices.

【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】 Read the syllabus and recommended readings.

【Learning After classes】 Review handouts distributed and notes taken during class. Students may speak with faculty members during their office hours.

【Lecture Schedule】 Please also refer to the timetable shown in Section 4

Session	Date & time		Instructors	Topics
1.	Apr 16 (Thu)	1st period	Takaichi Fukuda	Anatomy I
2.	Apr 16 (Thu)	3rd period	Tomohiko Wakayama	General Theory of Histology
3.	Apr 17 (Fri)	1st period	Takaichi Fukuda	Anatomy II
4.	Apr 17 (Fri)	3rd period	Tomohiko Wakayama	Theories of Histology I
5.	Apr 20 (Mon)	1st period	Takaichi Fukuda	Anatomy III
6.	Apr 20 (Mon)	3rd period	Tomohiko Wakayama	Theories of Histology II
7.	Apr 21 (Tue)	1st period	Takaichi Fukuda	Anatomy IV
8.	Apr 21 (Tue)	3rd period	Tomohiko Wakayama	Theories of Histology III
9.	Apr 23 (Thu)	1st period	Takahisa Imamura	Inflammation
10.	Apr 23 (Thu)	3rd period	Takahisa Imamura	Congenital Disorders
11.	Apr 24 (Fri)	1st period	Niimori Kanako(Takaaki Ito)	Tumors
12.	Apr 24 (Fri)	3rd period	Takumi Era	Early Embryo Axis and Endoderm Development
13.	Apr 27 (Mon)	1st period	Minetaro Ogawa	Mesoderm and Cell Lineage Specification
14.	Apr 27 (Mon)	3rd period	Akio Fujiwara	Disturbance of Metabolism
15.	Apr 28 (Thu)	1st period	Takashi Ohba	Reproductive Cell Development and Maturation; Follicular Growth and Fertilization
16.	Apr 28 (Thu)	3rd period	Kenji Shimamura	Ectoderm Regionalization and Morphogenesis

Lecture Series : A2 Functional Human Physiology **Subject Code 10020**

(Required : 2 credits)

Course Director:	Kazuhito Tomizawa (Molecular Physiology TEL: 373-5050)	tomikt@ kumamoto-u.ac.jp
Instructors :	Wen-Jie Song (Sensory Cognitive Physiol. TEL: 373-5056)	song@kumamoto-u.ac.jp
	Kunimasa Ohta (Developmental Neurobiology TEL: 373-5293)	ohta9203@gpo.kumamoto-u.ac.jp
	Teru Ogura (Molecular Cell Biology TEL: 373-6578)	ogura@gpo.kumamoto-u.ac.jp
	Kazuya Yamagata (Medical Biochemistry TEL: 373-5070)	k-yamaga@kumamoto-u.ac.jp
	Hisayuki Nomiyama (Molecular Enzymology TEL: 373-5065)	nomiyama@gpo.kumamoto-u.ac.jp
	Kazuhiko Maeda (Immunology TEL: 373-5135)	kazmaeda@kumamoto-u.ac.jp
	Satoru Senju (Immunogenetics TEL: 373-5313)	senjusat@gpo.kumamoto-u.ac.jp

【Objectives】

This course provides students with opportunities to understand and discuss how the human body's molecules, cells, tissues, and organs function in light of physiology and cell biology. Cell biology helps students understand how cells, the basic unit of the human body, work. Physiology, on the other hand, helps students understand the mechanisms behind the human body's physiological functions.

【Content Description】

The classes dealing with cell biology illustrate the structure of the cell membrane; transport and signal transduction across the membrane; protein transport, modification, arrangement, degradation, as well as the cell organelles involved in these functions; cytoskeletons; and the molecular motors that control cell type and motility.

The classes that deal with physiology illuminate neurological functions (e.g. senses, motion, and memory) as well as cellular and molecular mechanisms that maintain the homeostasis of a living organism.

Classes dealing with biochemistry illustrate metabolic pathways in the human body and their relation to pathological conditions.

Classes of immunology cover the molecules, cells, tissues, and organs that comprise the immune system, and instruct the molecular mechanism by which the immune system recognizes and removes various infectious organisms.

【Keywords】

Homeostasis, Visual sensation, Signal transduction, Neural network, Glucose and lipid metabolism, Cytokine function, Protein dynamics, Innate immunity, Adaptive immunity, T cell-mediated immunity

【Class Style】

Visual aids, including a projector and video, will be used in the lectures and active participation in discussions is encouraged.

【Textbooks】 No textbooks have been specified but handouts summarizing the lecture will be distributed.

【Recommended Readings】

- Sylvia S. Mader, *Human Biology*, translated by Takeo Sakai and Takao Okada, Igaku-Shoin, October 2005
- Bruce Alberts, Alexander Johnson, Peter Walter, Julian Lewis, *Molecular Biology of the Cell*, January 2008

【Office Hours】

Students who have questions about the lectures, etc. may contact the instructors listed above by phone or e-mail, or visit their offices.

【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】 Read the syllabus and recommended readings.

【Learning After classes】 Review class handouts and notes. Students who have any questions may visit the instructors during their office hours.

【Lecture Schedule】 Please also refer to the timetable shown in the Section 4

Session	Date & time		Instructors	Topics
1.	Apr 15 (Wed)	2nd period	Kazuhito Tomizawa	Mechanism of homeostasis in living organisms
2.	Apr 16 (Thu)	4th period	Kazuhito Tomizawa	Learning and emotional memory
3.	Apr 17 (Fri)	2nd period	Wen-Jie Song	Vision and visual plasticity
4.	Apr 17 (Fri)	4th period	Wen-Jie Song	Neural mechanism for motion control
5.	Apr 20 (Mon)	2nd period	Kunimasa Ohta	Mechanism for neural network formation
6.	Apr 20 (Mon)	4th period	Kunimasa Ohta	Cellular signal transduction
7.	Apr 21 (Tue)	2nd period	Teru Ogura	Intracellular protein dynamics
8.	Apr 21 (Tue)	4th period	Teru Ogura	Cytoskeletons and molecular motors
9.	Apr 22 (Wed)	2nd period	Hisayuki Nomiyama	Structures and functions of cytokines (1)
10.	Apr 23 (Thu)	4th period	Hisayuki Nomiyama	Structures and functions of cytokines (2)
11.	Apr 24 (Fri)	2nd period	Kazuhiko Maeda	Lymphatic vessel network, cells, tissues, and organs
12.	Apr 24 (Fri)	4th period	Kazuhiko Maeda	Structures and functions of antibodies; Antibody production in B cells
13.	Apr 27 (Mon)	2nd period	Kazuya Yamagata	Glucose metabolism and disorders
14.	Apr 27 (Mon)	4th period	Kazuya Yamagata	Lipid metabolism and disorders
15.	Apr 28 (Tue)	2nd period	Satoru Senju	Self defense system mediated by T cells
16.	Apr 28 (Thu)	4th period	Satoru Senju	T cell subsets and their diverse functions

Lecture Series : A3 General Social Medicine **Subject Code 10030 (Required : 2 credits)**

Course Director: Yoko Nishitani (Forensic Medicine TEL: 373-5123) n-yoko@kumamoto-u.ac.jp
Instructors : Takahiko Katoh (Public Health TEL: 373-5112) katoht@gpo.kumamoto-u.ac.jp
Hideki Kishikawa (Health Medicine TEL: 373-2164) hdkkishi@gpo.kumamoto-u.ac.jp
Changnian Wei (Public Health TEL: 373-5321) cnwei@gpo.kumamoto-u.ac.jp
Takao Kitano (Public Health TEL: 373-5112) kitano@gpo.kumamoto-u.ac.jp
Wataru Miyazaki (Public Health TEL: 373-5112) miya@kumamoto-u.ac.jp
Aya Hisada (Public Health TEL: 373-5112) a_hisada@kumamoto-u.ac.jp
Keiko Minamoto (Public Health TEL: 373-5321) may20@kumamoto-u.ac.jp
Kosei Yonemitsu(Forensic Medicine TEL: 373-5123) yonemie@gpo.kumamoto-u.ac.jp

【Objectives】 Environmental and socio medical sciences are vital spheres of medicine. Students will study health care and legal measures designed to protect an individual's basic human rights and ensure public safety.

【Content Description】 This course consists of some socio medical fields; health medicine, public health, and forensic medicine. Classes on health medicine provide the clinical nutrition. Classes on public health include practical lectures on environmental dynamics; the relationship between the environment and people; environmental indicators and assessment; establishing and maintaining environmental standards; the concept of public health; nurturing a healthy society through preventive medicine; and epidemiology, the discipline that underpins public health. Lectures on forensic medicine lay the groundwork for everything from identifying and classifying causes of death to medical, legal, and social aspects of death.

【Keywords】 Clinical nutrition, the environment - people, environmental and social diseases, quantity - reactions and confluent relations, public health studies, promoting better health, epidemiology, forensic medicine, medical jurisprudence studies, death

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

【Textbooks】 Handouts summarizing lecture topics.

【Recommended Readings】

- "Public Health & Preventive Mrdicine" 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】 Students will be graded on the basis of mini-reports submitted after each class. Students are required that the average score of mini-reports will be 60% or over.

【Learning Before classes】 Read the syllabus and the recommended readings.

【Learning After classes】 Review handouts distributed and notes taken during class. Students may speak with faculty members during their office hours.

【Lecture Schedule】 Please also refer to the timetable shown in Section 4

Session	Date & time	Instructors	Field	Topics
1.	April 30 (Thu) 1st period	Takahiko Katoh	Public Health Studies (1)	General Theory and Concepts
2.	May 1 (Fri) 1st period	Hideki Kishikawa	General Medicine (1)	Basics of Clinical Nutrition
3.	May 1 (Fri) 2nd period	Hideki Kishikawa	General Medicine (2)	Clinical Nutrition and Pathological Conditions
4.	May 7 (Thu) 1st period	Yoko Nishitani	Forensic Medicine (1)	Definition of Forensic Medicine
5.	May 8 (Fri) 1st period	Takahiko Katoh	Public Health Studies (2)	Epidemiology
6.	May 8 (Fri) 2nd period	Wataru Miyazaki	Public Health Studies (3)	Environmental Health
7.	May 11 (Mon) 1st period	Aya Hisada	Public Health Studies (4)	General Theory of Toxicology
8.	May 11 (Mon) 2nd period	Takao Kitano	Public Health Studies (5)	International Public Health
9.	May 12 (Tue) 1st period	Yoko Nishitani	Forensic Medicine (2)	Forensic Medicine and Science
10.	May 12 (Tue) 2nd period	Yoko Nishitani	Forensic Medicine (3)	Social Aspects of Death (1)
11.	May 13 (Wed) 2nd period	Yoko Nishitani	Forensic Medicine (4)	Social Aspects of Death (2)
12.	May 14 (Thu) 1st period	Kosei Yonemitsu	Forensic Medicine (5)	Techniques for Investigating Unnatural Deaths
13.	May 15 (Fri) 1st period	Changnian Wei	Environmental Medicine (1)	Health, Lifestyles, and Improving Public Health
14.	May 15 (Fri) 2nd period	Changnian Wei	Environmental Medicine (2)	Assessing Lifestyles
15.	May 18 (Mon) 1st period	Keiko Minamoto	Environmental Medicine (3)	Occupational skin disease (1)
16.	May 18(Mon) 2nd period	Keiko Minamoto	Environmental Medicine (4)	Occupational skin disease (2)

Lecture Series : A4 General Clinical Medicine **Subject Code 10040**

(Required : 2 credits)

Course Director	Fumio Endo	(Pediatrics Tel:373-5188)	fendo@kumamoto-u.ac.jp
Instructors	Yutaka Sasaki	(Gastroenterology&Hepatology Tel:373-5146)	sasakiy@kumamoto-u.ac.jp
	Hiroaki Mitsuya	(Hematology TEL: 373-5156)	hmitsuya@kumamoto-u.ac.jp
	Toshihiro Fukui	(CardiovascularSurgery TEL: 373-5205)	
	Hideo Baba	(Gastroenterological Surgery TEL: 373-5213)	hdobaba@kumamoto-u.ac.jp
	Hidetaka Katabuchi	(Obstetrics and Gynecology TEL:373-5269)	buchi@kumamoto-u.ac.jp
	Hiroshi Mizuta	(Orthopaedic Surgery TEL: 373-5226)	mizuta@kumamoto-u.ac.jp
	Masashi Mukoyama	(Nephrology TEL: 373-5164)	mmuko@kumamoto-u.ac.jp
	Hirotaka Matsui	(Diagnostic Medicine TEL:373-5890)	

【Objectives】
The lectures aim to understand the most recent advances in the field of clinical medicine.

【Content Description】
This class of "clinical medicine" covers the wide range of Internal Medicine, Surgery, Obstetrics and Gynecology, Pediatrics, Orthopedics, Laboratory Medicine, Clinical Pharmacology. The recent advances of each field will be introduced by professors who are acting in the respective area.

【Keywords】
Clinical medicine, diagnosis, treatment

【Class Style】
Power point presentation, report

【Textbooks】 . not specified

【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.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】 Read the syllabus and recommended readings.

【Learning After classes】 Review class handouts and notes. Students may consult with the instructors during their office hours.

【Lecture Schedule】 Please also refer to the timetable shown in Section 4

Session	Date & time		Instructors	Topics
1.	Apr 30 (Thu)	3rd period	Fumio Endo	Health of Childhood
2.	Apr 30 (Thu)	4th period	Kimitoshi Nakamura	Screening for disorders of children
3.	May 1 (Fri)	3rd period	Yutaka Okuno	Hematology
4.	May 1 (Fri)	4th period	Akito Tanoue	Clinical Pharmacology; Drugs and pregnancy
5.	May 7 (Thu)	3rd period	Hiroshi Mizuta	Reconstruction of Bone and Joint
6.	May 7 (Thu)	4th period	Yutaka Sasaki	Recent topics in the clinical practice of digestive system
7.	May 8 (Fri)	3rd period	Hirotaka Matsui	Pathogenesis and diagnosis of cancer
8.	May 8 (Fri)	4th period	Hisashi Sakaguchi	Surgical therapy of angina pectoris
9.	May 11 (Mon)	3rd period	Satoru Shinriki	
10.	May 11 (Mon)	4th period	Masanori Iwai	Neonatology; basics and topics
11.	May 12 (Tue)	3rd period	Konen Ohbayashi	Laboratory medicine and advanced medicine
12.	May 12 (Tue)	4th period	Toru Beppu	Current Status and Perspective of Gastroenterological Surgery
13.	May 14 (Thu)	3rd period	Satoru Shinriki	
14.	May 14 (Thu)	4th period	Hidetaka Katabuchi	Reproduction and Gynecologic Cancer
15.	May 15 (Fri)	3rd period	Masashi Mukoyama	Introduction to Nephrology
16.	May 15 (Fri)	4th period	Torayuki Okuyama	Enzyme replacement therapy and gene therapy

Lecture Series : A5 Bioethics **Subject Code 10050**

(Required : 1 credits)

Course Director: Yasuhiro Kadooka (associate professor at the department of bioethics)

【Objectives】

1 . To introduce students to a wide range of ethical and historical problems associated with medical treatment and science.
2 . To provide students with opportunities that will help them understand the basic issues inherent in the practice of medicine as well as the conduct of research and enable them to make logical arguments in exploring these problems.
3 . To give students an in-depth knowledge of relevant ethical guidelines and help them to understand their basis.
4 . To help students to forge a solid intellectual foundation in biomedical ethics.

【Content Description】

This course explores the history, case examples, problems, principles, concepts, and relevant ideas regarding bioethics and medical ethics, so students will gain the ethical footing they will need as medical researchers and healthcare professionals. The class is occasionally divided into small groups for discussion and students will be required to give presentations. Critically reading relevant articles from major journals, students examine problems associated with medical treatment and science. The topics this course covers are subject to change.

【Keywords】 Bioethics, Research Ethics, Medical ethics

【Class Style】 PowerPoint presentation will be used in the lectures, and active participation in the discussion is encouraged. E-learning concerning research ethics (CITI e-learning system) will also be used.

【Textbooks】 Handouts will be provided at every class period.

【Recommended Readings】

V. Ravitsky V, Fiester A, Caplan AL (eds). The Penn Center Guide to Bioethics. NY, Springer Publishing Company, 2009.

Singer PA, Viens AM (eds). The Cambridge Textbook of Bioethics. UK, Cambridge University Press, 2008.

The Hastings Center. Bioethics Briefing Book.

(http://www.thehastingscenter.org/Publications/BriefingBook/Default.aspx)

Bonnie Steinbock (Editor) The Oxford Handbook of Bioethics, Oxford University Press, Oxford, 2007.

Kuhse H, Singer P (eds). A Companion to Bioethics 2nd edition. London, Oxford University Press,2009.

Beauchamp TL, Childress JF. Principles of Biomedical Ethics 4th edition. NY, Oxford University Press, 1994.

Lo B. Resolving ethical dilemmas A Guide for Clinician. Lippincott-Williams and Wilkins, Baltimore, 2000.

British Medical Association. Medical Ethics Today 2nd edition. London, BMJ, 2004.

Rachels J: The Element of Moral Philosophy 2nd ed., McGraw-Hill, 1993.

Stephan G. Post (Ed). Encyclopedia of Bioethics, 3rd edition, Volume 1, Macmillan Reference USA, Thomson/Gale, 2004.

Mitchan C (Editor in Chief). Encyclopedia of Science, Technology, and Ethics. Volume 1, Macmillan Reference USA, Thomson/Gale, 2005.

【Office Hours】 Students who have questions may contact the instructor by phone or e-mail on weekdays except Wednesday. (Contact number: 096-373-5534, e-mail address: y-kad@kumamoto-u.ac.jp)

【Evaluation for Grades and Credits】 Student evaluations will be weighted on attendance, understanding and presentation at discussion and classes, completion of appointed CITI e-leaning classes and a term paper.

【Learning Before classes】 Read the syllabus and recommended readings.

【Learning After classes】 Review handouts distributed and notes taken during class. Students may speak with faculty members during their office hours.

【Lecture Schedule】 Four classes on research ethics education is held by using CITI e-learning system. Other 4 classes below will be lecture-based learning style.

Session	Instructor	Date	Topics (one-day intensive course)
1.	Yasuhiro Kadooka	23th Apr.	Introduction of biomedical ethics, and Ethics of Advanced Medicine I
2.	Yasuhiro Kadooka	30th Apr.	Ethics of Advanced Medicine II
3.	Yasuhiro Kadooka	7th May	Clinical Ethics I
4.	Yasuhiro Kadooka	14th May	Clinical Ethics II

Elective subjects

(5 credits)

B1～B8

C1・C2

Lecture Series : B1 Clinical Pathology **Subject Code 10080**

(Elective : 1 credits)

Course Director:	Shuzo Matsushita	(AIDS Research II TEL: 373-6536)	shuzo@kumamoto-u.ac.jp
Instructors	: Hirotsugu Kohrogi	(Respiratory Medicine TEL: 373-5007)	kohrogi@kumamoto-u.ac.jp
	Eiichi Araki	(Metabolic Medicine TEL: 373-5169)	earaki@gpo.kumamoto-u.ac.jp
	Fumio Endo	(Pediatrics TEL: 373-5188)	fendo@kumamoto-u.ac.jp
	Koichi Kaikita	(Cardiovascular Medicine TEL: 373-5175)	kaikitak@kumamoto-u.ac.jp
	Yutaka Sasaki	(Gastroenterology & Hepatology TEL: 373-5146)	sasakiy@kumamoto-u.ac.jp
	Hideki Nakayama	(Oral and Maxillofacial Surgery TEL: 373-5288)	hinakayam@gmail.com
	Satoshi Yamashita	(Neurology TEL: 373-5686)	yamashitasatosi@fc.kuh.kumamoto-u.ac.jp

【Objectives】

In Pathology and Pathological Conditions students learned about how diseases are classified and how they develop. Clinical Pathology picks up where that course left off with a focus on major diseases. This course provides students with opportunities to learn about specific clinical and pathological conditions along with their underlying molecular mechanisms so that they can expand their understanding of the nature of various diseases. Students will also learn about the particular characteristics of diseases that manifest themselves in the nervous system, motor system, and tissues as well as the mechanisms behind systemic conditions, such as immune deficiency.

【Course Description】 Experts in eight representative fields such as congenital diseases, metabolic disorders, immunodeficiency as systemic diseases and circulatory disturbance, inflammation, tumor and degenerative diseases of specific organ systems will give a series of lectures with LCD projector. See the detailed schedule and topics below. The lectures address pathogenesis of each representative disease and underlining molecular mechanisms.

【Keywords】 Congenital anomaly, metabolic disorder, degenerative disease, circulatory disturbance, inflammation, tumor, immune deficiency

【Class Style】 PowerPoint and/or an overhead projector will be used in lectures where active participation in discussion is encouraged.

【Textbooks】 Some instructors may distribute handouts.

【Recommended Readings】 The instructors will suggest readings during class.

【Office Hours】

Students who have questions about the lectures, etc. may contact the instructors listed above by phone or e-mail, orvisit their offices.

【Evaluation for Grades and Credits】

Evaluation of this lecture series will be weighted by active participation and scores in test or reports to the topic for individual lecture. Instructors look at the following for grading:

1) Whether the student correctly understands the terms used in the selected area under study.
2) Whether the student correctly understands the background of the selected area under study.
3) Whether the student correctly understands the current state of the selected area under study.
4) Whether the student correctly grasps the subject matter discussed in class.
5) Whether the student offers his/her own view.

The instructors evaluate the scores of test or and reports on a scale of 1 to 10 (10 x 8 would yield a maximum score of 80 points). The total score at the end of the semester is multiplied by 5/4 to calculate the final grade.

【Learning Before classes】 Read the syllabus and recommended readings.

【Learning After classes】 Review handouts distributed and notes taken during class. Students may speak with faculty members during their office hours.

【Lecture Schedule】 Please also refer to the timetable shown in Section 4

Session	Date & time		Instructors	Topics
1.	Jun 1 Mon	4th period	Koichi Kaikita	Pathology and anti-thrombotic therapy in Acute Coronary Syndrome
2.	Jun 2 Tue	4th period	Eiichi Araki	Diabetes/Metabolic disorder caused by impaired insulin action and its complications
3.	Jun 4 Thu	4th period	Satoshi Yamashita	Diagnosis and Treatment of Intractable Neurological Diseases
4.	Jun 5 Fri	4th period	Shuzo Matsushita	Pathogenesis of HIV-induced immunodeficiency
5.	Jun 8 Mon	4th period	Fumio Endo	Liver diseases in inborn errors of metabolism
6.	Jun 9 Tue	4th period	Yutaka Sasaki	Liver cirrhosis and cancer: pathogenesis and treatment
7.	Jun 11 Thu	4th period	Hirotsugu Kohrogi	Pneumonia and Bronchial Asthma
8.	Jun 12 Fri	4th period	Hideki Nakayama	Pathology and Characteristics of Periodontal Disease

Lecture Series : B2 Infection and Immunology **Subject Code 10090**

(Elective : 1 credits)

Course Director:	Tomohiro Sawa	(Microbiology	TEL:373-5320)	sawat@kumamoto-u.ac.jp
Instructors :	Yosuke Maeda	(Medical Virology	TEL: 373-5131)	ymaeda@kumamoto-u.ac.jp
	Shuzo Matsushita	(AIDS Research II	TEL: 373-6536)	shuzo@kumamoto-u.ac.jp
	Takamasa Ueno	(AIDS ResearchV	TEL: 373-6530)	uenotaka@kumamoto-u.ac.jp
	Seiji Okada	(Hematopoiesis	TEL: 373-6522)	okadas@kumamoto-u.ac.jp
	Yasuo Ariumi	(AIDS Research VII	TEL: 373-6530)	ariumi@kumamoto-u.ac.jp
	Yorifumi Sato	(AIDS Research XIII	TEL: 373-6830)	y-satou@kumamoto-u.ac.jp

【Objectives】

Updated knowledge of various pathogenic microorganisms such as bacteria and viruses that are associated with infectious diseases in human-being is addressed to learn the route of transmission, mechanism of the diseases, prevention measures and treatment strategies. The lecture series especially focus on protective immunity to viral diseases including HIV-1.

【Content Description】

The first 4 lectures address the introduction (bacteriology, virology) and particulars of various pathogenic organisms (including gram-positive and negative bacteria, a DNA or RNA viruses) focusing on topics of pathogenesis, control and prevention of infectious diseases and emerging and reemerging infectious diseases. The latter 4 lectures address protective immunity of host against infectious diseases including HIV-1 infection. Especially, recent topics such as the mechanism of T-cell recognition of the viral antigens, differentiation of immune cells from hematopoietic stem cells and the strategy for the development of effective vaccine against HIV-1 infection will be discussed.

【Keywords】

Infection and immunity, emerging and reemerging infectious diseases, reactive Oxygen/NO, HIV-1, cytotoxic T-cells, hematopoietic stem cell, T-cell receptor, HLA antigen, neutralizing antibodies, vaccine

【Class Style】

PowerPoint and/or an overhead projector will be used in lectures where active participation in discussion is encouraged.

【Textbooks】.

No textbooks are specified for this lecture series. Some instructors may have handouts for the lecture.

【Recommended Readings】

- "Fundamentals of Microbiology" by I. E. Alamoco. The Benjamin / Cummmings Publishing Company, Inc.
- McMichael AJ, Haynes BF: Lessons learned from HIV-1 vaccine trials: newpriorities and directions. Nat Immunol 2012, 13(5):423–427.
- Mouquet H, Nussenzweig MC: HIV: Roadmaps to a vaccine. Nature 2013, 496(7446):441–442.

【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】 Evaluation will be weighted by active participation, brief evaluating test and/or a report for the theme announced after the lecture. Instructors look at the following when grading the tests and reports:

1) Whether the student correctly understands the terms used in the selected area under study.
2) Whether the student correctly understands the background of the selected area under study.
3) Whether the student correctly understands the current state of the selected area under study.
4) Whether the student correctly grasps the subject matter discussed in class.
5) Whether the student offers his/her own view.

The final score is calculated from the mean value of upper 6 score in the evaluations of tests and reports by 8 lectures.

【Learning Before classes】 Read the syllabus and recommended readings.

【Learning After classes】 Review class handouts and notes. Students may consult with the instructors during their office hours.

【Lecture Schedule】

Session	Date & time		Instructors	Topics
	(Pathogenic microbial)			
1.	May 19 (Tue)	1st period	Tomohiro Sawa	Introduction to bacterial infections/diseases.
2.	May 20 (Wed)	2nd period	Tomohiro Sawa	Pathogenic mechanisms of bacterial infections.
3.	May 22 (Fri)	2nd period	Yosuke Maeda	Basic and practical medical virology.
4.	May 25 (Mon)	2nd period	Yorifumi Sato	Pathogenesis of virus infection and diseases.
	(Infection and Immunity)			
5.	May 26 (Tue)	2nd period	Takamasa Ueno	Cellular immune responses to viral infections.
6.	May 27 (Wed)	2nd period	Shuzo Matsushita	Neutralizing antibodies for vaccine development.
7.	May 29 (Fri)	2nd period	Yasuo Ariumi	Viral infection and innate immunity
8.	Jun 1 (Mon)	2nd period	Seiji Okada	Differentiation of hematopoietic stem cells to immunocompetent cells

Lecture Series : B3 Metabolic Informatics **Subject Code 10100**

(Elective : 1 credits)

Course Director: Yuichi Oike (Molecular Genetics TEL: 373-5142) oike@gpo.kumamoto-u.ac.jp
Instructors : Kazuhito Tomizawa (Molecular Physiology TEL: 373-5050) tomikt@ kumamoto-u.ac.jp
Norie Araki (Tumor Genetics and Biology TEL: 373-5119) nori@gpo.kumamoto-u.ac.jp
Atsushi Irie (Immunogenetics TEL: 373-5313) airie@gpo.kumamoto-u.ac.jp
Fan-Yan Wei (Molecular Physiology TEL: 373-5051) fywei@kumamoto-u.ac.jp

【Objectives】

Biological environment in vivo is controlled by various signals. Recent remarkable improvement of studies such as genomics, proteomics, metabolomics made it possible to analyze changes of in vivo environment systematically as well as comprehensively. In addition, analysis of the mechanism underlying disease onset, identification of therapeutic target and development of biomarker are also becoming possible by applying these methods. In the class, academic backgrounds of genomics, proteomics, metabolomics, principles of analytic technology and applications to disorder analysis are going to be lectured.

Attending the lectures will help students apply the theories to their research fields.

【Content Description】

In relation to genomics, proteomics and metabolomics, outlines of the academic backgrounds, the histories, the recent progresses will be given.

Also, practical usage cases for development of therapeutic methods and drug discoveries including analysis of the mechanisms underlying disease onset, identification of therapeutic target will be explicated, providing as an example of those, analytic methods of oxidative stress in pathologic conditions using biomarker.

【Keywords】

Proteomics, metabolomics, genomics, biomarker, reactive oxygen species, oxidative stress

【Class Style】

PowerPoint and/or OHP will be used in the lectures, and active participation in the discussion is encouraged.

【Textbooks】 Handouts for each practice will be provided.

【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. 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】 Read the syllabus and recommended readings.

【Learning After classes】 Review handouts distributed and notes taken during class. Students may speak with faculty members during their office hours.

【Lecture Schedure】 Please also refer to the timetable shown in Section 4

Session	Date & time	Instructors	Topics
1	May 18 (Mon) 3rd period	Norie Araki	Academic Background of Genomics, Proteomics and Metabolomics
2	May 19 (Tue) 3rd period	Atsushi Irie	Basic Principle of Genomics, Proteomics and Metabolomics (1)
3	May 21 (Thu) 3rd period	Yuichi Oike	Recent topics of metabolic study (1)
4	May 22 (Fri) 3rd period	Yuichi Oike	Recent topics of metabolic study (2)
5	May 25 (Mon) 3rd period	Kazuhito Tomizawa	General remarks of RNA epigenetics
6	May 26 (Tue) 3rd period	Fan-Yan Wei	RNA epigenetics & diseases
7	May 28 (Thu) 3rd period	Atsushi Irie	Basic Principle of Genomics, Proteomics and Metabolomics (2)
8	May 29 (Fri) 3rd period	Norie Araki	Genomics, Proteomics and Metabolomics and frontier of disease research

Lecture Series : B4 Neuroscience **Subject Code 10110**

(Elective : 1 credits)

Course Director: Wen-Jie Song (Sensory & Cognitive Physiol. TEL: 373-5056) song@kumamoto-u.ac.jp
Instructors : Kenji Shimamura (Brain Morphogenesis TEL: 373-6583) simamura@kumamoto-u.ac.jp
Nobuaki Tamamaki (Morph. Neural Sci TEL: 373-5298) tamamaki@kumamoto-u.ac.jp
Kunimasa Ohta (Developmental Neurobiology TEL: 373-5293) ohta9203@gpo.kumamoto-u.ac.jp
Mitsuharu Ueda (Neurology TEL: 373-5893) mueda5@fc.kuh.kumamoto-u.ac.jp
Shigetoshi Yano(Neurosurgery TEL: 373-5219) yanos@kumamoto-u.ac.jp
Yasuhiro Indo (Pediatrics TEL: 373-5191) yindo@kumamoto-u.ac.jp
Ryuji Fukuhara (Psych. Neuropathobio. TEL: 373- 5184) fryuji@kumamoto-u.ac.jp

【Objectives】

Neuroscience is about our brain and is a currently rapidly growing discipline. Not only our sensory and motor functions but higher functions such as learning and memory, cognitive function, emotion, and mental function are all attributable to the function of our brain. The goal of this lecture is to assist students to learn the following from molecular to organism level, from neurodevelopmental, neuroanatomical, neurophysiological, and neurological perspectives: differentiation and development of the nervous system, structure and function of the neuronal circuits, etiology, symptom, and treatment of neurological disorders.

【Content Description】

Classes on the development of the nervous system cover topics including regulation of neural stem cells, induction and regionalization of the central nervous system, and development of the cerebral cortex. Classes on neuroanatomy and neurophysiology focus on the structure and function of the cerebral cortex, with a stress on the auditory system. Classes on clinical neurological diseases cover the etiology, symptom, and treatment of disorders such as congenital insensitivity to pain with anhidrosis, Parkinson's disease, Alzheimer's disease, intractable neurological diseases including cerebral amyloid angiopathy, and other neurological disorders that require neurosurgery.

【Keywords】

Neural stem cell, regionalization, cerebral cortex, hearing, congenital insensitivity to pain with anhidrosis, cancer stem cell, psychiatric disorders

【Class Style】

Visual aids, including a projector and video, will be used in the lectures and active participation in discussions is encouraged.

【Textbooks】

No textbook is specified but handouts summarizing the lecture will be distributed.

【Recommended Readings】

Eric Kandel, James Schwartz, Thomas Jessell, Steven Siegelbaum, A.J. Hudspeth, *Principles of Neural Science, Fifth Edition*, 2012.

Mark F. Bear, Barry W. Connors, Michael A. Paradiso, *Neuroscience: Exploring the Brain*, 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 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】 Read the syllabus and recommended readings.

【Learning After classes】 Review handouts distributed and notes taken during class. Students may speak with faculty members during their office hours.

【Lecture Schedule】 Please also refer to the timetable shown in Section 4

Session	Date & time	Instructors	Topics
1.	May 18 (Mon) 4th period	Kenji Shimamura	Induction and regionalization of the central nervous system
2.	May 19 (Tue) 4th period	Kunimasa Ohta	Regulation of neural stem cells
3.	May 21 (Thu) 4th period	Nobuaki Tamamaki	Structure and development of the cerebral cortex
4.	May 22 (Fri) 4th period	Wen-Jie Song	Auditory neuroscience
5.	May 25 (Mon) 4th period	Yasuhiro Indo	Neuroscience of pain and sweating
6.	May 26 (Tue) 4thd period	Shigetoshi Yano	Clinical neuroscience in Neurosurgery
7.	May 28 (Thu) 4th period	Mitsuharu Ueda	Intractable neurological diseases
8.	May 29 (Fri) 4th period	Ryuji Fukuhara	Neuroscience from a mental disorder perspective

Lecture Series : B5 Heredity Reproduction Medicine **Subject Code 10120**

(Elective : 1 credits)

Course Director: Ryuichi Nishinakamura (Kidney Development TEL: 373-6615) ryuichi@kumamoto-u.ac.jp
Instructors : To be announced (Stem Cell Biology TEL: 373-6620)
Satoshi Tateishi (Cell Maintenance TEL: 373-6602) tate@gpo.kumamoto-u.ac.jp
Mitsuyoshi Nakao (Medical Cell Biology TEL: 373-6800) mnakao@gpo.kumamoto-u.ac.jp
Fumio Endo (Pediatrics TEL: 373-5188) fendo@kumamoto-u.ac.jp
Kazutoyo Terada (Molecular Genetics TEL: 373-5143) terada@gpo.kumamoto-u.ac.jp
Yukihiro Inomata (Pediatric Surgery and Transplantation TEL:373-5613)
yino@fc.kuh.kumamoto-u.ac.jp
To be announced (Cardiovascular surgery TEL:373-5202)
Shinjiro Hino (Medical Cell Biology TEL: 373-6801) s-hino@kumamoto-u.ac.jp

【Objectives】

Heredity Reproduction Medicine aims at obtaining basic knowledge on molecular biology, developmental biology and genetics for the understanding of regenerative medicine, genetic medicine and transplant medicine. In this course, you will obtain essential knowledge on normal embryonic development and organ morphogenesis, and the origin and mechanism of diseases, their treatments. Furthermore, this course will up-to-date the knowledge on regenerative medicine, genetic defects, transplantations, kidney & liver transplantations, from basic and clinical views.

【Content Description】

In this course, lectures on the following fields will be given:

- Embryonic development and embryonic stem cells and tissue stem cells
- Kidney development and regenerative medicine
- Tumor suppression via regulation of mitosis and DNA repair
- Hereditary mitochondrial disease
- Diagnosis and gene therapy
- Epigenetic medicine
- Tissue and organ grafts
- Cardiac disease and regenerative medicine,

【Keywords】

Embryogenesis, organ morphogenesis, pancreas development, kidney development, stem cells, epigenetics, proliferation, DNA repair, genetic disorders, gene therapy, genetic metabolic disorders, mitochondrial DNA, mitochondrial genetic diseases, cardiac disease, regeneration, liver transplantation.

【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】

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】 Read the syllabus and recommended readings.

【Learning After classes】 Review handouts distributed and notes taken during class. Students may speak with faculty members during their office hours.

【Lecture Schedule】 Please also refer to the timetable shown in Section 4

Session	Date & time	Instructors	Topics
1.	May 19 (Tue) 1st period	Ryuichi Nishinakamura	Developmental and regenerative medicine
2.	May 21 (Thu) 1st period	To be announced	Embryonic development and stem cells
3.	May 22 (Fri) 1st period	Satoshi Tateishi	Tumor suppression via regulation of cell cycle and DNA repair
4.	May 25 (Mon) 1st period	Yukihiro Inomata	Organ transplantation
5.	May 26 (Tue) 1st period	Fumio Endo	DNA diagnosis and gene therapy
6.	May 28 (Thu) 1st period	Mitsuyoshi Nakao, Shinjiro Hino	Epigenetics in health and diseases
7.	May 29 (Fri) 1st period	Kazutoyo Terada	Mitochondrial disease
8.	Jun 1 (Mon) 1st period	To be announced	Cardiac disease and regenerative medicine

Lecture Series : B6 Medical Informatics **Subject Code 10130**

(Elective : 1 credits)

Course Director: Koichiro Usuku (Medical Information Sciences TEL: 373-5739) space-usk@fc.kuh.kumamoto-u.ac.jp
Instructors : Jun Hirose (Medical Information Sciences TEL: 373-5738)hirojunkmc@yahoo.co.jp
Yoshio Haga(International Medical Cooperation TEL:353-6501) yoshio@kumamed.jp
Takeshi Takahashi(International Medical Cooperation TEL:353-6501) t99@kumamed.jp

【Objectives】

Though medical care is a work to apply a medical advance to the medical practice, appropriate handling of informations occurring in the healthcare setting is essential to accomplish its purpose. The aim of this lecture is to acquire ability to handle information appropriately in the field of the healthcare setting through learning types of information in this field, way to handle information including personal information protection, and method to take useful information from patients and literature.

【Content Description】

In the medical information science, lectures will focus on the way how to handle medical records based on the viewpoint of the personal information protection, information literacy and ethic that health care workers should wear on exchanging medical records electronically, problems arising on exchanging medical information, points essential to focus on recording healthcare information using Information and Communication Technology(ICT), and advantage and disadvantage of electronic health record system.

In the international medical cooperation studies, lectures will focus on topics of clinical researches including design, study plan making, ethical problems taking into account, analytical method of data, and critical examination method of the English article and procedure of the EBM using computers, and also focus on emergency care information and disaster medical care information.

【Keywords】

The medical information science : handling medical records, personal information protection, information ethic, electronic medical record, regional cooperation, clinical pass

The international medical cooperation studies : clinical research, research planning, English articles, emergency care information , disaster medical care information

【Class Style】 Lectures using Power point and OHP etc.

【Textbooks】 Handouts will offer thorough e-Learning system.

【Recommended Readings】 Informations will offer in each lecture.

【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】 Read the syllabus and recommended readings.

【Learning After classes】 Review handouts distributed and notes taken during class. Students may speak with faculty members during their office hours.

【Lecture Schedule】 Please also refer to the timetable shown in Section 4

Session	Date & time		Instructors	Topics
1.	Jun 1 (Mon)	3rd period	Jun Hirose	Clinical Pass
2.	Jun 2 (Tue)	3rd period	Yoshio Haga	Design of Clinical Researches, EBM
3.	Jun 4 (Thu)	3rd period	Yoshio Haga	Analytical method of clinical study, critical examination of the English article
4.	Jun 5 (Fri)	3rd period	Koichiro Usuku	Handling medical records
5.	Jun 8 (Mon)	3rd period	Jun Hirose	Regional Medical Cooperation
6.	Jun 9 (Tue)	3rd period	Takeshi Takahashi	Emergency Medical Information
7.	Jun 11 (Thu)	3rd period	Takeshi Takahashi	Disaster medical care information
8.	Jun 12 (Fri)	3rd period	Koichiro Usuku	Electronic medical information and records

Lecture Series : B7 Introduction for Laboratory Animal Experiments **Subject Code 10140**

(Elective : 1 credits)

Course Director: Naomi Nakagata (Reproductive Engineering TEL: 373-6570) nakagata@gpo.kumamoto-u.ac.jp
Course Subdirector: Masatake Araki (Bioinformatics TEL: 373-6501) maraki@gpo.kumamoto-u.ac.jp
Instructors: Kimi Araki (Developmental Genetics TEL: 373-6598) arakimi@gpo.kumamoto-u.ac.jp
: Akira Nakamura (Germline Development TEL: 373-6598) arakimi@gpo.kumamoto-u.ac.jp
: Masaki Ohmuraya (Transgenic Technology TEL: 373-6818)ohmuraya@kumamoto-u.ac.jp
: Akihiro Kojima (Isotope Science TEL: 373-6508)akojima@gpo.kumamoto-u.ac.jp

【Objectives】
To provide students with opportunities to gain an understanding of laboratory animals (especially mice).

【Content Description】
1) Infectious diseases of laboratory animals
2) Reproductive engineering technology in mice
3) Production of knock-out mice, transgenic mice and gene trap mice
4) The use of animal models in studying human disease
5) Principle of the RNA silencing technology
6) Small animal experiment using molecular imaging

【Keywords】
Laboratory animals, Infectious diseases, Reproductive engineering technology, Gene trap, Genetically engineered mice, Knock-down technology, Human disease model animals, Molecular imaging.

【Class Style】
Mainly PowerPoint will be used in lectures and active participation in discussions is encouraged.

【Textbooks】
No textbooks.

【Recommended Readings】
- Nagy, A., Gertsenstein, M., Vintersten, K. & Behringer, R. Manipulating the mouse embryo: a laboratory manual (3rd ed.). Cold Spring Harbor Laboratory Press, 2003.
- Virginia E. Papaiannou and Richard R. Behringer. Mouse Phenotypes: A Handbook of Mutation Analysis. Cold Spring Harbor Laboratory Press 2005.
- Fox, J.G., Barthold, S.W., Davisson, M.T., Newcomer, C.E., Quimby, F.W. &Smith, A.L. The mouse in biomedical research, vol.2 diseases (2nd ed.). Academic Press, 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 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】 Read the syllabus and recommended readings.

【Learning After classes】 Review handouts distributed and notes taken during class. Students may speak with faculty members during their office hours.

【Lecture Schedule】 Please also refer to the timetable shown in Section 4

Session	Date & time		Instructors	Topics
1.	Jun 15 (Mon)	1nd period	Naomi Nakagata	Infectious diseases of laboratory animals
2.	Jun 15 (Mon)	2nd period	Naomi Nakagata	Reproductive engineering technology in mice
3.	Jun 15 (Mon)	3nd period	Masaki Ohmuraya	The use of animal models in studying human disease
4.	Jun 15 (Mon)	4nd period	Kimi Araki	Production of transgenic mice
5.	Jun 16 (Tue)	1nd period	Kimi Araki	Production of knock-out mice
6.	Jun 16 (Tue)	2nd period	Masatake Araki	Production of gene trap mouse lines
7.	Jun 16 (Tue)	3nd period	Akira Nakamura	Principle of the RNA silencing technology
8.	Jun 16 (Tue)	4nd period	Akihiro Kojima	Small animal experiment using molecular imaging

※The lecture room "AIDS Research"," 504 room on the floor of the Institute of Resource Development and Analysis"
URL : http://www.kumamoto-u.ac.jp/campusjouhou/map_honjyou_2

Lecture Series : B8 Basic Radiology **Subject Code 10150**

(Elective : 1 credits)

Course Director: Seiji Okada (Hematopoiesis TEL: 373-6522) okadas@kumamoto-u.ac.jp
Instructors : Akihiro Kojima (Iotope Science TEL:373-6508) akojima@gpo.kumamoto-u.ac.jp
Tatsuya Shimasaki (Iotope Science TEL:373-6509) tshima@gpo.kumamoto-u.ac.jp

【Objectives】

The lectures focus on the application of radiation and radioisotope (RI) for medical sciences.

Radiation and radioisotopes are very useful tools in the study of science. Also they significantly contribute to our daily life, especially clinical medicine. Excessive exposure of radiation, however, causes the harmful effect on the human body. This lecture series focus on the application of radiation and radioisotope (RI) for life or medical science after training safe handling of radiation and radioisotope to prevent radiation hazards.

【Content Description】

(1) To receive the certificate of "education and training for radiation workers" to use radiation or radioisotopes safely in the master course research
(2) To understand the usefulness and reasonableness of radiation or radioisotopes, and measure radiation dose or radioactivity effectively in the life science experiment
(3) To understand basic protocols for typical radioisotopes and perform some basic experiments using real radioisotopes

【Keywords】

Radioisotope, Radiation physics, Radiochemistry, Radiobiology, Nuclear medicine, Radioprotection, Radiation measurement, Law Concerning Prevention from Radiation Hazards due to Radio-Isotopes, etc., Education and training for radiation workers

【Class Style】

PowerPoint will be used in lectures where active participation in discussion is encouraged.
Practice on radioisotope and radiation

【Textbooks】

Text for radioisotope experiments (Kumamoto University), Hand out

【Recommended Readings】

Basic Knowledge of Radiation and Radioisotopes (Scientific Basic, Safe Handling of Radioisotopes and Radiation Protection). Japan Radioisotope Association, 2005.

細胞工学別冊「ＲＩの逆襲」アイソトープを活用した簡単・安全バイオ実験. 監修：岡田誠治 秀潤社（2007年 12 月）：**In Japanese**

【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】 Read the syllabus and recommended readings.

【Learning After classes】 Review handouts distributed and notes taken during class. Students may speak with faculty members during their office hours.

【Lecture Schedule】 Please also refer to the timetable shown in Section 4

Session	Date & time	Instructors	Topics
1.	Apr 22 (Wed) 3rd period	Akihiro Kojima	Basics of Radioisotope (1)
2.	Apr 22 (Wed) 4th period	Akihiro Kojima	Basics of Radioisotope (2)
3.	May 13 (Wed) 3rd period	Akihiro Kojima	Basics of Radioisotope (3)
4.	May 13(Wed) 4th period	Akihiro Kojima	Basics of Radioisotope (4)
5.	Jun 2 (Tue) 1st period	Seiji Okada	Application of RI for Biomedical Research
6.	Jun 4 (Thu) 1st period	Akihiro Kojima	Meaturement of RI
7.	Jun 5 (Fri) 1st period	Tatsuya Shimasaki	Biological effects of irradiation
8.	Jun 8 (Mon) 1st period	Tatsuya Shimasaki	Use of RI for biological research

Elective subject : C1 Medical Experimental Course (1 credit)

Subject code : 10170

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 Trasfer 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 Ohmuraya)	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 3rd 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.

Elective subject : C2 Medical & Life Science Seminar (1 credit) **Subject code 10180**

(Medical and Life Science Seminar , Learning from Experience Doctors Seminar)

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 3rd (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 3rd (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 8th (WED)	Hiroyuki NOJI	Single-molecule biophysics on ATP synthase	Professor, The University of Tokyo	Molecular Cell Biology
5.	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
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 13th (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)

C2(continue)

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 15th (WED)	Haruhisa INOUE	Translational neuroscience using iPSC technology	Professor, Center for iPS Cell Research and Application Kyoto University	Cell Modulation
2.	May 13th (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 26th (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 15th (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 24th (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 16th (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 "C2: Medical and Life Science Seminar"

(Medical and Life Science Seminar ,Learning from Experienced Doctors Seminar)

Write 1 essay based on 1 talk chosen from the seminar "C2: Medicine and Life Science Seminar". Length of the essays should be 250-500 words. "C2 :"Medical and Life Science Seminar" require students to attend more than 8 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 , (Master's) C2"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			

*Students can obtain this format via a homepage of Graduate School of Medical Sciences.

Compulsory subjects
(16 credits)
A6～A7

A6. Exercises in Medical Sciences, A7. Study in Medical Science

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A6 Exercises in Medical Sciences: Anatomy — **Subject Code 10060 (Required: 8 credits)**

Supervisors: Takaichi Fukuda
Program schedule: year 1-2, every Wednesday (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 morohological 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.

A7 Study in Medical Sciences: Anatomy — **Subject Code 10070 (Required: 8 credits)**

Supervisors: Takaichi Fukuda
Program schedule: year 1-2, every Wednesday (3rd 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).

A6 Exercises in Medical Sciences: Histology — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Tomohiko Wakayama
Program Schedule: year 1-2,
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. In order to study histology, histochemistry is one of powerful tools. Histochemistry is used mainly 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 based on enzymatic reactions, antigen-antibody reactions, or nucleic-acid hybridization. Students also will learn how to read representative histochemical literatures and discuss their contents.

【Evaluation for Grades and Credits】

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

【Evaluation Criteria】

The evaluation will be done based on the following issues.

1) The ability to read the representative literatures in English.

2) Acquisition of knowledge on principles and skills of histochemical techniques.

A7 Study in Medical Sciences: Histology — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Tomohiko Wakayama
Program Schedule: year 1-2
Site and Facilities: seminar rooms and laboratories at Department of Histology

【Course Description】

Students will acquire several histochemical techniques to analyze biological molecules by morphology. 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 for analyses the expression and cellular localization of a variety of biological molecules.

2) Research progression based on the data obtained by experiments.

3) Publication in high-quality journal(s).

A6 Exercises in Medical Sciences: Morphological Neural Science — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Nobuaki Tamamaki
Program Schedule: year 1-2, every Friday (1st 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 neuroepithelum 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.

A7 Study in Medical Sciences: Morphological Neural Science — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Nobuaki Tamamaki
Program Schedule: year 1-2, every Tuesday (1st 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, rentivirus, 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.

A6 Exercises in Medical Sciences: Developmental Neurobiology

Subject Code 10060
(Required: 8 credits)

Supervisor: Kunimasa Ohta
Program Schedule: year 1-2, every Thursday (2nd 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

A7 Study in Medical Sciences: Developmental Neurobiology

Subject Code 10070
(Required: 8 credits)

Supervisor: Kunimasa Ohta
Program Schedule: year 1-2, every Friday (4th 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.

A6 Exercises in Medical Sciences: Sensory and Cognitive Physiology — **Subject Code 10060 (Required; 8 credits)**

Supervisor: Wen-Jie Song, Makoto Takemoto, Masataka Nishimura
Program Schedule: year 1-2, every Friday (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.

A7 Study in Medical Sciences: Sensory and Cognitive Physiology — **Subject Code 10070 (Required; 8 credits)**

Supervisor: Wen-Jie Song, Makoto Takemoto, Masataka Nishimura
Program Schedule: year 1-2, every Monday (1st 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.

A6 Exercises in Medical Sciences: Molecular Physiology

Subject Code 10060
(Required: 8 credits)

Supervisor: Kazuhito Tomizawa
Program Schedule: year 1-2, every Wednesday (1st 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.

A7 Study in Medical Sciences: Molecular Physiology

Subject Code 10070
(Required: 8 credits)

Supervisor: Kazuhito Tomizawa
Program Schedule: year 1-2, every Monday (1st 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.

A6 Exercises in Medical Sciences: Molecular Enzymology — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Hisayuki Nomiyama
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 enzymes with known three-dimensional structures. Based on the structural information, students discuss the reaction mechanisms of enzyme, focusing on the optimization of the reactions by enzyme/substrate alignment with respect to the isoalloxazine ring system.

【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 research theme
2) Overall consistency of the reports

A7 Study in Medical Sciences: Molecular Enzymology — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Hisayuki Nomiyama
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 dedign and construction of tailor-made enzymes with intended specificity, based on careful scrutiny of the structural information of enzyme and its catalytic properties. The results obtained will be published in scientific journals.

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

【Evaluation Criteria】
1) Acquirement of the techniques for the construction of mutant enzymes and enzymatic analysis.
2) Capability of understanding of the catalytic mechanisms of enzyme based on its structural information.
3) Rationale in the planning experiments and in the discussion of results.

A6 Exercises in Medical Sciences:
Medical Biochemistry

Subject Code 10060
(Required: 8 credits)

Supervisor: Kazuya Yamagata, Tatsuya Yoshizawa
Program Schedule: year 1-2, every Monday (4th 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.

A7 Study in Medical Sciences:
Medical Biochemistry

Subject Code 10070
(Required: 8 credits)

Supervisor: Kazuya Yamagata, Tatsuya Yoshizawa
Program Schedule: year 1-2, every Friday (4th 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.

A6 Exercises in Medical Sciences: Molecular Genetics — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Yuichi Oike, Kazutoyo Terada, Motoyoshi Endo, Tsuyoshi Kadomatsu, Keishi Miyata
Program Schedule: year 1-2, every Tuesday (1st 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.

A7 Study in Medical Sciences: Molecular Genetics — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Yuichi Oike, Kazutoyo Terada, Motoyoshi Endo, Tsuyoshi Kadomatsu, Keishi Miyata
Program Schedule: year 1-2, every Monday (1st 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.

A6 Exercises in Medical Sciences: Tumor Genetics and Biology — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Norie Araki
Program Schedule: year 1-2, 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 (including 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.

A7 Study in Medical Sciences: Tumor Genetics and Biology — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Norie Araki
Program Schedule: year 1-2, every Monday (1st 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-Dimentional 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-QQTOF, 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 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/indentification/sequensing, 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 and its stem cells.
3) Execution of experimental techniques to the proposed research projects and proper construction of experimental design on own thesis subject.

A6 Exercises in Medical Sciences:
Pathology and Experimental Medicine

Subject Code 10060
(Required: 8 credits)

Supervisor: Takaaki Ito, Kohki Hasegawa, Kanako Niimori
Program Schedule: year 1-2, every Friday (3rd 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.

A7 Study in Medical Sciences:
Pathology and Experimental Medicine

Subject Code 10070
(Required: 8 credits)

Supervisor: Takaaki Ito, Kohki Hasegawa, Kanako Niimori
Program Schedule: year 1-2, every Monday , Tuesday (1st 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 transcriptiona activity.
5) Acquisition of experimental techniques to produce recombinant genes and proteins for studying cell proliferation and differentiation mechanisms.
6) Understanding the FACS analyses.

A6 Exercises in Medical Sciences:
Cell Pathology

Subject Code 10060
(Required: 8 credits)

Supervisor: Motohiro Takeya
Program Schedule: year 1-2, every Friday (1st 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 pursuit 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.

A7 Study in Medical Sciences:
Cell Pathology

Subject Code 10070
(Required: 8 credits)

Supervisor: Motohiro Takeya
Program Schedule: year 1-2, every Monday (1st period)
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.

A6 Exercises in Medical Sciences: Molecular Pathology — **Subject Code 10060 (Required: 8 credits)**

Supervisors: Takahisa Imamura
Program Schedule: year 1-2, every Monday (3rd period)
Site and Facilities: seminar room and laboratories at Department of Molecular Pathology

【**Course Description**】 You will study blood coagulation, inflammatory and immune reactions, and their crosstalk. You learn protease classification, functions and virulence activities via interaction with host proteins. You will have basic knowledge on cancer biology including cell characters and functional modifications by host molecules You will have training for gathering new information by reading scientific articles published international journals. You will be guided how to present in a congress and publish your research work in international journals and write your PhD thesis.

【**Evaluation for Grades and Credits**】 Students are evaluated for their course grades and credits from integrated performance of reference paper understanding and of presentation of the study. The presentation in the 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 principles of blood clotting reactions and its control, and association with diseases.
2) Acquisition of the latest knowledge on molecules associated with inflammatory and immune reactions and their interactions.
3) Understanding of protease types, functions and virulence activities.
4) Acquisition of basic knowledge on cancer biology.

A7 Study in Medical Sciences: Molecular Pathology — **Subject Code 10070 (Required: 8 credits)**

Supervisors: Takahisa Imamura
Program Schedule: year 1-2, every Tuesday (3rd periods)
Site and Facilities: seminar room and laboratories at Department of Molecular Pathology

【**Course Description**】 The aim of this class is to understand the cascade reaction of blood coagulation and its modification by various molecules, and protease virulence activities via interacting host plasma and cell membrane proteins. Students realize these phenomena by experiments using blood, cells and proteases and recognize importance of cancer cell receptors and the microenvironment from experiments using cancer cells and animals. They also learn how to publish their research results.

【**Evaluation for Grades and Credits**】 Students are evaluated for their course grades and credits from integrated ability to perform the study. The presentation in scientific meetings and publishing paper are regarded greater importance.

【**Evaluation Criteria**】 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. The achievement will be evaluated according to the following criteria.
1) Acquisition of methods to observe blood coagulation, protease functions and cancer.
2) Setup of proper theme to analyze blood coagulation, protease functions and cancer.
3) Experiment planning and performance for the theme.
4) Acquisition of new knowledge about blood coagulation, protease functions and cancer.

A6 Exercises in Medical Sciences: Molecular Pharmacology

Subject Code 10060
(Required: 8 credits)

Supervisor:Hiroyuki Nakanishi, Kazuaki Umeda, Koji Kikuchi, Yasuhisa Sakamoto
Program Schedule: year 1-2, every Wednesday (1st 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.

A7 Study in Medical Sciences: Molecular Pharmacology

Subject Code 10070
(Required: 8 credits)

Supervisor: Hiroyuki Nakanishi, Kazuaki Umeda, Koji Kikuchi, Yasuhisa Sakamoto
Program Schedule: year 1-2, every Thursday (2nd 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.

A6 Exercises in Medical Sciences: **Subject Code 10060**
Pharmacology and Molecular Therapeutics **(Required: 8 credits)**

Supervisor: Shokei Kim-Mitsuyama, Hoichi Yorinaka, Nobutaka Koibuchi, Yu Hasegawa
Program Schedule: year 1-2, every Friday (1st 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.

A7 Study in Medical Sciences: **Subject Code 10070**
Pharmacology and Molecular Therapeutics **(Required: 8 credits)**

Supervisor: Shokei Kim-Mitsuyama, Hoichi Yorinaka, Nobutaka Koibuchi, Yu Hasegawa
Program Schedule: year 1-2, every Monday (1st period)
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.

A6 Exercises in Medical Sciences: Microbiology — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Tomohiro Sawa, Yosuke Maeda
Program Schedule: year 1-2
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.

A7 Study in Medical Sciences: Microbiology — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Tomohiro Sawa, Yosuke Maeda
Program Schedule: year 1-2
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.

A6 Exercises in Medical Sciences: Immunology — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Kazuhiko Maeda, Masahiro Kitabatake
Program Schedule: year 1-2, every Friday (1st 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.

A7 Study in Medical Sciences: Immunology — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Kazuhiko Maeda, Masahiro Kitabatake
Program Schedule: year 1-2, every Wednesday (1st period)
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. Imimunological 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.

A6 Exercises in Medical Sciences: **Subject Code 10060**

Immunogenetics **(Required: 8 credits)**

Instructors: Yasuharu Nishimura, Satoru Senju, Atsushi Irie, Hirotake Awai
Program Schedule: year 1-2, every Friday (1st period)
Site and Facilities: seminar room and laboratories at the Department of Immunogenetics

【Course Description】 Students will learn processes of the past epoch-making discoveries, working hypotheses leading to these discoveries, and evaluations of these hypotheses by investigation of the phenomena together with identification of immune cells and molecules involved in immune-regulation in the recent immunological researches by reading, introducing and discussing leading literatures. They will also learn both classical and up-to-date techniques for analyses of immunological phenomena and identification of molecules important for immune responses, investigation of their pattern of expression, and the intra-cellular and intra-tissue localization of the molecules.

【Evaluation for Grades and Credits】 Students are evaluated based on their ability to understand and criticize scientific reports and literatures, to make plan for their own researches, to interpret and present their experimental results by oral presentations 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 for the research theme of each student.
1) Acquisition of skills to understand new research achievements in immunology published in English.
2) Acquisition of knowledge on principles of experimental techniques for immunological studies and ability to evaluate the data properly.
3) Acquisition of knowledge on basic experimental techniques to solve particular immunological problems.
4) Acquisition of knowledge regarding their own research themes by learning related literatures in the field.

A7 Study in Medical Sciences: **Subject Code 10070**

Immunogenetics **(Required: 8 credits)**

Instructors: Yasuharu Nishimura, Satoru Senju, Atsushi Irie, Hirotake Awai
Program Schedule: year 1-2, every Monday (1st period)
Site and Facilities: seminar room and laboratories at Department of Immunogenetics

【Course Description】
Students will acquire essential experimental techniques of cellular-immunology, biochemistry and molecular biology for the immunological investigations of human, mouse and other experimental animals. Specifically, techniques for T lymphocyte isolation to analyze the mechanisms of antigen recognition and T-cell responses and knowledge of phenomena such as protection from infection, autoimmune diseases and anti-tumor immunology should be mastered. In addition, students will learn basic and clinical studies for the regulation of immune responses. Finally, students will be trained for oral presentation and manuscript preparation for publication.

【Evaluation for Grades and Credits】 Students are evaluated based on the acquisition of experimental 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 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 antigens and immune-cell responses that recognized antigens.
3) Research progression by obtaining new data regarding the basic research for the development of techniques to control immune-cell responses or acquisition of those techniques for clinical applications.
4) Adequate planning and execution of experiments for conducting their researches.

A6 Exercises in Medical Sciences: **Subject Code 10060**
Public Health **(Required: 8 credits)**

Supervisor: Takahiko Katoh, Takao Kitano, Wataru Miyazaki, Aya Hisada
Program Schedule: year 1-2, every Friday (1st 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.

A7 Study in Medical Sciences: **Subject Code 10070**
Public health **(Required: 8 credits)**

Supervisor: Takahiko Katoh, Takao Kitano, Wataru Miyazaki, Aya Hisada
Program Schedule: year 1-2, every Monday (1st 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.

A6 Exercises in Medical Sciences:
Forensic Medicine

Subject Code 10060
(Required: 8 credits)

Supervisor: Yoko Nishitani, Kosei Yonemitsu
Program Schedule: year 1-2, every Wednesday (1st 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.

A7 Study in Medical Sciences:
Forensic Medicine

Subject Code 10070
(Required: 8 credits)

Supervisor: Yoko Nishitani, Kosei Yonemitsu
Program Schedule: year 1-2, every Tuesday (2nd 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.

A6 Exercises in Medical Sciences: Bioethics — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Yasuhiro Kadooka
Program Schedule: year 1-2, every Friday (1st 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 the subject, participating students read relevant articles and analyze various bioethical issues, and are expected to learn how to conduct their own research in the field by integrating two fore-mentioned methods. Students are required to find and determine their research themes, conduct bioethical studies, and write and publish their own academic 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 knowledge earned about information on recent topics in bioethics, ability of planning their own research projects and interpretation and criticism of the obtained results, and capacity to develop valid arguments in bioethical deliberation.

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

1) Understanding of major discussions published in relevant international journals
2) Knowledge about recent problems and arguments in the field
3) Adequate understanding of the implications and significance of the results of their own research
4) Ability to discuss, present, and write bioethics issues in English
5) Ability to summarize and present their own research results or arguments.

A7 Study in Medical Sciences: Bioethics — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Yasuhiro Kadooka
Program Schedule: year 1-2, every Monday (1st periods)
Site and Facilities: seminar room at Department of Bioethics

【**Course Description**】 The aim of this course is to learn how to investigate descriptive empirical research regarding bioethical problems. 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 comprehensively evaluated for their course grades and credits based on the course hours completed, understanding and knowledge earned about information on recent progress in the research for bioethics, ability for planning their own research projects and interpretation and criticism of the obtained results, and capacity to develop valid arguments in bioethical deliberation.

【**Evaluation Criteria**】 The achievement will be evaluated according to the following criteria
1) Ability to conduct appropriate literature review and indentify unresolved bioethical issues and determine their own research themes.
2) Ability to plan research projects
3) Ability to conduct their research projects in an appropriate manner
4) Ability to consider the implications of research results or their own arguments, summarize and present their own research results or arguments at the academic meetings, and write and publish articles

A6 Exercises in Medical Sciences: Respiratory Medicine — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Hirotsugu Kohrogi, Kazuhiko Fujii, Hidenori Ichiyasu, Shinichiro Okamoto, Susumu Hirosako, Keisuke Kojima, Sho Saeki
Program Schedule: year 1-2, every Monday (3rd period)
Site and Facilities: seminar room and laboratories at Department of Respiratory Medicine, and Souken

【**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.

【**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.

【**Evaluation Criteria**】 The achievement will be evaluated according to the following criteria.
1) Histochemical staining and its diagnosis are understood, and relating novel findings are obtained
2) Immunohistochmeical 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.

A7 Study in Medical Sciences: Respiratory Medicine — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Hirotsugu Kohrogi, Naoki Saita, Kazuhiko Fujii, Hidenori Ichiyasu, Keisuke Kojima, Sho Saeki
Program Schedule: year 1-2, every Wednesday (3rd periods)
Site and Facilities: seminar room and laboratories at Department of Respiratory Medicine, and Souken

【**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.

【**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 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.

A6 Exercises in Medical Sciences: Cardiology — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Hisao Ogawa, Seiji Hokimoto, Koichi Kaikita
Program Schedule: year 1-2, every Tuesday (2nd 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.

A7 Study in Medical Sciences: Cardiology — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Hisao Ogawa, Seiji Hokimoto, Koichi Kaikita
Program Schedule: year 1-2, every Thursday (2nd 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.

A6 Exercises in Medical Sciences: Endocrinology and Metabolism — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Eiichi Araki
Program Schedule: year 1-2, every Tuesday (2nd period)
Site and Facilities: seminar room and laboratories at Department of Metabolic Medicine

【Course Description】Select several manuscripts concerning the mechanisms of the hormonal action and the cause of metabolic or endocrinological diseases, and learn the molecular biological methods that are used for 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.

A7 Study in Medical Sciences: Endocrinology and Metabolism — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Eiichi Araki
Program Schedule: year 1-2, every Thursday (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, and 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.

A6 Exercises in Medical Sciences: Nephrology — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Masashi Mukoyama
Program Schedule: year 1-2, every Thursday (2nd 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.

A7 Study in Medical Sciences: Nephrology — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Masashi Mukoyama
Program Schedule: year 1-2, every Tuesday (2nd 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.

A6 Exercises in Medical Sciences: Gastroenterology and Hepatology — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Yutaka Sasaki, Motohiko Tanaka, Hideaki Naoe, Masakuni Tateyama, Takashi Shono, Takehisa Watanabe, Tetsuya Murao, Kotaro Fukubayashi, Shumpei Hashigo
Program Schedule: year 1-2, every Friday(1st period)
Site and Facilities: Seminar room and laboratory at Department of Gastroenterology & Hepatology

【Course Description】
Recent progress in medicine has identified molecular mechanisms underlying gastrointestinal & liver diseases, leading to the development and application of new therapies. Aim of this course is 1) to learn molecular mechanisms underlying inflammation and carcinogenesis in the gastrointestinal tract as well as liver, 2) to comprehend how molecular mechanisms would be modulated and regulated for the purpose of treatment on gastrointestinal and liver diseases.

【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 in the course, the report regarding contents in the course.

【Evaluation Criteria】

The students, who have completed more than 75% of the whole course, would be required to submit a report regarding the course lectures. The report will be evaluated regarding the criteria listed below.
1) Comprehension on variety of gastrointestinal and liver cancers and their incidence rates.
2) Comprehension on precancerous lesions of gastrointestinal and liver cancers
3) Comprehension on the relation between inflammation and carcinogenesis

A7 Study in Medical Sciences: Gastroenterology and Hepatology — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Yutaka Sasaki, Motohiko Tanaka, Hideaki Naoe, Masakuni Tateyama, Takashi Shono, Takehisa Watanabe, Tetsuya Murao, Kotaro Fukubayashi, Shumpei Hashigo
Program Schedule: year 1-2, every Monday(3rd period)
Site and Facilities: Seminar room and laboratory at Department of Gastroenterology & Hepatology

【Course Description】
Aim of this course is to experience measuring gene abnormalities, cytokines and chemokines which closely related to disease, to solve research theme through Medical Sciences practice. Specifically, practice analysis of gene abnormalities such as LOH, point mutation, analysis of PCR, protein electrophoresis, immunological gene expression, protein expression.

【Evaluation for Grades and Credits】
Students are totally evaluated with acquired experimental skills regarding own research theme, discussion, oral presentation and report in regard to the results.

【Evaluation Criteria】

The report will be evaluated regarding the criteria listed below.

1) Comprehension on the gene abnormalities in gastrointestinal and liver disease, the roles of cytokines and chemokines.
2) Comprehension on the rationale of PCR, protein electrophoresis, immunohistochemistry.
3) Comprehension on the significance of gene abnormalities and its evaluation methods
4) Acquisition of experimental technique for own research theme after planning appropriate experiment.

A6 Exercises in Medical Sciences: Hematology — **Subject Code 10060** — **(Required: 8 credits)**

Supervisor: Hiroaki Mitsuya, Yutaka Okuno
Program Schedule: year 1-2, every Tuesday (2nd 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

A7 Study in Medical Sciences: Hematology — **Subject Code 10070** — **(Required: 8 credits)**

Supervisor: Hiroaki Mitsuya, Yutaka Okuno
Program Schedule: year 1-2, every Thursday (2nd 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 *in vivo* and *in vitro* evaluation methods of drug treatment

A6 Exercises in Medical Sciences: Rheumatology

Subject Code 10060
(Required: 8 credits)

Supervisor: Hiroaki Mitsuya, Shinya Hirata
Program Schedule: year 1-2, every Tuesday (2nd 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 collagen 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

A7 Study in Medical Sciences: Rheumatology

Subject Code 10070
(Required: 8 credits)

Supervisor: Hiroaki Mitsuya, Shinya Hirata
Program Schedule: year 1-2, every Thursday (2nd 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

A6 Exercises in Medical Sciences: Infectious diseases — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Hiroaki Mitsuya, Tatsuya Kawaguchi, Toshikazu Miyakawa
Program Schedule: year 1-2, every Tuesday (2nd period)
Site and Facilities: seminar room and laboratories at Department of Infectious diseases

【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

A7 Study in Medical Sciences: Infectious diseases — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Hiroaki Mitsuya, Tatsuya Kawaguchi, Toshikazu Miyakawa
Program Schedule: year 1-2, every Thursday (2nd period)
Site and Facilities: seminar room and laboratories at Department of Infectious diseases

【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

A6 Exercises in Medical Sciences: Subject Code 10060

Neurology **(Required: 8 credits)**

Supervisor: Yukio Ando, Yasushi Maeda
Program Schedule: year 1-2, every Thursday(1st 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.

A7 Study in Medical Sciences: Subject Code 10070

Neurology **(Required: 8 credits)**

Supervisor: Yukio Ando, Yasushi Maeda
Program Schedule: year 1-2, every Monday (1st periods)
Site and Fascilities: 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.

A6 Exercises in Medical Sciences: Pediatrics — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Fumio Endo
Program Schedule: year 1-2, every Friday (2nd 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.

【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 basic mechanism of Genetic disorders
Understanding the basic features of stem cells
Understanding of the clinical uses of gene therapy
Understanding the regenerative medicine

A7 Study in Medical Sciences: Pediatrics — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Fumio Endo
Program Schedule: year 1-2, every Tuesday (2nd period)
Site and Facilities: to be announced

【Course Description】

Provides 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

A6 Exercises in Medical Sciences: **Subject Code 10060**

Diagnostic Medicine **(Required: 8 credits)**

Instructor: Hirotaka Matsui
Program Schedule: year 1-2, every Friday (1st period)
Site and Facilities: seminar room and laboratories at the 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, students who wish to take part 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 based on their ability to understand and criticize scientific reports and literatures, to make plan for their own researches, to interpret and present their experimental results by oral presentations 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 for the research theme of each student.
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.

A7 Study in Medical Sciences: **Subject Code 10070**

Diagnostic Medicine **(Required: 8 credits)**

Instructors: Hirotaka Matsui
Program Schedule: year 1-2, every Tuesday (1st period)
Site and Facilities: seminar room and laboratories at the Department of Diagnostic Medicine

【Course Description】
In this course, the students will receive instructions for the achievement of experimental techniques in laboratory medicine using human and mice materials, which are required to figure out the given research subjects. In addition, the students will be educated with the recent advances in diagnostic medicine, especially in hematological malignancies including leukemia and myelodysplastic syndrome. Furthermore, the class in this course provides information about the development of diagnostic techniques in laboratory medicine, which is intended to give suggestions for students' interests.

【Evaluation for Grades and Credits】 Students are evaluated based on the acquisition of experimental 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 for the research theme of each student.
1) Acquisition of techniques for the analysis of molecular pathogenesis.
2) Acquisition of experimental techniques in laboratory medicine.
3) Research progression by obtaining basic and translational experimental data which might give rise to the development of new diagnostic systems.
4) Adequate planning and execution of experiments for conducting their research.

A6 Exercises in Medical Sciences: Diagnostic Radiology — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Yasuyuki Yamashita
Program Schedule: year 1-2, every Thursday (2nd 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 deseases 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.

A7 Study in Medical Sciences: Diagnostic Radiology — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Yasuyuki Yamashita
Program Schedule: year 1-2, every Tueseday (2nd 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 deseases of various organs including brain, head&neck, chest, abdomen, pelvis and mucloskeletal 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.

A6 Exercises in Medical Sciences: Radiation Oncology — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Natsuo Oya
Program Schedule: year 1-2, every Tuesday (2nd 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.

A7 Study in Medical Sciences: Radiation Oncology — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Natsuo Oya
Program Schedule: year 1-2, every Thursday (2nd 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.

A6 Exercises in Medical Sciences: Neuropsychiatry — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Manabu Ikeda, Noboru Fujise, Mamoru Hashimoto, Tadashi Jyono
Program Schedule: year 1-2, every Monday (3rd 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.

A7 Study in Medical Sciences: Neuropsychiatry — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Manabu Ikeda, Noboru Fujise, Mamoru Hashimoto, Tadashi Jyono
Program Schedule: year 1-2, every Monday (4th 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.

A6 Exercises in Medical Sciences: General Medicine — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Shunji Kasaoka, Jun-ichi Taniguchi
Program Schedule: year 1-2
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.

A7 Study in Medical Sciences: General Medicine — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Shunji Kasaoka, Jun-ichi Taniguchi
Program Schedule: year 1-2
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.

A6 Exercises in Medical Sciences: Health Care Science — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Hideki Kishikawa, Hirofumi Soejima
Program Schedule: year 1-2, every Thursday (4th 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.

A7 Study in Medical Sciences: Health Care Science — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Hideki Kishikawa, Hirofumi Soejima
Program Schedule: year 1-2, every Thursday (3rd 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.

A6 Exercises in Medical Sciences: Clinical Chemistry and Informatics — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Tetsumi Irie, Yoichi Ishitsuka
Program Schedule: year 1-2, 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 pharmaceutics, 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 pharmaceutics but also to the optimal individualized dosage regimen for patients in clinical practices.

A7 Study in Medical Sciences: Clinical Chemistry and Informatics — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Tetsumi Irie, Yoichi Ishitsuka
Program Schedule: year 1-2, every Monday (1st 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.

A6 Exercises in Medical Sciences: Medical Information Sciences — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Koichiro Usuku, Jun Hirose
Program Schedule: year 1-2, every Tuesday (5th 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

A7 Study in Medical Sciences: Medical Information Sciences — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Koichiro Usuku, Jun Hirose
Program Schedule: year 1-2, every Thursday (5th 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

A6 Exercises in Medical Sciences: Gastroenterological Surgery — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Hideo Baba et al.
Program Schedule: year 1-2
Site and Facilities: seminar room and laboratories at Department of Gastroenterogical 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 muti-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 an metastasis of digestive cancer
4) Proposal of appropriate research projects on the basis of understanding the background on the gastroenterological surgery.

A7 Study in Medical Sciences: Gastroenterological Surgery — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Hideo Baba et al.
Program Schedule: year 1-2
Site and Facilities: seminar room and laboratories at Department of Gastroenterogical 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.

A6 Exercises in Medical Sciences: **Subject Code 10060**

Thoracic Surgery **(Required: 8 credits)**

Supervisor : Makoto Suzuki
Program Schedule : year1-2, every Friday (1st period)
Site and Facilities : Seminar room at the Department of Thoracic Surgery

【**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.

【**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.

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

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.

A7 Study in Medical Sciences: **Subject Code 10070**

Thoracic Surgery **(Required: 8 credits)**

Supervisor : Makoto Suzuki
Program Schedule : year1-2, every Monday (3rd periods)
Site and Facilities : Seminar room at the Department of Thoracic Surgery

【**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.

【**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 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.

A6 Exercises in Medical Sciences: Cardiovascular Surgery — **Subject Code 10060 (Required:8 credits)**

Supervisors: Toshihiro Fukui, Hisashi Sakaguchi
Program Schedule: year 1-2, every Tuesday (2nd period)
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 disturvance, 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.

A7 Study in Medical Sciences: Cardiovascular Surgery — **Subject Code 10070 (Required:8 credits)**

Supervisors: Toshihiro Fukui , Hisashi Sakaguchi
Program Schedule: year 1-2
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.

A6 Exercises in Medical Sciences: Breast and Endocrine Surgery — **Subject Code 10060 (Required: 8 credits)**

Instructors: Hirotaka Iwase, Yutaka Yamamoto (Breast and Endocrine Surgery TEL: 373-5521)
Program Schedule: year 1-2, every Friday (1st period)
Study place : the seminar room and laboratory of the Breast and Endocrine Surgery

【 Content Description】

Surgical management and muti-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 machanism 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.

A7 Study in Medical Sciences: Breast and Endocrine Surgery — **Subject Code 10070 (Required: 8 credits)**

Instructors: Hirotaka Iwase, Yutaka Yamamoto (Breast and Endocrine Surgery TEL: 373-5521)
Program Schedule: year 1-2, every Monday (1st period)
Study place : the seminar room and laboratory of the Breast and Endocrine Surgery

【Content Description】

Surgical management and muti-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 machanism 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 grand will be reported.
5. About the fundamental knowledge and the achievements related to the study theme, your documents will be published in English Journals.

A6 Exercises in Medical Sciences:
Pediatric surgery and Transplantation

Subject Code 10060
(Required: 8 credits)

Supervisor: Yukihiro Inomata
Program schedule : year 1-2,every Friday 1st 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 understanding and knowledge earned about scientific information on recent progress in the research for pediatric surgery and 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.

A7 Study in Medical Sciences:
Pediatric surgery and Transplantation

Subject Code 10070
(Required: 8 credits)

Supervisor: Yukihiro Inomata
Program schedule : year 1-2,every Monday 1st 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 immunosuppressiants, 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

A6 Exercises in Medical Sciences: **Subject Code 10060**
Neurosurgery **(Required: 8 credits)**

Supervisors: Jun-ichi Kuratsu, Hideo Nakamura, Keishi Makino
Program Schedule: Years 1-2, 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 tumorgenesis
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
5. An understanding of the biological properties of glioma cancer stem cells.

A7 Study in Medical Sciences:
Neurosurgery

Subject Code 10070
(Required: 8 credits)

Supervisors: Jun-ichi Kuratsu, Hideo Nakamura, Keishi Makino
Program Schedule: Years 1-2, every Monday (3rd 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, Grades and Credits】 Students will receive course grades and credits based on the course hours completed and their understanding and knowledge of course material.
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 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

A6 Exercises in Medical Sciences: Orthopaedic — **Subject Code 10060 (Required: 8 credits)**

Supervisors: Hiroshi Mizuta, Junji Ide
Program Schedule: years 1-2, each Friday (1st period)
Site and Facilities: Seminar room and laboratories in the Department of Orthopaedic Surgery

【Course Description】 With a focus on (1) molecular mechanisms regulating the destruction and repair of musculoskeletal tissues, (2) basic research aimed at the regeneration of musculoskeletal tissues, and (3) molecular genetic approaches to musculoskeletal disease, we introduce recent advances in basic research in these fields. We instruct the establishment of hypotheses guiding individual studies and the testing thereof. In addition, we provide instruction on study design and the methodology necessary for the clinical verification of the diagnosis, the development of treatment strategies, and for disease prevention. We also address the pathologic analysis of musculoskeletal disease and discuss the literature in which specific cases are presented.

【Evaluation for Grades and Credits】 Course grades and credits are based on the students' ability to understand and critique books and papers related to their research theme and on reports and oral presentations of their study design and progress. Students may substitute accepted research papers, conference presentations, or progress reports in laboratory meetings for these reports.

【Evaluation Criteria】 Evaluations will focus on the following areas in each individual research project:
1) Ability to understand the results of clinical and basic research on musculoskeletal disease reported in English.
2) Ability to understand the basic principles of the analysis methods and the interpretation of the results of basic research on musculoskeletal disease.
3) Knowledge of the basic methodology and the interpretation of outcomes in clinical research studies on musculoskeletal disease.
4) Sufficient understanding of methodology to identify unresolved issues in musculoskeletal disease.
5) Knowledge of the results of earlier studies related to their research topic.

A7 Study in Medical Sciences: Orthopaedic — **Subject Code 10070 (Required: 8 credits)**

Supervisors: Hiroshi Mizuta, Junji Ide
Program Schedule: years 1-2, each Monday (1st periods)
Site and Facilities: Seminar room and laboratories at the Department of OrthopaedicSurgery

【Course Description】 Using animal models and cultured cells we instruct the experimental procedures of histology, biochemistry, and molecular biology to solve research problems identified during this course. Students will be instructed to design studies and to plan the methodology required for advancing clinical research, solving ethical issues, and obtaining medical statistics. We will provide instructions for basic or clinical research studies on musculoskeletal diseases aimed at elucidating their etiology and pathogenesis, at verifying and rendering a diagnosis, and at developing treatments and prevention methods. In addition, we provide instructions on the methods for summarizing the results of such studies in written reports and oral presentations.

【Evaluation for Grades and Credits】 Course grades and credits are based on the mastery of the methodology related to the research topic, on the quality of oral presentations and reports interpreting their results, and on the outcome of individual research efforts. Students may substitute accepted research papers, conference presentations, or progress reports in laboratory meetings for these reports.

【Evaluation Criteria】 Evaluations will focus on the following areas in each individual research project:
1) Acquisition of a variety of experimental skills and techniques required for orthopedic research and of novel findings that contribute to the field of orthopedics.
2) Sufficient knowledge regarding the methodology necessary for clinical research on musculoskeletal disease.
3) Development of an appropriate study design for the elucidation of the etiology and pathogenesis of musculoskeletal disease or for the verification and development of a diagnosis, for treatment, and for disease prevention.
4) Planning and execution of appropriate methodologies and study designs to solve research problems.

A6 Exercises in Medical Sciences:
Obstetrics and Gynecology

Subject Code 10060
(Required: 8 credits)

Supervisor: Hidetaka Katabuchi, Takashi Ohba, Hironori Tashiro, Ritsuo Honda, Yoshinori Okamura
Program Schedule: year 1-2,every Fridy(1st period)
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.

A7 Study in Medical Sciences:
Obstetrics and Gynecology

Subject Code 10070
(Required: 8 credits)

Supervisor: Hidetaka Katabuchi, Takashi Ohba, Hironori Tashiro, Ritsuo Honda, Yoshinori Okamura
Program Schedule: year 1-2, every Monday (1st periods)
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).

A6 Exercises in Medical Sciences: Urology — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Masatoshi Eto, Yoshiaki Kawano
Program Schedule: year 1-2 every Tuesday (1st period)
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-RCR or northern blotting. Understanding of those principles.
5. Ability to employ appropriate approaches, to plan experiments and to evaluate data upon a provided project.

A7 Study in Medical Sciences: Urology — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Masatoshi Eto, Yoshiaki Kawano
Program Schedule: year 1-2 every Tuesday (1st period)
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.

A6 Exercises in Medical Sciences: Ophthalmology — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Hidenobu Tanihara and Toshihiro Inoue
Program Schedule: year 1-2, every Friday 1st period
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.

A7 Study in Medical Sciences: Ophthalmology — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Hidenobu Tanihara and Toshihiro Inoue
Program Schedule: year 1-2, every Monday 1st period
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.

A6 Exercises in Medical Sciences:
Otolaryngology-Head and Neck Surgery

Subject Code 10060
(Required: 8 credits)

Supervisor: Eiji yumoto, Tetsuji sanuki
Program Schedule: year 1-2,every Tuesday 2nd period
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,

①To analyze the process of nerve regeneration on the site of nerve injury and nucleus ambiguous 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.

②To 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 immunohistologycal 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.

A7 Study in Medical Sciences:
Otolaryngology-Head and Neck Surgery

Subject Code 10070
(Required: 8 credits)

Supervisor: Eiji yumoto, Ryosei Minoda
Program Schedule: year 1-2, every Monday 2nd period
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 atho1 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, electoroporation

【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 repots 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 revaluated 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.

A6 Exercises in Medical Sciences:
Oral & Maxillofacial Surgery

Subject Code 10060
(Required: 8 credits)

Supervisor: Hideki Nakayama , Akimitsu Hiraki
Program Schedule: year 1-2, every Friday (4th 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 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.

A7 Study in Medical Sciences:
Oral & Maxillofacial Surgery

Subject Code 10070
(Required: 8 credits)

Supervisor: Hideki Nakayama, Akimitsu Hiraki
Program Schedule: year 1-2, every Friday (3rd periods)
Site and Facilities: to be announced

【**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.

A6 Exercises in Medical Sciences: Dermatology and Plastic Surger — **Subject Code 10060** — **(Required: 8 credits)**

Supervisor: Hironobu Ihn, Masatoshi Jinnin, Satoshi Fukushima, Shinichi Masuguchi, Takamitsu Makino, Toshikatsu Igata, Asako Ichihara, Takamitsu Johno, Azusa Miyashita
Program Schedule: year 1-2
Site and Facilities: to be announced

【**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.

A7 Study in Medical Sciences: Dermatology and Plastic Surgery — **Subject Code 10070** — **(Required: 8 credits)**

Supervisor: Hironobu Ihn, Masatoshi Jinnin, Satoshi Fukushima, Shinichi Masuguchi, Takamitsu Makino, Toshikatsu Igata, Asako Ichihara, Takamitsu Johno, Azusa Miyashita
Program Schedule: year 1-2
Site and Facilities: to be announced

【**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.

A6 Exercises in Medical Sciences: Agressology — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Yoshihiro Kinoshita
Program Schedule: year 1-2, every Tuesday (3rd 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.

A7 Study in Medical Sciences: Agressology — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Yoshihiro Kinoshita
Program Schedule: year 1-2, every Thursday (2nd 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.

A6 Exercises in Medical Sciences: Anesthesiology — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Tatsuo Yamamoto
Program Schedule: year 1-2, every Friday (1st 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 filed 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.

A7 Study in Medical Sciences: Anesthesiology — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Tatsuo Yamamoto
Program Schedule: year 1-2, every Monday (1st 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.

A6 Exercises in Medical Sciences: Molecular Cell Biology — **Subject Code 10060 (Required: 8 credits)**

Supervisors: Teru Ogura, Kunitoshi Yamanaka, Masatoshi Esaki
Program Schedule: year 1-2
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.

A7 Study in Medical Sciences: Molecular Cell Biology — **Subject Code 10070 (Required: 8 credits)**

Supervisors: Teru Ogura, Kunitoshi Yamanaka, Masatoshi Esaki
Program Schedule: year 1-2
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.

A6 Exercises in Medical Sciences: Kidney Development — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Ryuichi Nishinakamura, Satomi Tanaka, Atsuhiro Taguchi
Program Schedule: year 1-2, every Tuesday (2nd period)
Site and Facilities: seminar room and laboratories at Department of Kidney Development

【**Course Description**】 The aim of this 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.

【**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.

【**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.

A7 Study in Medical Sciences: Kidney Development — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Ryuichi Nishinakamura, Satomi Tanaka, Atsuhiro Taguchi
Program Schedule: year 1-2, every Tuesday (1st 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 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.

A6 Exercises in Medical Sciences: Brain Morphogenesis — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Kenji Shimamura and Jun Hatakeyama
Program Schedule: year 1-2
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 regionalization, 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 will be 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 the 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 master 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 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 pre-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.

A7 Study in Medical Sciences: Brain Morphogenesis — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Kenji Shimamura and Jun Hatakeyama
Program Schedule: year 1-2
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 department. 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 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 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 regional specification 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.

A6 Exercises in Medical Sciences: Cell Modulation — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Takumi Era
Program Schedule: The first half year 1-2, 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 and maintenance of pulripotent stem cells such as embryonic stem (ES) and induced pulripotent 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.

【**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 international fields. 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 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.

A7 Study in Medical Sciences: Cell Modulation — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Takumi Era
Program Schedule: The second half year 1-2, every Monday (1st 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 cells into tissue stem cells and to manipulate ES cell 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.

A6 Exercises in Medical Sciences: Cell Maintenance — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Satoshi Tateishi
Program Schedule: year 1-2, 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, apoptosis (cell death) 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, apoptosis (cell death), cellular senescence and DNA repair.
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.

A7 Study in Medical Sciences: Cell Maintenance — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Satoshi Tateishi
Program Schedule: year 1-2, every Monday (1st 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 evaluation for cell cycle checkpoint, DNA repair, apoptosis (cell death) and cellular senescence and phenotypic analysis of mutant mice defective for the mechanisms. Advanced techniques to investigate intracellular signal response on 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 cell cycle checkpoint, DNA repair, apoptosis (cell death) and cellular senescence.
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 cell cycle checkpoint, DNA repair, apoptosis (cell death) and cellular senescence.
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.

A6 Exercises in Medical Sciences: Cell Differentiation — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Minetaro Ogawa
Program Schedule: year 1-2, every Monday (1st period)
Site and Facilities: laboratories at Department of Cell Differentiation

【**Course Description**】 The aim of this class is to learn how to conduct research on the developmental processes of the hematopoietic and vascular systems. The latest literatures are examined to understand current status of the research fields, focusing largely on 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. Principles of the study tool including 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 will be learned.

【**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. The presentation including discussion at the laboratory and academic meetings is also taken into consideration to assess the level of achievement.

【**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.

A7 Study in Medical Sciences: Cell Differentiation — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Minetaro Ogawa
Program Schedule: year 1-2, every Tuesday (1st 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. Research projects and working hypothesis can be modified and improved depending on the progress and achievement of research. Finally, the experimental results may be reported in academic meetings. All instructions in the above-mentioned processes, which are necessary to fulfill requirements for a master thesis, are conducted in this 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) 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.
7) Research findings are properly presented and discussed in an academic environment.

A6 Exercises in Medical Sciences: Medical Cell Biology — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Mitsuyoshi Nakao, Noriko Saitoh, Shinjiro Hino
Program Schedule: year 1-2, every Friday (4th 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 transcriptionaly active or inactive chromatins 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.

A7 Study in Medical Sciences: Medical Cell Biology — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Mitsuyoshi Nakao, Noriko Saitoh, Shinjiro Hino
Program Schedule: year 1-2, every Monday (1st 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.

A6 Exercises in Medical Sciences: AIDS Research I — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Masafumi Takiguchi
Program Schedule: year 1-2, every Tuesday (4th 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 the 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.

A7 Study in Medical Sciences: AIDS Research I — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Masafumi Takiguchi
Program Schedule: year 1-2, every Friday (1st 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.

A6 Exercises in Medical Sciences: AIDS Research II

Subject Code 10060 (Required: 8 credits)

Supervisor: Shuzo Matsushita
Program Schedule: year 1-2, every Monday (3rd period)
Site and Facilities: seminar room and laboratories at "AIDS Research II"

【**Course Description**】 The exercise which gave some examples is guided about the circumstances of the important discovery of a phenomenon in retrovirus research including human immunodeficiency virus (HIV) in recent years and the methodology for a setup of the hypothesis about the mechanism of the phenomenon, and its pathogenesis analysis. Furthermore, the exercise for understanding the new technique developed in recent years as well as a classic technique is guided in terms of a functional molecule, molecular biology and cell biology to analyze pathogenesis of retroviral infection.

【**Evaluation for Grades and Credits**】 Students are evaluated for their course grades and credits based on an oral presentation, a report, etc. about an understanding of the work relevant to a subject of research or a paper, the capability of criticism, and planning of an experimental design are evaluated collectively. In addition, it is replaceable with a report with a paper, a presentation in a conference, or the progress report in a lab meeting.

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

1) The capability to understand updated achievements in research of retroviral infection.
2) Understanding the principle of the general method for analysis in retroviral infection research and the interpretation of a result.
3) Understanding possible methods to approach unsolved subjects in retroviral infection.
4) Understanding the important past discovery corresponding to the research task of retrovirus infection.

A7 Study in Medical Sciences: AIDS Research II

Subject Code 10070 (Required: 8 credits)

Supervisor: Shuzo Matsushita
Program Schedule: year 1-2, every Monday (1st 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 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.

A6 Exercises in Medical Sciences: AIDS Research III — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Seiji Okada
Program Schedule: year 1-2, every Friday (1st 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. .

A7 Study in Medical Sciences: AIDS Research III — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Seiji Okada
Program Schedule: year 1-2, every Wednesday (1st 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 hematopoieitic-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.

A6 Exercises in Medical Sciences: AIDS Research IV

Subject Code 10060 (Required: 8 credits)

Supervisor: Shinya Suzu
Program Schedule: year 1-2, every Friday (1st 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.

A7 Study in Medical Sciences: AIDS Research IV

Subject Code 10070 (Required: 8 credits)

Supervisor: Shinya Suzu
Program Schedule: year 1-2, every Wednesday (1st 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. phentotypical analyses with hemaotpoietic 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)

A6 Exercises in Medical Sciences: AIDS Research V — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Takamasa Ueno
Program Schedule: year 1-2,every Tuesday (1st 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.

their ability to implement strategic experimental design, accomplish research projects, and draw logical conclusions by evaluating their own experimental results.

A7 Study in Medical Sciences: AIDS Research V — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Takamasa Ueno
Program Schedule: year 1-2,every Wednesday (1st 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 to 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.

their skills and knowledge to analyze functional aspects of cells, proteins, and genes.

A6 Exercises in Medical Sciences:
AIDS Research VII

Subject Code 10060
(Required: 8 credits)

Supervisor: Yasuo Ariumi
Program Schedule: year 1-2,every Monday (2nd 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.

A7 Study in Medical Sciences:
AIDS Research VII

Subject Code 10070
(Required: 8 credits)

Supervisor: Yasuo Ariumi
Program Schedule: year 1-2,every Thursday (2nd 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.

A6 Exercises in Medical Sciences: AIDS Research XIII — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Yorifumi Sato
Program Schedule: year 1-2 every Wednesday (2nd 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.

A7 Study in Medical Sciences: AIDS Research XIII — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Yorifumi Sato
Program Schedule: year 1-2 every Friday (1st 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.

A6 Exercises in Medical Sciences: Reproductive Engineering — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Naomi Nakagata
Program Schedule: year 1-2 every Tuesday (2nd period)
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 biology and the basic reproductive engineering techniques. In particular, you are expected to understand the following.

1. Mouse early development
   1) Spermatogenesis
   2) Oogenesis
   3) Ovulation
   4) Fertilization

2. Reproductive engineering techniques
   1) In vitro fertilization
   2) Freezing of embryos and sperm

【**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 biology and the basic 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 master's degree 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 biology and the basic 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.

A7 Study in Medical Sciences: Reproductive Engineering — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Naomi Nakagata
Program Schedule: year 1-2 every Friday (3rd period)
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 and sperm
3) Embryo transfer
4) 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 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.

A6 Exercises in Medical Sciences: Bioinformatics — **Subject Code 10060 (Required: 8 credits)**

Supervisor: Masatake Araki
Program Schedule: year 1-2, every Tuesday (3rd 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.

A7 Study in Medical Sciences: Bioinformatics — **Subject Code 10070 (Required: 8 credits)**

Supervisor: Masatake Araki
Program Schedule: year 1-2, every Monday (3rd 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.

A6 Exercises in Medical Sciences: Radioisotope science

Subject Code 10060
(Required: 8 credits)

Supervisor: Akihiro Kojima
Program Schedule: year 1-2, 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) Acquirement 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.

A7Study in Medical Sciences: Radioisotope science

Subject Code 10070
(Required: 8 credits)

Supervisor: Akihiro Kojima
Program Schedule: year 1-2, every Friday (1st 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

A6 Exercises in Medical Sciences: IRCMS－I **Subject Code 10060 (Required: 8 credits)**

Supervisor: Hitoshi Takizawa
Program Schedule: 1-2 years, every Monday (4th period)
Site and Facilities: in the seminar room 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. Through these, the students are expected to study key cell types and molecules that are involved in immune-hematopoietic regulation, and general techniques of molecular, cellular, and developmental biology. Students are expected to prepare written and oral reports.

【**Evaluation for Grades and Credits**】 Grades will be determined based upon attendance to the seminar, understanding the significance of the literatures introduced and the ability to criticize them. Also, we will grade students' overall performance, the quality of experimental design, oral presentations, and written reports.

【**Evaluation Criteria**】 Students will be evaluated on the following topics:
1) their understanding of research background on the paper introduced.
2) their ability to communicate the significance of the study with other lab member.
3) their understanding of significance and problem of the study.

A7 Study in Medical Sciences: IRCMS－I **Subject Code 10070 (Required: 8 credits)**

Supervisor: Hitoshi Takizawa
Program Schedule: 1-2 years, every Friday (1st period)
Site and Facilities: in the seminar room at International Research Center for Medical Sciences

【**Course Description**】 The course set a research project focusing on physiology or pathophysiology of human or mouse hematopoietic stem cells, and introduce experimental approaches/techniques using cell biology, biochemistry, molecular biology, in order to address the questions raised on the project. The student will also learn how to make a research report and how to present their own findings.

【**Evaluation for Grades and Credits**】 Grades will be determined based upon attendance to the seminar, 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 the following topics:
1) their progress on learning basic experimental techniques that are required for their research project
2) their ability to design appropriate experiments, make experimental plans and make progress.
3) their ability to present their progress in lab meetings and scientific meetings.
4) their ability to write and present master thesis.

A6 Exercises in Medical Sciences: IRCMS－II

Subject Code 10060 (Required: 8 credits)

Supervisor: Goro Sashida
Program Schedule: year 1-2, every Wednesday (1th 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 leukemia cells and also examine the regulation of genes and oncogenes, the structures of the gene products, and their biological function in vivo. Based on the their empirical findings, students will design experimental systems, using biological, molecular, and biochemical techniques to understand the molecular functions of identified genes on hematopoiesis and oncogenes in leukemia. 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 presentation, 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 hematopoietic stem cells and hematopoietic malignancies
2) their knowledge of previous literature relevant to their research and their ability to form reasonable hypotheses and perform their experimental plans.

A7 Study in Medical Sciences: IRCMS－II

Subject Code 10070 (Required: 8 credits)

Supervisor: Goro Sashida
Program Schedule: year 1-2, every Wednesday (2th 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.

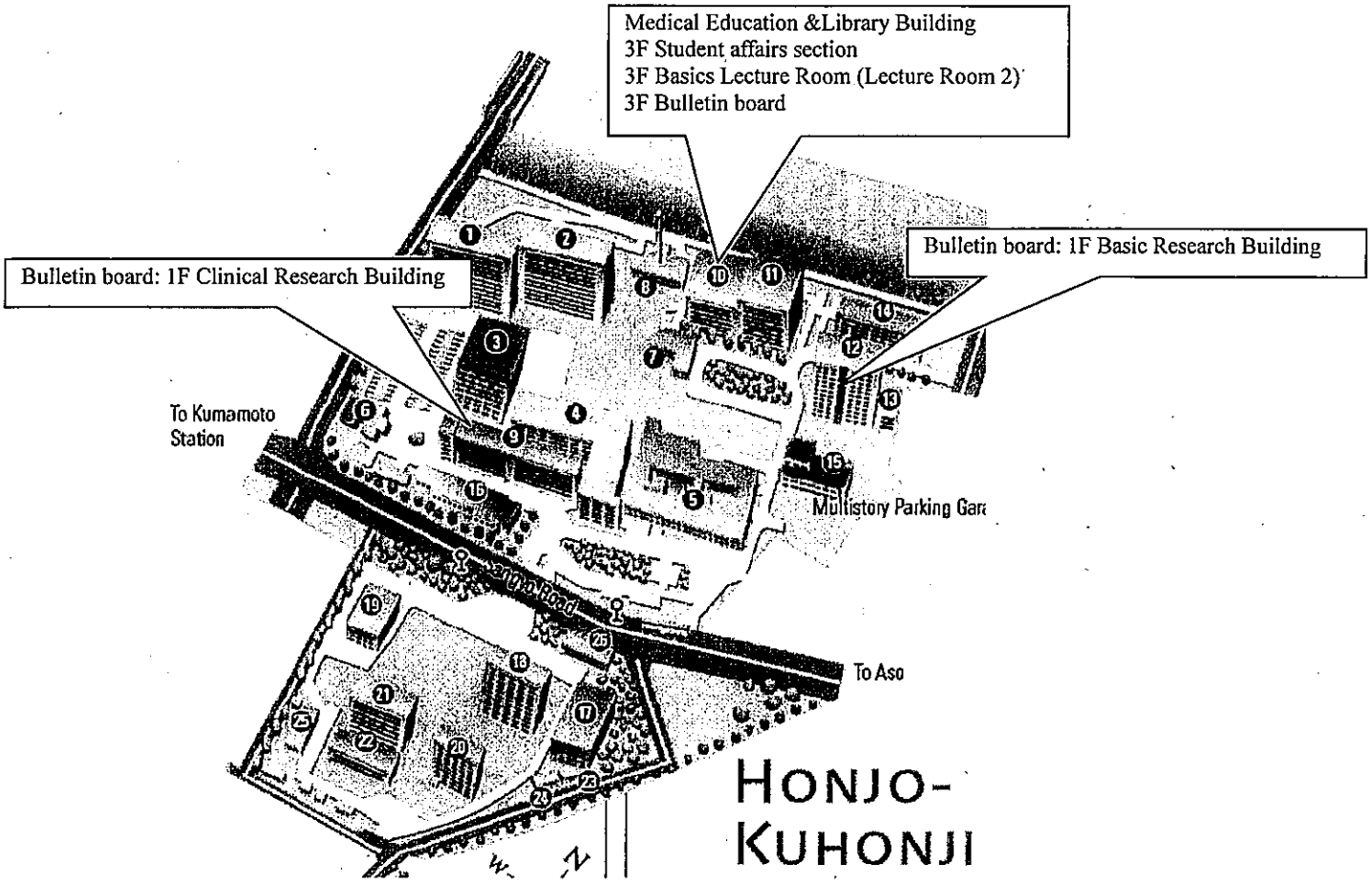
【**Evaluation for Grades and Credits**】 Grades will be based upon attendance, students' experimental techniques and skills learned during the course, and laboratory reports. A manuscript prepared for publication and presentations at the lab meetings or domestic/ international conferences may be substituted 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 experimental plans.

7. 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