Syllabus of Graduate School

2018

Kyoto Pharmaceutical University Graduate School

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The Concept of Education in the Graduate School

The concept of education in the graduate school is to contribute to human health and welfare through the development of academic research and respect for life, which are accomplished by promoting education and research in pharmacy.

The Educational Goal of the Graduate School

The educational goal of the graduate school is to train valuable researchers who conduct their own research in a variety of pharmaceutical fields, such as basic and clinical pharmacy, and who also contribute internationally. The researcher must obtain advanced knowledge and research abilities in the field of pharmaceutical science.

Diploma Policy

Doctoral Course in Pharmacy

By following the curriculum of this course, it is expected that the student will acquire advanced knowledge and abilities to conduct research on basic and clinical pharmacy. The Doctor of Science in Pharmacy will be awarded to students who have completed the prescribed credits and a doctoral dissertation based on their own original research and who have passed the final exam given by the department's board of professors. The criteria for granting the doctorate are as follows:

1) For the basic pharmaceutical researcher, advanced specialized knowledge and the ability to conduct original research in a variety of fields regarding pharmaceutical science are expected.
2) For the clinical pharmaceutical researcher and pharmacist, advanced knowledge of medicine and the ability to conduct clinical pharmaceutical research are expected.
3) As a specialist able to conduct advanced research in a medical-related area, the student is expected to acquire advanced education and ethical perspectives and to cooperate with others.
4) Students are expected to acquire a specialization and linguistic ability sufficient to be active globally.

Additionally, the doctorate will be given to students who submit a doctoral dissertation to the university and pass the final examination. The students must also be certified as equivalent or superior to other graduates of the course.

Pre-Doctoral Course in Pharmaceutical Sciences

By following the curriculum of this course, the student is expected to acquire advanced knowledge and the ability to conduct research in pharmaceutical science. The Master of Science in Pharmaceutical Sciences will be awarded to students who have completed the prescribed credits and a master's thesis and who have passed the final exam given by the department's board of professors. The criteria for granting the doctorate are as follows:

1) The student is expected to acquire special knowledge and skills in basic scientific fields such as pharmaceutical science and life science.
2) The student is expected to acquire advanced education and ethical perspectives.

Doctoral Course in Pharmaceutical Sciences

By following the curriculum of this course, the student is expected to acquire advanced knowledge and the ability to conduct research. The Doctor of Science in Pharmaceutical Sciences will be awarded to students who have completed the prescribed credits and a doctoral dissertation based on their original research and who have passed the final exam given by the department's board of professors. The criteria for granting the doctorate are as follows:

1) The student is expected to acquire specialized knowledge and the ability to conduct original research in basic scientific fields such as pharmaceutical science and life science.
2) As a specialist able to conduct advanced research in the pharmaceutical sciences, the student is expected to acquire advanced education and ethical perspectives and to cooperate with others.
3) Students are expected to acquire a specialization and linguistic ability sufficient to be active globally.

Additionally, the doctorate will be awarded to students who submit a doctoral dissertation to the university and pass the final examination. The student must also be certified as equivalent or superior to other graduates of the course.

Curriculum Policy

Doctor Course of Pharmacy

This educational program aims at training specialists who can contribute to research in basic pharmaceutical science and clinical pharmacy. This program comprises two research-intensive courses, the “Basic Pharmaceutical Science Course” and the “Clinical Pharmacy Course.” In these two courses, advanced technical knowledge and research skills for a variety of academic fields in basic and clinical pharmaceutical science are covered through interdisciplinary pharmaceutical seminars, Seminars on Current Topics and the Pharmaceutical Research Seminar. The curriculum is designed to train globally active pharmacists and highly motivated researchers in basic or clinical pharmaceutical science. Additionally, our program provide educational courses for Pharmaceutical Researchers Specializing in Cancer Treatment and Pharmacists Specializing in Personalized Cancer Pharmacotherapy in collaboration with medical universities. The educational course for Pharmaceutical Researchers Specializing in Cancer Treatment is to train researchers who are able to contribute to cutting-edge cancer research with deep knowledge and clinical research experience in pharmaceutical cancer treatment. The course for Pharmacists Specializing in Personalized Cancer Pharmacotherapy is to train pharmacists with cutting-edge knowledges in academic fields in variety for cancer pharmacotherapy and abilities to perform the basic and the clinical researches, which enable to pursue personalized medical care according to life stage of a patient.

1) The aim of the courses is to educate established and independent researchers in the fields of basic pharmaceutical science and clinical pharmacy by conducting their own research and completing a doctoral dissertation. Accordingly, the program is organized for students to improve themselves and attain an appropriate level of proficiency in scientific presentations and discussions, in practical English, and in research ethics by carrying out pharmaceutical research in their fields of interest through the interdisciplinary pharmaceutical seminars, Seminars on Current Topics and the Pharmaceutical Research Seminar.
2) Advanced lectures are to be held in an omnibus fashion in cooperation with undergraduate courses as transdisciplinary classes that cover multiple academic fields. This system has been organized for the doctoral course, which is set above the six-year undergraduate education in the faculty of pharmacy to effectively cultivate advanced scientific achievements and scholarship in a variety of pharmaceutical fields. Furthermore, in case a student requires knowledge from outside the area of his or her expertise, classes have been prepared in the Basic Pharmacy Course to teach fundamentals and applications. These classes can be taken during any year of graduate school from the first to the fourth.

3) The “Basic Pharmaceutical Science Course” trains globally active researchers in scientific knowledge and the ability to perform research in the fields of pharmaceutical science. The students are expected to conduct research in the laboratory and to cultivate high research abilities in discovering and solving problems.

4) The “Clinical Pharmacy Course” regards training clinical pharmacists and clinical pharmaceutical researchers as its most important objective and provides practical education in actual medical settings through cooperation with the pharmaceutical division of a hospital. Students in the doctoral course are expected to acquire specialized and obligatory knowledge in advanced lectures. Simultaneously, they are expected to serve as hospital pharmacists to contribute to medical teams in a hospital. Laboratory activities to perform translational collaborative research in clinical pharmacy targeted at a specific disease, which bridges basic and clinical research, are also required.

5) Regarding a research topic, an advisory system has been established by laboratories in medicinal science, pharmaceutical analytical science, pharmaceutical life science, pharmaceutical pathophysiological science, pharmaceutical clinical science, and pharmaceutical education. Students can choose one of the research groups from the departments above. Laboratories engaged in education for the doctoral course in Pharmaceutical Science collaborate for the smooth and effective progress of research.

6) In the “Training Course for Pharmaceutical Researchers Specializing in Pharmaceutical Cancer Treatment,” students are required to take certain designated advanced subjects (six credits) in which they acquire in-depth knowledge of cancer and pharmaceutical cancer treatments. As a general rule, students are to participate in the cooperative educational program between graduate schools and hospitals for one to two years. During this period, the ability to conduct clinical pharmaceutical research is cultivated through translational research collaboration between the involved laboratories, which can also be the bridge between basic research specializing in pharmacy and clinical medical research.

7) In the “Pharmacists Specializing in Personalized Cancer Pharmacotherapy”, students are required to take certain designated advanced subjects (six credits) in which they acquire in-depth knowledge of cancer and pharmaceutical cancer treatments. For this purpose, students are to participate in an educational program, either for home medical care or of the graduate school – hospital cooperation, in a period set by the president. Students must acquire an ability to perform a leading-edge research on home medical care with taking leadership on cancer pharmacotherapy in the community-based integrated care systems.

8) In the laboratory, progress reports and participation in research discussions are required. In addition, all students are asked to participate in the journal club and textbook reading in turn. These activities strengthen research capability, cultivate the “research mind,” and inculcate

skills in presentation, discussion, and English. These seminars and progress reports are required (four credits) for the Pharmaceutical Research Seminar.

9) The Seminar on Current Topics (required; two credits) is usually held in the summer of the third year and is supported by all of the laboratories in the graduate school. One must conduct a "Review" of one's topic and present it to the attendees with time provided for "questions and answers." The purpose of this event is to raise abilities in presentation, discussion, and writing research papers.

Pre-Doctoral Course in Pharmaceutical Sciences

This course, the master's course in Pharmaceutical Sciences, builds on the four-year undergraduate course. Basic and cutting-edge knowledge and techniques necessary to perform original research in pharmaceutical science are expected to be acquired. This course is intended for practice and to set the foundation for continuously conducting research in the doctoral course. The education in this course comprises advanced lectures, the Seminar on Special Topics, the Seminar in Pharmaceutical Sciences, and Research Work in Pharmaceutical Sciences.

1) Basic transdisciplinary programs that cover a number of specialized fields are established as advanced course subjects to cultivate scientific scholarship in a variety of specializations.
2) From the second semester of the first year, the student is expected to put in great effort and concentrate on research activities to become an independent researcher, ending in completing a thesis for the master's degree.
3) The research is performed in a laboratory to which the student is assigned in one of the program's divisions, such as the Division of Medicinal Chemical Sciences, Division of Analytical and Physical Sciences, Division of Biological Sciences, Division of Pathological Sciences, Division of Clinical Pharmaceutical Sciences, and Division of Pharmacy Education.
4) In the laboratory, progress reports and participation in research discussions are required. In addition, all students are asked to participate in the journal club and textbook reading in turn. These activities strengthen research capabilities and, skills in presentation, discussion, and English, and also cultivate the "research mind." These seminars and progress reports are required (four credits) for the Seminar in Pharmaceutical Science.
5) The Seminar on Special Topics (required; two credits) is usually held in the summer of the second year and is supported by all of the laboratories in the graduate school. One must construct a "Review" of one's topic and present it to the attendees with time provided for "questions and answers." The purpose of this event is to raise abilities in presentation, discussion, and writing research papers.

Doctoral Course in Pharmaceutical Sciences

This course is established to train highly motivated and internationally active researchers in the field of pharmaceutical sciences. The student is expected to cultivate the ability to conduct original research and scholarship in a basic pharmaceutical field, such as drug development or life science, through Research Work in Pharmaceutical Science, the Seminar on Current Topics, and the Pharmaceutical Research Seminar.

1) Upon joining the graduate school, the student is expected to focus on conducting laboratory research. The course aims at training independent researchers who will complete a doctoral thesis and who are expected to raise their abilities in scientific presentation and discussion through laboratory research, the Seminar on Current Topics, and the Pharmaceutical Research Seminar. Students also must take an advanced lecture as a compulsory subject to raise perspectives on research ethics.
2) Research Work in Pharmaceutical Science is performed in a laboratory to which the student is assigned in one of the following departments: The Department of Pharmaceutical Chemistry, Department of Medicinal Chemistry, Department of Pharmacognosy, Department of Biophysical Chemistry, and Department of Public Health. Furthermore, a system has been organized for collaborative research and education with laboratories belonging to the Doctoral Course in Pharmacy.
3) In the laboratory, progress reports and participation in research discussions are required. In addition, all students are asked to participate in the journal club and textbook reading in turn. These activities strengthen research capabilities and skills in presentation, discussion, and English, and also cultivate the “research mind.” These seminars and progress reports are required (four credits) in the Pharmaceutical Research Seminar.
4) The Seminar on Current Topics (required; two credits) is usually held in the summer of the second year and is supported by all of the laboratories in the graduate school. One must conduct a “Review” of one’s topic and present it to the attendees with time provided for “questions and answers.” The purpose of this event is to raise abilities in presentation, discussion, and writing research papers.

admission policy

This doctoral program has been established based on a six-year undergraduate education and aims to foster researchers specializing in basic or clinical pharmaceutical research and clinical pharmacists who have outstanding specialized knowledge and the ability to conduct original research. The program also trains personnel who can take the lead in the drug-development process as well as specialized pharmacists. Individuals seeking admission to the doctoral program are required to possess an interest in the pharmaceutical research field and to demonstrate a high level of creativity and progressive thinking driven by intellectual curiosity. Given the specific nature of pharmacy as a subject and considering the public demand, application for admission can be made by individuals meeting any of following criteria: Pharmacy graduates who have completed the current six-year curriculum; certified pharmacists aged 24 or above who completed the old four-year curriculum; and post-graduates in pharmacy from any foreign educational institution.

Course Title **Advanced Medicinal Science 1** **(創薬科学特論1)**		Professor Hisashi Matsuda Professor Kenichi Akaji Professor Takumi Furuta Professor Masayuki Yamashita Associate Professor Naoto Kojima
Specialty	Semester	
Course of Pharmacy Course of Pharmaceutical Sciences	The first semester	

【Outline】

In drug discovery, the wide knowledge for development of pharmaceutical products are needed. Especially, the chemical knowledge such as search of natural products, chemical modifications, and total synthesis are essential. In this course, the participants learn isolation and chemical elucidation of natural products, organic reactions applied to synthesis of anti-cancer drugs and the structure-activity relationships.

【Note】

Students are asked for preliminary investigations about the contents before the lecture, active participation, and debate.

No.	Item	Lecturer	Content of a lecture
1	Isolation and chemical elucidation of low molecular compounds (1)	Matsuda	Outline on isolation and chemical elucidation of natural products.
2	Isolation and chemical elucidation of low molecular compounds (2)	Matsuda	Isolation and chemical elucidation of taxoids.
3	Reaction and synthesis (1)	Yamashita	Organic reactions applied to synthesis of anti-cancer drugs.
4	Reaction and synthesis (2)	Kojima	Organic reactions applied to synthesis of anti-cancer drugs.
5	Reaction and synthesis (3)	Furuta	Organic reactions applied to synthesis of anti-cancer drugs.
6	Structure-activity relationships (1)	Akaji	Structure-activity relationships of anti-cancer drugs.
7	Structure-activity relationships (2)	Akaji	Structure-activity relationships of anti-cancer drugs.
8	Overview and Seminar	All lecturers	Presentation of study assignment by student.

Textbook: Handout will be distributed.

【Evaluation of learning results】

Learning results will be evaluated based on the results of report and presentat

Course Title **Advanced Medicinal Science 2** **(創薬科学特論 2)**		Professor Hisashi Matsuda Professor Kenichi Akaji Professor Takumi Furuta Professor Masayuki Yamashita Associate Professor Kazuya Kobayashi Associate Professor Naoto Kojima Associate Professor Seikou Nakamura Assistant Professor Hiroki Iwasaki
Specialty	Semester	
Course of Pharmacy	The first semester	

【Outline】

To acquire the knowledge and skills necessary for drug discovery, the participants study through the practice about the structural elucidation by 2D NMR, organic reaction and synthesis, and structure-activity relationships of enzyme inhibitors based on the course of Advanced Medicinal Science 1.

【Note】

Students are asked for preliminary investigations about the contents before the lecture, active participation, and debate.

No.	Item	Lecturer	Content of a lecture
1	Chemical elucidation by NMR (1)	Matsuda S.Nakamura	Practice of measurements and analyses of 2D NMR spectra of low molecular compounds.
2	Chemical elucidation by NMR (2)	Matsuda S.Nakamura	Practice of measurements and analyses of 2D NMR spectra of low molecular compounds.
3	Organic reaction and synthesis (1)	Yamashita Iwasaki	Practice of synthetic methods for low molecular compounds.
4	Organic reaction and synthesis (2)	Yamashita Kojima	Practice of synthetic methods for low molecular compounds.
5	Medicinal chemistry (1)	Akaji Kobayashi	Practice of structure-activity relationships of enzyme inhibitors.
6	Medicinal chemistry (2)	Akaji Kobayashi	Practice of structure-activity relationships of enzyme inhibitors.
7	Overview and Seminar	All lecturers	Presentation of study assignment by student.
8	Special lecture	visiting lecturer	Presentation of a success story of drug discovery.

Textbook: Handout will be distributed.

【Evaluation of learning results】

Learning results will be evaluated based on the results of report and presentation.

Course Title

Advanced Biomolecular Science 1
(生命分子科学特論 1)

Professor Eishi Ashihara
Professor Masahiro Fujimuro
Professor Yuji Nakayama
Assistant Professor Hiromi Ii
Assistant Professor Akihiro Ohishi
Assistant Professor Youhei Saito
Assistant Professor Tadashi Watanabe

Specialty	Semester
Course of Pharmacy Course of Pharmaceutical Sciences	The first semester

【Outline】

To start the pharmaceutical researches, it is essential to acquire knowledge of Biomolecular Science. In this course, participants learn basic molecular and cellular biology using textbooks and handouts.

【Note】

Digest the handouts to discuss before attending each lecture.

No.	Item	Lecturer	Content of a lecture
1	Transcription and translation in gene expression	Ohishi	Basic mechanism for transcription and translation in gene expression.
2	Control of gene expression	Tadashi Watanabe	Gene expression machinery modulated by transcription factors and chromatin modification.
3	Organelles (1)	Y.Saito	Molecular mechanisms of nucleocytoplasmic transport of protein and mRNA in mammalian cells.
4	Organelles (2)	Fujimuro	Structures and functions of organelles such as nucleus, membrane, endoplasmic reticulum, golgi apparatus, and transport vesicle.
5	Signal transduction	Ii	Functions of signal transduction mediators and analysis using their inhibitors.
6	Cell cycle regulation and its analysis	Nakayama	Molecular mechanisms of cell cycle control
7	Immunology (1)	Ashihara	Overview of immunology
8	Immunology (2)	Ashihara	Overview of acqired immune respoponse and immune system malfunctions

Textbook: Molecular Biology of the Cell, LIFE: The Science of Biology

【Evaluation of learning results】

Learning results will be evaluated based on presentation.

Course Title

Advanced Biomolecular Science 2
(生命分子科学特論 2)

Professor Yuji Nakayama
Professor Kazuki Nagasawa
Professor Kazuyuki Takata
Professor Tatsuhiro Yoshiki
Associate Professor Susumu Nakata
Assistant Professor Youhei Saito
Assistant Professor Yuki Toda

Specialty	Semester
Course of Pharmacy	The first semester

【Outline】

To start the pharmaceutical researches, it is essential to acquire knowledge of Biomolecular Science. In this course, participants learn basic molecular and cellular biology using textbooks.

【Note】

Digest the handout to discuss before attending each lecture.

No.	Item	Lecturer	Content of a lecture
1	Evaluation of mRNA and protein expression profiles I	K.Nagasawa	Methodology of RT-PCR, realtime PCR and immunocyto(histo)chemistry.
2	Protein function	K.Nagasawa	Regulatory mechanisms for protein fuction and its evaluation methods.
3	Evaluation of mRNA and protein expression profiles II	Nakayama	Methodology to analyze the protein-protein interaction.
4	Cellular stress response	Y.Saito	Heat shock response and autophagy: Molecular mechanisms and experimental approaches.
5	Cell Death	Toda	Mechanisms of cell death and its experimental methodology.
6	Oncogenes and carcinogenesis	Yoshiki	Biological functions of oncogenes and proto-oncogenes in carcinogenesis.
7	Tumor suppressor genes	S.Nakata	Biological functions of tumor suppressor genes in carcinogenesis.
8	Biomolecular science of stem cells	K.Takata	Molecular mechanisms of pluripotency and differentiation of stem cells.

Textbook: Handout

Reference book: Molecular Biology of the Cell, Molecular Biology of Cancer: Mechanisms, Targets, and Therapeutics

【Evaluation of learning results】

Learning results will be evaluated based on presentation.

Course Title **Etiologic-Pathological Analysis** **(病因病態分析学特論)**		Professor Tatsuya Kitade Professor Satoshi Tanaka Professor Tetsushi Watanabe Associate Professor Masanori Fujii Associate Professor Shigehiko Takegami Assistant Professor Takahiro Matsumoto
Specialty	Semester	
Course of Pharmacy Course of Pharmaceutical Sciences	The first semester	

【Outline】

Understanding the causes of diseases, the analytical methods for clinical chemistry and the analysis of pathophysiology by using the analytical tool is imperative to learn the basis of pathogenesis. In this course, we will give lectures regarding the environment which has an effect on the human health, the biosensor and nano-diagnostic system as the analytical technique for clinical chemistry, the analysis of pathophysiology by using calcium imaging, and the method of in vivo neural activity using fiber photometry.

【Note】

Preliminary investigations about the contents before the lesson, active participation and active debate are required.

No.	Item	Lecturer	Content of a lecture
1	Analysis of environments 1	T.Matsumoto	Structure elucidation of environmental pollutants.
2	Analysis of environments 2	Tetsushi Watanabe	Particle size, composition, production mechanism of airborne particles.
3	Analysis of environments 3	Tetsushi Watanabe	Influence of air pollutants to respiratory organs.
4	Analysis of clinical chemistry 1	Kitade	Basis of biosensor and novel biosensor.
5	Analysis of clinical chemistry 2	Kitade	Diabetes meters as main medical biosensors.
6	Analysis of clinical chemistry 3	Takegami	Nano-diagnostic system using nanoparticles.
7	Live imaging of cell function 1	Tanaka	Calcium imaging at high spatio-temporal resolution.
8	Live imaging of cell function 2	Fujii	In vivo fiber photometry of neural activity.

Textbook: Handout

【Evaluation of learning results】

Evaluated comprehensively with reports and presentations.

Course Title

Advanced Molecular Pathogenesis 1
(分子病態学特論 1)

Professor Shinichi Kato
Professor Satoshi Akiba
Professor Tetsuo Nakata
Associate Professor Masanori Fujii
Assistant Professor Eri Kawashita
Assistant Professor Hiroe Toba

Specialty	Semester
Course of Pharmacy Course of Pharmaceutical Sciences	The first semester

【Outline】

Biological homeostasis is maintained by various regulatory mechanisms neurally, humorally, and immunologically. These regulatory mechanisms further make cross-talks among them. Therefore, dysregulation of these regulatory mechanisms and cross-talks may cause various diseases. This lecture will review about ion chanel, chromosomal/genetic, neuronal, gastrointestinal, and immunoloical regulations for maintaing biological homeostasis in relation to various diseases.

【Note】

Students should attend all lectures with enough knowledge of physiology and pharmacology. Active discussions and debates are expected. Presentation should be prepared and made with your own thoughts, opinions, and ideas.

No.	Item	Lecturer	Content of a lecture
1	Central nervous system	Kawashita	Cellular components and functions in the central nervous system.
2	Lipid metabolism	Akiba	Humoral regulation of lipoprotein metabolism and intracellular lipid metabolism.
3	Vascular function	Toba	Neurohumoral vascular control and mechanisms of atherosclerosis.
4	Cardio-renal function	T.Nakata	Molecuar mechanisms of lifestyle-related disease; Metabolic syndrome.
5	Urinary tract function	Fujii	Pathophysiology of urinary tract diseases
6	Mucosal barrier function	Kato	Neural and humoral regulation of gastrointestinal barrier functions.
7	Gut microbiota	Kato	Relationship between intestinal microbiota and gut functions.
8	Gastrointestinal mucosal injury and repair	Kato	Molecular mechanims of gastrointestinal mucosal injury development and repair.

Textbook: Handout

【Evaluation of learning results】

Evaluated comprehensively with reports and presentations.

Course Title

Advanced Molecular Pathogenesis 2
(分子病態学特論 2)

Professor Satoshi Akiba
Professor Tetsuo Nakata
Professor Satoshi Tanaka
Associate Professor Miyuki Kobara
Lecturer Keiichi Ishihara
Assistant Professor
Kenjiro Matsumoto

Specialty	Semester
Course of Pharmacy	The first semester

【Outline】

Biological homeostasis is maintained by various regulatory mechanisms such as neurally, humorally, and immunologically. These regulatory mechanisms further make cross-talks among them. Therefore, dysregulation of these regulatory mechanisms and cross-talks may cause various diseases. This lecture will review about the pathogenesis of immunologic, neurologic, dyslipidemia-related diseases, chronic heart failure, hypertension, peptic ulcer, functional gastrointestinal disorders, and inflammatory bowel diseases.

【Note】

Students should attend all lectures with enough knowledge of physiology and pharmacology in addition to regulatory mechanisms of biological homeostasis. Active discussions and debates are expected. Presentation should be prepared and made with your own thoughts, opinions, and ideas.

No.	Item	Lecturer	Content of a lecture
1	Immunologic diseases	Tanaka	Pathophysiology of immunologic diseases and drug discovery
2	Neurologic Diseases	Ishihara	Molecular mechanisms of neurologic diseases.
3	Metabolic disease	Akiba	Molecular mechanisms of dyslipidemia-related diseases.
4	Cardiovascular disease 1	Kobara	Pathophysiology, molecular mechanisms and treatment of chronic heart failure.
5	Cardiovascular disease 2	T.Nakata	Pathogenesis and pharmaceutical management of hypertension and the complications.
6	Cardiovascular disease 3	T.Nakata	Pathophysiology of the brain and cardiorenal connection based on EBM.
7	Gastrointestinal disorders	K.Matsumoto	Molecular mechanisms of functional gastrointestinal disorders via neural pathways.
8	Pain diseases	K.Matsumoto	Pathogenesis of allodynia and visceral pain.

Textbook: Handout

【Evaluation of learning results】

Evaluated comprehensively with reports and presentations.

Course Title **Advanced Pharmaceutics and Pharmacokinetics 1** **(投与設計薬学特論 1)**		Professor Toshiyuki Sakaeda Professor Hiroyuki Saito Professor Akira Yamamoto Professor Hiroyuki Yasui Associate Professor Hidemasa Katsumi Associate Professor Hiroyuki Kimura Lecturer Yukako Ito Assistant Professor Takashi Ohgita
Specialty	Semester	
Course of Pharmacy Course of Pharmaceutical Sciences	The first semester	

【Outline】

The optimization of pharmacotherapy is of fundamental importance; however, it may be difficult, because of extensive inter- and intra-individual variations in therapeutic response and/or side effects. In the present lecture, basic concept, fundamental theory, and conventional methodologies concerning the optimization of pharmacotherapy will be discussed from viewpoints of biophysical chemistry, biopharmacy, pharmacokinetics and analytical and bioorganic chemistry.

【Note】

Digest the handout to discuss before attending each lecture.

No.	Item	Lecturer	Content of a lecture
1	Drug transport mechanism 1	H.Saito	Structure of biological membranes and lipoprotein metabolism as a basis of drug adsorption, permeation, and transport.
2	Drug transport mechanism 2	H.Saito Ohgita	Membrane transport of drugs.
3	Drug disposition	Yamamoto	Drug absorption, distribution, metabolism and excretion
4	Drug delivery system	Katsumi	Control of drug absorption, drug release and drug targeting
5	Phramacokinetics 1	Sakaeda	Pharmacokinetic analyses based on linear 1-compartment model.
6	Phramacokinetics 2	Ito	Pharmacokinetic analyses besides those based on linear 1-compartment model.
7	Pharmaceutical analysis 1	Yasui	Fundamental principle and method for analysis of pharmaceutics and metabolites in biological samples essential for PK and DDI studies .
8	Pharmaceutical analysis 2	H.Kimura	Fundamental principle and method of PET analysis for direct monitoring of PK and DDI in alive human and animals.

Textbook: Handout will be provided.

【Evaluation of learning results】

Evaluated based on the performance of discussion or reports.

Course Title **Advanced Pharmaceutics and Pharmacokinetics 2** **(投与設計薬学特論 2)**		Professor Toshiyuki Sakaeda Professor Hiroyuki Saito Professor Akira Yamamoto Professor Hiroyuki Yasui Associate Professor Hidemasa Katsumi Associate Professor Hiroyuki Kimura Lecturer Susumu Hama Lecturer Yukako Ito Assistant Professor Shinji Kobuchi Assistant Professor Takashi Ohgita
Specialty	Semester	
Course of Pharmacy	The first semester	

【Outline】

The optimization of pharmacotherapy is of fundamental importance; however, it may be difficult, because of extensive inter- and intra-individual variations in therapeutic response and/or side effects. In the present lecture, latest information concerning the optimization of pharmacotherapy will be discussed from viewpoints of biophysical chemistry, biopharmacy, pharmacokinetics and analytical and bioorganic chemistry.

【Note】

Digest the handout to discuss before attending each lecture.

No.	Item	Lecturer	Content of a lecture
1	Lipid-protein interaction	H.Saito Ohgita	Regulation of structure and function of proteins in biological membranes.
2	Control of intracellular trafficking of macromolecular drugs	Hama	Control of intracellular trafficking of macromolecular drugs by physical and carrier-based drug delivery systems
3	Improvement of intestinal and transmucosal absorption of drugs	Yamamoto	Improvement of intestinal and transmucosal absorption of poorly absorbable drugs including peptide drugs
4	Targeted delivery of drugs and nucleic acids	Katsumi	Targeted delivery of drugs and nucleic acids using chemical modification and nanoparticles
5	Pharmacokinetic analysis 1	Sakaeda Ito Kobuchi	PK analysis using nonlinear least - squares method and optimization of pharmacotherapy.
6	Pharmacokinetic analysis 2	Sakaeda Ito Kobuchi	Population PK analysis and optimization of pharmacotherapy.
7	Basic and clinical PK-PD analysis	Yasui	PK-PD analysis of both the basic drug candidates and clinical anti-MRSA or anti-cancer drugs and their evaluation methods.
8	Applied PET diagnosis	H.Kimura	Animal PET in transgenic animals, micro-dose/PET for determination of organ distribution in human, and longitudinal PET/probe diagnostic of transplantation in regenerative medicine, and their evaluation methods.

Textbook: Handout will be provided.

【Evaluation of learning results】

Evaluated based on the performance of discussion or reports.

Course Title **Advanced Clinical Pharmacy** **(臨床薬学特論)**		Professor Kohshi Nishiguchi Professor Masaaki Kusumoto Lecturer Nobuhiko Nakamura Lecturer Masayuki Tsujimoto Assistant Professor Tetsuya Minegaki
Specialty	Semester	
Course of Pharmacy	The first semester	

【Outline】

To use medicines effectively and safely, pharmacists should be carrying out the advanced efforts on the proper use of drugs in various view points. Currently, the researches and the evidences will be more important for making a decision about the proper medicine and/or dosage based on various characteristics of patients. The aim of this course is to master basic skills for clinical and pharmaceutical research by discussing the recent topics of clinical research focused on the characteristics and the pathological conditions in patients.

【Note】

Students attending this lecture should do homework about the contents of lecture beforehand, and actively participate in class.

No.	Item	Lecturer	Content of a lecture
1	Introduction	Nishiguchi	Overview of recent trends in pharmacotherapy
2	Genetic factors	Nishiguchi Minegaki	Recent research topics of pharmacotherapy in consideration of genetic factors
3	Physiological factors	Minegaki	Recent research topics of pharmacotherapy in consideration of physiological factors
4	Complications 1	Tsujimoto	Recent research topics of pharmacotherapy in patients with complications
5	Complications 2	Tsujimoto	Recent research topics in variation of pharmacokinetics including drug interaction in patients with complications
6	Pathological conditions 1	N.Nakamura	Recent research topics of pharmacotherapy and pharmaceutical care in cancer patients
7	Pathological conditions 2	Kusumoto	Recent research topics of pharmacotherapy in patients with specific diseases in community-based health care
8	Pathological conditions 3	Visiting Lecturer	Recent advanced research topics of pharmacotherapy in clinical practice

Textbook: Handout will be distributed when it is needed.

【Evaluation of learning results】

Learning results will be evaluated based on report and examination.

Course Title

Pharmacometrics for Drug Evaluation (医薬品評価科学特論)

Professor Yoshitaka Yano
Lecturer Hideyuki Motohashi
Assistant Professor Yugo Chisaki
Assistant Professor Chikako Matsumura

Specialty	Semester
Course of Pharmacy	The first semester

【Outline】

The 'evidence-based medicine (EBM)' is essential for the pharmacotherapy, and pharmacists should have interests in clinical researches and translational researches. To evaluate the clinical features of drugs, it is important to understand the details of clinical researches from the statistical and pharmacometric viewpoints. In drug development, pharmacometrics is also exploited for conducting the best clinical studies. The aim of this course is to master basic skills of pharmacometrics by discussing the recent topics of drug evaluation in clinical pharmacotherapy and drug development and by learning the computer skills for pharmacometric modeling and simulations.

【Note】

Join the class actively in the discussion time and give your idea and thoughts in the presentation.

No.	Item	Lecturer	Content of a lecture
1	Overview of biostatistics and pharmacometrics	Yano	Overview of biostatistics and pharmacometrics for drug evaluation
2	Topics of clinical / translational researches 1	Motohashi	Topics of clinical researches and translational researches relating to pharmacotherapy
3	Topics of clinical / translational researches 2	Motohashi	Topics of clinical researches and translational researches relating to pharmacotherapy
4	Planning of clinical study by pharmacist 1	Yano Matsumura	How to make clinical questions and collaborate with pharmacometrics in clinical study planning
5	Planning of clinical study by pharmacist 2	Yano Matsumura	How to make clinical questions and collaborate with pharmacometrics in clinical study planning
6	Clinical drug development and drug evaluation	Yano	Topics of drug evaluation in clinical drug development
7	New drug approval and drug evaluation	Visiting Lecturer	Topics of drug evaluation in new drug approval (NDA)
8	Skills for pharmacometrics	Yano Chisaki	Statistical methodology such as multiple-regression, survival data analysis, and time-series modeling and simulation

Textbook: Handout will be distributed as appropriate

【Evaluation of learning results】

Evaluated based on attitude and report

Course Title

Advanced Infection Control Sciences (感染制御学特論)

Professor Masataka Oda
Professor Masahiro Fujimuro
Professor Yuichi Muraki
Assistant Professor Naoki Hayashi
Assistant Professor Tadashi Watanabe

Specialty	Semester
Course of Pharmacy Course of Pharmaceutical Sciences	The first semester

【Outline】

Improper use of antibacterial agents is increasing the prevalence of drug resistant bacteria. Development of new antibacterial agents is on a decline, making bacterial infections a major issue not only in Japan but also worldwide. In addition, various viral infections are developing around the world, posing a threat to human life. This course aims to encourage students to learn advanced infection control sciences. To this end, students are encouraged to comprehensively learn the pathogenesis of infectious diseases caused by pathogenic bacteria and viruses, which have recently become prevalent, in addition to reviewing the latest studies on their treatment and prevention.

【Note】

Students are encouraged to enthusiastically participate in lectures and discussions when attending this course. Digest the handout to discuss before attending each leacture.

No.	Item	Lecturer	Content of a lecture
1	Infectious diseases attracting attention	Muraki	Presentation of a general account of emerging and re-emerging infectious diseases.
2	Bacterial infections	Hayashi	Characteristics of antibacterial drug resistant bacteria.
3	Treatment of bacterial infections	Oda	Therapeutic means for infectious diseases caused by antibiotic resistant bacteria.
4	Viral infections	Tadashi Watanabe	Viral infections such as influenza and AIDS.
5	Treatment of viral infections	Fujimuro	Drugs for treating viral infections.
6	Vaccines	Oda	Vaccines and adjuvants.
7	Infection control	Muraki	Infection Control Team (ICT) and Antimicrobial Stewardship Team (AST).
8	Role of pharmacists	Muraki	Overview of pharmacists in mitigating infectious disease

Textbook: Handouts

Reference book: Microbiology: Principles and Explorations by J. G. Black

【Evaluation of learning results】

The extent to which the students have learned is to be comprehensively evaluated on the basis of their enthusiasm, as demonstrated by posing questions during lectures and participating in discussions.

Course Title

Responsible Conduct of Research (研究倫理特論)

Professor Yuji Nakayama
Professor Kenichi Akaji
Professor Akiko Nozaki
Professor Takeshi Sato
Associate Professor Naoto Kojima
Assistant Professor Yuki Naito

Specialty	Semester
Course of Pharmacy Course of Pharmaceutical Sciences	The first semester

【Outline】

Scientific research is advancing through an accumulation of effort made by many researchers who came before us. Today, scientific results are indispensible to people's lives, with science making extremely significant impacts on society, particularly over recent years. Meanwhile, scientific research has unfortunately seen cases in which the "pursuit of truth", science's most inherent value, is to one degree or another neglected. Therefore, all scientists need to be perspective of the true nature of scientific research.

The purpose of the present lecture is to explain and discuss about the essential points on how scientists including graduate students engaging in research should conduct their research and communicate their results within the scientific community and to the larger society.

【Note】

Students have to actively join in the discussion and express their own opinion at the presentation. In advance, students should take the quiz for the module "Course #1, Responsible Conduct of Research, Stage 1" in "APRIN e-learning program". After the lecture, student should complete this e-learning course again.

No.	Item	Lecturer	Content of a lecture
1	Responsible Conduct of Research (RCR)	Akaji	What is a Responsible Conduct of Research (RCR) ?
2	Presentation of research results	Akaji	Presentation of research results, Authorship, Improper authorship, Improper presentation methods, and Copyright
3	Research misconduct (1)	Nozaki	Learning from cases of research misconduct
4	SGD about RCR (1)	Sato Kojima Naito	Discussion about RCR using the style of small group discussion (SGD)
5	Planning and conducting research	Nakayama	Freedom in research and what is to be protected, Conflicts of interest, Security consideration, Lab notes, Collecting, managing, and processing data
6	Research misconduct (2)	Nozaki	Practice of decision-making on issues concerning RCR
7	SGD about RCR (2)	Sato Kojima Naito	Discussion about RCR using the style of SGD
8	Summary	Akaji	Presentation on the research ethics

Textbook: For the Sound Development of Science -The Attitude of a Conscientious Scientist- （Edited by Japan Society for the Promotion of Science Editing Committee "For the Sound Development of Science", Maruzen Publishing）

【Evaluation of learning results】

Learning results will be evaluated based on the presentation and discussion

Course Title **Advanced English for Pharmaceutical Science** **(薬学英語特論)**		Professor Takeshi Sato Professor Kazuyuki Takata
Specialty	Semester	
Course of Pharmacy Course of Pharmaceutical Sciences	The first semester	

【Outline】

In the progress of globalization, advanced English skills for writing, reading, communication, and self-expression are essential. In this course, participants learn advanced English skills in the field of pharmaceutical sciences through scientific papers, communications, and presentations.

【Note】

For the effective achievement, participants must be active and take the initiative for discussion in the class. In the last class of the course, students are asked to present their research focusing on the importance and interest to summarize what they have learned. Although unpublished data is not required in the presentation, the participant must get a permission from the supervisor for the content.

No.	Item	Lecturer	Content of a lecture
1	Reading and writing 1	Sato	Basic structure and rules of scientific papers
2	Reading and writing 2	Sato	Misinterpretation, common mistakes and taboo words in scientific papers
3	Reading and writing 3	Sato Takata	Expressive and complex phrases by native English speaks in scientific papers
4	Communication	Sato Takata	English communications in study abroad and medical team conference in hospitals
5	Presentation 1	Sato	Preparation of slides for presentation in English
6	Presentation 2	Sato	Manners and attitude for presentation in English
7	Presentation 3	Sato	Manners and survival phrase in the discussion time of presentation
8	Overview	Sato Takata	Presentations by students

Textbook: Handout will be distributed.

【Evaluation of learning results】

Learning results will be totally evaluated based on the active debates and presentation.