

**Graduate School of Medicine and
Pharmaceutical Sciences for Education**

**Master's Program in the Department of
Pharmaceutical Basic Sciences**

Admission Guidelines
(Second Recruitment)

For Admission in April 2018

General Admission

Special Admission for Working Students

Special Admission for International Students

November 2017

University of Toyama

Table of Contents

Admission Policy	1
General Admission.....	1
1. Capacity	1
2. Eligibility	1
3. Selection Method	3
Special Admission for Working Students	4
1. Capacity	4
2. Eligibility	4
3. Selection Method	5
Special Admission for International Students.....	6
1. Capacity	6
2. Eligibility	6
3. Selection Method	7
Information for All Applicants	8
1. Application Procedure.....	8
2. Notification of Acceptance	10
3. Admission Procedure.....	10
4. Privacy Policy	10
5. Cautions.....	11
Overview of the Master's Program in the Department of Pharmaceutical Basic Sciences.....	12
1. Purpose	12
2. List of Subjects and Credits.....	12
3. Outline of the Subjects	12
4. Requirements for completion of the program	12
5. Conferral of Degree	12
Appendix I List of Subjects and Credits	13
Appendix II Outline of the Subjects.....	14
Appendix III List of Academic Advisors and Their Research Themes.....	16

Admission Policy

Department of Pharmaceutical Basic Sciences

The Master's Program at the Department of Pharmaceutical Basic Sciences is based on cooperation between the pharmaceutical and medical education programs. It focuses on providing access to unique education and research that integrates Eastern and Western medical science through Japanese Kampo medicines. The department aims to produce creative and compassionate researchers and technicians with a high level of specialized expertise based on a wide range of knowledge. The program welcomes applicants who are interested in organic chemistry, biochemistry, pharmacology, and Japanese and Kampo Medicines, and who aspire to become researchers or technicians with a high level of creativity and good judgment.

General Admission

1. Capacity

Department	Research field	Laboratory	Number of Students Accepted
Pharmaceutical Basic Sciences	Drug Design and Medicinal Chemistry	Chemical Biology, Synthetic and Medicinal Chemistry, Synthetic and Biomolecular Organic Chemistry, Biointerface Chemistry, Structural Biology, Natural Product Chemistry	A few
	Pharmacology and Biopharmaceutics	Biopharmaceutics, Applied Pharmacology, Pharmaceutical Physiology, Gastrointestinal Pathophysiology, Neuromedical Science, Pharmaceutical Technology	
	Biochemistry and Molecular Biology	Biorecognition Chemistry, Cancer Cell Biology, Molecular Neurobiology, Gene Regulation, Molecular Cell Biology, Pathogenic Biochemistry, Nutritional Biochemistry, Molecular Genetics	
	Natural Medicine	Medicinal Bioresources, Pharmacognosy, Medicinal Pharmacology, Kampo Diagnostics, Natural Drug Discovery	
	Clinical Medicine	Clinical Pharmacology, Clinical Pharmacokinetics, Pharmaceutical Therapy and Neuropharmacology, Medical Pharmacy, Clinical Pharmaceutics	

- Note: 1 Applicants should consult with the professor (associate professor) of the laboratory for their desired area of study prior to submitting their application.
2 The Graduate School of Medicine and Pharmaceutical Sciences for Education (Master's Program) has the laboratories specified below in addition to those listed above.
Biology, Chemistry

2. Eligibility

The following persons are eligible to apply:

- (1) Persons who have graduated from a university or students scheduled to graduate in March 2018
- (2) Persons with a bachelor by the National Institution for Academic Degrees and Quality Enhancement of Higher Education under Article 104, Paragraph 4 of School Education Act, or who are scheduled to fulfill said requirement by March 2018
- (3) Persons who have completed 16 years of formal education abroad, or who are

scheduled to fulfill said requirement by March 2018

- (4) Persons who have completed 16 years of formal education provided by an educational institution in a foreign country, including periods of correspondence or distance study while residing in Japan, or persons scheduled to fulfill said requirement by March 2018
- (5) Persons who have completed the course of an educational institution located in Japan that offers courses for a foreign university as part of the school education system of that country (limited to those who have completed a 16-year course of school education in that country), and designated as such by the Minister of Education, Culture, Sports, Science and Technology of Japan, or persons scheduled to fulfill said requirement by March 2018
- (6) Persons who have completed an educational program of three years or more at a university or an educational institution in a foreign country (which has been evaluated for its educational and research activities by an institute certified by the government or its related organization, or an equivalent thereof designated by the Minister of Education, Culture, Sports, Science and Technology, Japan) (including individuals who have completed a correspondence course offered by the foreign educational institution while residing in Japan, and individuals who have completed an educational program at an educational institution authorized by the School Education System and designated as such by the Minister of Education, Culture, Sports, Science and Technology, Japan), and have been conferred a degree that is equivalent to a Bachelor's degree, or will be conferred said degree by March 2018
- (7) Persons who have completed a professional course (with a term of four years or longer and which fulfils the requirements of the Minister of Education, Culture, Sports, Science and Technology of Japan) designated as such by the Minister after the day it was so designated, or persons scheduled to fulfill said requirement by March 2018
- (8) Persons designated by the Minister of Education, Culture, Sports, Science and Technology of Japan. (1953 Ministry of Education Notification No.5)
- (9) Persons who have been enrolled in another graduate school in accordance with the provisions of School Education Law Article 102, Paragraph 2 and have been deemed by the Graduate School to have the academic ability required to study at the Graduate School
- (10) Persons who are 22 years of age or older at the time of entrance, and after having undergone the preliminary qualification screening and have been determined to have a level of academic ability equal to or higher than that of a graduate of a college by the Graduate School of Medicine and Pharmaceutical Sciences for Education, University of Toyama
- (11) Applicants who have been enrolled in a college for three years or longer and regarded as having acquired the necessary credits with outstanding results during the period of enrollment by the Graduate School of Medicine and Pharmaceutical Sciences for Education, University of Toyama

Note: Applicants who fall into categories (8)~(11) are required to contact the Educational Affairs Division of Medicine and Pharmaceutical Sciences Majors (in charge of admission), Student Academic Affairs Division, University of Toyama for details by December 1 (Friday), 2017.

3. Selection Method

Applicants are selected on the basis of the results of a written examination and an oral examination, as well as an evaluation of academic transcripts.

(1) Written Examination

- Basic pharmacy subjects: Applicants select four questions out of 13 questions regarding six subjects (two from Pharmacology, three from Organic Chemistry, three from Biochemistry, three from Physical Chemistry, one from Pharmaceutics and one from Pharmacognosy).
- Foreign language: English

(2) Oral Examination

(3) Examination Schedule and Venue

Date	Time	Subject	Venue
Feb. 9 (Friday), 2018	9:30 ~ 12:00	Basic pharmacy subjects	University of Toyama Sugitani Campus (Medicine and Pharmaceutical Sciences), 2630 Sugitani, Toyama City, Toyama
	13:00 ~ 14:00	Foreign language (English)	
	15:00 ~ (planned)	Oral examination	

Note: The starting time for the oral examination is subject to change, depending on the number of applicants. Should the starting time change, applicants will be notified when examination admission cards are sent.

Special Admission for Working Students

1. Capacity

Department	Research field	Laboratory	Number of Students Accepted
Pharmaceutical Basic Sciences	Drug Design and Medicinal Chemistry	Chemical Biology, Synthetic and Medicinal Chemistry, Synthetic and Biomolecular Organic Chemistry, Biointerface Chemistry, Structural Biology, Natural Product Chemistry	A few
	Pharmacology and Biopharmaceutics	Biopharmaceutics, Applied Pharmacology, Pharmaceutical Physiology, Gastrointestinal Pathophysiology, Neuromedical Science, Pharmaceutical Technology	
	Biochemistry and Molecular Biology	Biorecognition Chemistry, Cancer Cell Biology, Molecular Neurobiology, Gene Regulation, Molecular Cell Biology, Pathogenic Biochemistry, Nutritional Biochemistry, Molecular Genetics	
	Natural Medicine	Medicinal Bioresources, Pharmacognosy, Medicinal Pharmacology, Kampo Diagnostics, Natural Drug Discovery	
	Clinical Medicine	Clinical Pharmacology, Clinical Pharmacokinetics, Pharmaceutical Therapy and Neuropharmacology, Medical Pharmacy, Clinical Pharmaceutics	

- Note: 1 Applicants should consult with the professor (associate professor) of the laboratory for their desired area of study prior to submitting their application.
- 2 The Graduate School of Medicine and Pharmaceutical Sciences for Education (Master's Program) has the laboratories specified below in addition to those listed above.
Biology, Chemistry

2. Eligibility

Persons who meet any of the following criteria and have a minimum of three years work experience are eligible to apply:

- (1) Persons who have graduated from a university
- (2) Persons with a bachelor by the National Institution for Academic Degrees and Quality Enhancement of Higher Education under Article 104, Paragraph 4 of School Education Act
- (3) Persons who have completed 16 years of formal education abroad
- (4) Persons who have completed 16 years of formal education provided by an educational institution in a foreign country, including periods of correspondence or distance study while residing in Japan
- (5) Persons who have completed the course of an educational institution located in Japan that offers courses for a foreign university as part of the school education system of that country (limited to those who have completed a 16-year course of school education in that country)
- (6) Persons who have completed an educational program of three years or more at a university or an educational institution in a foreign country (which has been evaluated for its educational and research activities by an institute certified by the government or its related organization, or an equivalent thereof designated by the

Minister of Education, Culture, Sports, Science and Technology, Japan) (including individuals who have completed a correspondence course offered by the foreign educational institution while residing in Japan, and individuals who have completed an educational program at an educational institution authorized by the School Education System and designated as such by the Minister of Education, Culture, Sports, Science and Technology, Japan), and have been conferred a degree that is equivalent to a Bachelor's degree.

- (7) Persons designated by the Minister of Education, Culture, Sports, Science and Technology of Japan. (1953 Ministry of Education Notification No.5)
- (8) Persons who have been enrolled in another graduate school in accordance with the provisions of School Education Law Article 102, Paragraph 2 and have been deemed by the Graduate School to have the academic ability required to study at the Graduate School
- Note: Applicants who fall into categories (7)or(8) are required to contact the Educational Affairs Division of Medicine and Pharmaceutical Sciences Majors (in charge of admission), Student Academic Affairs Division, University of Toyama for details by December 1 (Friday), 2017.

3. Selection Method

Applicants are selected on the basis of the results of a written examination and an oral examination, as well as an evaluation of academic transcripts.

- (1) Written Examination
- Short thesis

- (2) Oral Examination

- (3) Examination Schedule and Venue

Date	Time	Subject	Venue
Feb. 9 (Friday), 2018	13:00 ~ 14:00	Short thesis	University of Toyama Sugitani Campus (Medicine and Pharmaceutical Sciences), 2630 Sugitani, Toyama City, Toyama
	15:00 ~ (planned)	Oral examination	

Note: The starting time for the oral examination is subject to change, depending on the number of applicants. Should the starting time change, applicants will be notified when examination admission cards are sent.

Special Admission for International Students

1. Capacity

Department	Research field	Laboratory	Number of Students Accepted
Pharmaceutical Basic Sciences	Drug Design and Medicinal Chemistry	Chemical Biology, Synthetic and Medicinal Chemistry, Synthetic and Biomolecular Organic Chemistry, Biointerface Chemistry, Structural Biology, Natural Product Chemistry	A few
	Pharmacology and Biopharmaceutics	Biopharmaceutics, Applied Pharmacology, Pharmaceutical Physiology, Gastrointestinal Pathophysiology, Neuromedical Science, Pharmaceutical Technology	
	Biochemistry and Molecular Biology	Biorecognition Chemistry, Cancer Cell Biology, Molecular Neurobiology, Gene Regulation, Molecular Cell Biology, Pathogenic Biochemistry, Nutritional Biochemistry, Molecular Genetics	
	Natural Medicine	Medicinal Bioresources, Pharmacognosy, Medicinal Pharmacology, Kampo Diagnostics, Natural Drug Discovery	
	Clinical Medicine	Clinical Pharmacology, Clinical Pharmacokinetics, Pharmaceutical Therapy and Neuropharmacology, Medical Pharmacy, Clinical Pharmaceutics	

- Note: 1 Applicants should consult with the professor (associate professor) of the laboratory for their desired area of study prior to submitting their application.
- 2 The Graduate School of Medicine and Pharmaceutical Sciences for Education (Master's Program) has the laboratories specified below in addition to those listed above.
Biology, Chemistry

2. Eligibility

Persons of foreign nationality to whom any of the following items applies are eligible to apply for admission.

- (1) Persons who have completed 16 years of formal education abroad, or who are scheduled to fulfill said requirement by March 2018.
- (2) Persons who have completed an educational program of three years or more at a university or an educational institution in a foreign country (which has been evaluated for its educational and research activities by an institute certified by the government or its related organization, or an equivalent thereof designated by the Minister of Education, Culture, Sports, Science and Technology, Japan) (including individuals who have completed a correspondence course offered by the foreign educational institution while residing in Japan, and individuals who have completed an educational program at an educational institution authorized by the School Education System and designated as such by the Minister of Education, Culture, Sports, Science and Technology, Japan), and have been conferred a degree that is equivalent to a Bachelor's degree, or will be conferred said degree by March 2018.
- (3) Persons who are 22 years of age or older at the time of entrance, and after having undergone the preliminary qualification screening and have been determined to have a level of academic ability equal to or higher than that of a graduate of a college by the University of Toyama Graduate School of Medicine and Pharmaceutical Sciences for Education.

- (4) Persons who have been enrolled in another graduate school in accordance with the provisions of School Education Law Article 102, Paragraph 2 and have been deemed by the Graduate School to have the academic ability required to study at the Graduate School

Note: Applicants who fall into categories (3) or (4) are required to contact the Educational Affairs Division of Medicine and Pharmaceutical Sciences Majors (in charge of admission), Student Academic Affairs Division, University of Toyama for details by December 1 (Friday), 2017.

3. Selection Method

Applicants are selected on the basis of the results of a written examination and an oral examination, as well as an evaluation of academic transcripts.

(1) Written Examination

- Basic pharmacy subjects:
Applicants select one subject from among Pharmacology, Organic Chemistry, Biochemistry, Physical Chemistry, Pharmaceutics and Pharmacognosy.
- Foreign language: English (Specialized)

(2) Oral Examination

(3) Examination Schedule and Venue

Date	Time	Subject	Venue
Feb. 9 (Friday), 2018	9:30 ~ 10:30	Basic pharmacy subjects	University of Toyama Sugitani Campus (Medicine and Pharmaceutical Sciences), 2630 Sugitani, Toyama City, Toyama
	13:00 ~ 14:00	Foreign language (English (Specialized))	
	15:00 ~ (planned)	Oral examination	

Note: The starting time for the oral examination is subject to change, depending on the number of applicants. Should the starting time change, applicants will be notified when examination admission cards are sent.

Information for All Applicants

1. Application Procedure

(1) Method of Application

After paying the examination fee by bank remittance, write the applicable item from 2) below on an envelope in red ink and post the application documents by registered express mail.

1) Application Period

From December 11 (Monday), 2017 to January 5 (Friday), 2018 (as indicated by postmark)

Mailing address: Educational Affairs Division of Medicine and Pharmaceutical Sciences Majors (in charge of admission), University of Toyama, 2630 Sugitani, Toyama 930-0194

Telephone: (076) 434-7658 From abroad: +81-76-434-7658

For information on the method of examination fee payment, refer to (3) Method of Examination Fee Payment.

2) Items to Be Written on the Envelope

- **General Admission**

Contains an application for the Graduate School of Medicine and Pharmaceutical Sciences for Education (Master's Program General Admission)

- **Special Admission for Working Students**

Contains an application for the Graduate School of Medicine and Pharmaceutical Sciences for Education (Master's Program Special Admission for Working Students)

- **Special Admission for International Students**

Contains an application for the Graduate School of Medicine and Pharmaceutical Sciences for Education (Master's Program Special Admission for International Students)

(2) Application Documents

Documents		Applicable Documents
1)	Application for Admission	Prepared using the University's prescribed form
2)	Certificate of (Expected) Bachelor's Degree	The certificate must be signed by the president or dean of the issuing university. (Not required for graduates from the Faculty of Pharmacy and Pharmaceutical Sciences of the University of Toyama)
3)	Academic transcript	Prepared and sealed by the president or dean of the issuing university
4)	Examination Admission Card / Photo Identification Card	Prepared using the University's prescribed form. Attach a photograph (upper body photo of the applicant alone taken full face with no head covering within three months of the application (4 cm in length x 3 cm in width)).
5)	Certificate of Examination Fee Transfer	After paying the examination fee at a financial institution using the University's prescribed Examination Fee Remittance Request Form, attach the slip of the Certificate of Transferred Amount (Examination fee) issued by the financial institution to the Certificate of Examination Fee Transfer (University's prescribed form).

6)	Letter of Approval for Entrance Examination	Applicants who are enrolled in a graduate school elsewhere than at the University of Toyama or who are employed at a public office or private company are required to submit an approval for examination signed by the dean of their graduate school or their immediate supervisor at work. (No specific format required)
7)	Copy of the Certificate of Residence	Foreign nationals currently residing in Japan should attach a Copy of the Certificate of Residence issued by the city, town, village or special ward in which they reside.
8)	Stamped, self-addressed envelope	Used to post the Examination Admission Card. Please write your name, address, and postal code on a No. 3 long envelope (23.5 cm x 12 cm) and attach postage stamps to the amount of ¥362 yen (special delivery).
9)	Mailing label (used to post the notice of examination results)	Prepared using the University's prescribed form. Write your name, address, and postal code.

(3) Method of Examination Fee Payment

Applicants should pay the ¥30,000 examination fee by the prescribed method not later than 3:00 pm, January 5 (Friday), 2018.

Use the University's prescribed form to remit the examination fee at the service counter of a nearby bank, Shinkin Bank, agricultural cooperative, or other financial institution that handles wire transfers.

Payment cannot be made at an automatic teller machine (ATM) or Japan Post Bank. Examination fees cannot be refunded for any reason except in the following cases:

- 1) The applicant does not apply to the University of Toyama after remitting the examination fee (The applicant does not submit the application documents, or the application documents are not received.)
- 2) Double payment
- 3) Payment exceeding the required amount

Note: When applying to the University of Toyama for an examination fee refund, affix the slip of the Certificate of Transferred Amount (Examination fee) to the designated Examination Fee Refund Request Form, and mail it to the University of Toyama.

Mailing address: Accounting Group, Financial Affairs Division, University of Toyama, 3190 Gofuku, Toyama 930-8555

Telephone: (076) 445-6053 From abroad: +81-76-445-6053

(4) Advance Consultation for Applicants with a Disability

Since applicants with a disability may require special consideration when taking the entrance examination or attending school, they are requested to consult with the Educational Affairs Division of Medicine and Pharmaceutical Sciences Majors (in charge of admission), University of Toyama in advance.

At the time of consultation, applicants may be requested to submit a document containing the following matters and a doctor's certificate.

- Type and degree of disability
- Matters requiring special consideration at the time of the entrance examination
- Matters requiring special consideration at the time of school attendance
- Circumstances of daily life and other matters for reference

1) Consultation deadline: December 1 (Friday), 2017.

2) Contact information: Educational Affairs Division of Medicine and Pharmaceutical Sciences Majors (in charge of admission), University of Toyama, 2630 Sugitani,

Toyama 930-0194

Telephone: (076) 434-7658 From abroad: +81-76-434-7658

2. Notification of Acceptance

The examination numbers of successful applicants will be posted at the front entrance of the University of Toyama Sugitani Campus Faculty of Pharmacy and Pharmaceutical Sciences Bldg. at 3:00 pm on February 23 (Friday), 2018 and the successful applicants will be notified. Telephone and facsimile inquiries will not be accepted.

3. Admission Procedure

The enrollment procedure is as follows. Successful applicants will be given more details.

(1) Enrollment Date

For Admission in April 2018: March 22 (Thursday), 2018 (planned)

(2) Place: University of Toyama Sugitani Campus

(3) Documents Required for Admission

Notice of Acceptance, color photograph (4 cm in length x 3 cm in width), written pledge of school enrollment (University of Toyama prescribed form)

(4) Expenses Required for Admission

a) Admission fee: ¥282,000 (provisional amount)

- Notes: 1) The above admission fee is a provisional amount. Should the admission fee be revised, the new admission fee will become effective at the time of the revision.
2) Once paid, admission fees cannot be refunded for any reason.

b) Other matters

- 1) In cases where payment of the admission fee is judged to be difficult, after screening an exemption may be granted, or collection may be postponed.
- 2) Tuition is paid after admission. Information on the tuition amount and payment method is provided at the time of enrollment.
Reference information: Tuition for the 2017-2018 academic year: ¥535,800 per year
- 3) Scholarships are available through the Admission Office.
- 4) Students are required to pay the cost of Personal Accident Insurance for Students Pursuing Education and Research and other items separately.

(5) Cautionary Statement

Persons who fail to complete the admission procedure on the enrollment date will be considered to have declined admission.

4. Privacy Policy

Personal information held by the University is handled in accordance with the Act on the Protection of Personal Information Held by Administrative Organs and the University of Toyama Policies on Personal Information Protection

- (1) Names, addresses, and other personal information that the University of Toyama obtains from applicants will be used for 1) the selection of students (processing of applications and the selection process), 2) announcement of successful applicants, 3) enrollment procedures, 4) investigation and research for the selection process, and 5) other related activities.
- (2) Personal information obtained from persons who have completed the admission procedures will be used for preparatory education before admission and for 1)

instruction and administration (the school register, student guidance, etc.), 2) student assistance (health management, application for tuition exemptions and scholarships, employment assistance, etc.), and 3) the collection of tuition after admission.

- (3) The names and addresses of successful applicants may be used to facilitate contact by organizations related to after-school activities, the alumni association, the support association, and the student cooperative association of the University of Toyama.

Note: Successful applicants who do not wish to be contacted by the abovementioned organizations should notify the Educational Affairs Division of Medicine and Pharmaceutical Sciences Majors (in charge of admission), University of Toyama to that effect.

- (4) The University of Toyama may partially outsource operations to commissioned companies (hereinafter referred to as “Contractors”). We may provide said Contractors with all or part of the personal information obtained through the application process as required for the execution of contracted business.

5. Cautions

- (1) If there is any defect in the application documents, the application may not be accepted.
- (2) Once accepted, the application documents and related materials shall not be returned for any reason.
- (3) If any of the information provided in the submitted documents is found to be false even after acceptance for admission, the admission of a successful applicant may be cancelled.
- (4) Please forward any inquiry about application or other matters to the following address:

Educational Affairs Division of Medicine and Pharmaceutical Sciences Majors
(in charge of admission), University of Toyama, 2630 Sugitani, Toyama
930-0194

Telephone: (076) 434-7658 From abroad: +81-76-434-7658

Overview of the Master's Program in the Department of Pharmaceutical Basic Sciences

1. Purpose

In accordance with the university's founding principle, the Master's Program in the Department of Pharmaceutical Basic Sciences, Graduate School of Medicine and Pharmaceutical Sciences for Education involves collaboration between the fields of Medicine and Pharmacy, and offers unique instruction and research that integrate Eastern and Western medicine and science through natural medicine. It cultivates a high level of expertise based on wide-ranging knowledge and well-rounded creativity. Students develop an awareness of the importance of defending human dignity, and acquire the sense of judgment needed to actively contribute to the development of academic research and society as researchers.

2. List of Subjects and Credits

See Appendix I.

3. Outline of the Subjects

See Appendix II.

4. Requirements for completion of the program

The requirements for the master's program in Pharmaceutical Basic Sciences are enrollment for a period of two or more years, 30 or more credits in the designated subjects (including special research, etc.) and successful completion of a screening of a master's dissertation and final examination after having obtained the necessary research guidance.

If a student presents a plan to take and complete the program systematically over a certain period of time beyond the standard course term (two years) due to special circumstances such as working outside the campus, it will be considered for possible acceptance.

5. Conferral of Degree

The degree offered is a Master of Philosophy in Pharmaceutical Sciences.

Appendix I

List of Subjects and Credits

Pharmaceutical Basic Sciences

Subject Name	Credits			Required/Elective
	Lecture	Seminar	Experiment / Special research	
Molecular Chemistry	2			Elective
Molecular Design	2			Elective
Physical and Structural Biology	2			Elective
Pharmacology	2			Elective
Advanced Topics in Molecular Physiology	1			Elective
Biopharmaceutics and Pharmacokinetics	2			Elective
Special lecture course of gene regulation	1			Elective
Genetic approach for analyzing the molecular mechanisms of life	1			Elective
Molecular Regulation of Disorder	2			Elective
Cell Signaling	1			Elective
Advanced Bioanalytical Chemistry	1			Elective
Advanced Chemistry of Natural Products	2			Elective
Medical and Pharmaceutical Basis of Kampo Medicine (Traditional Japanese - Chinese Medicine)	2			Elective
Advanced Pharmaceutics	1			Elective
Introduction to Clinical Biostatistics	1			Elective
Designing Clinical Research	1			Elective
Special Lecture on Clinical Pharmacy at University of Southern California	2			Elective
Bioscience Training Course			2	Optional
Pharmacy seminar		6		Required
Pharmaceutical science special research			14	Required
Japanese Language & Culture (for foreign student)	2			Optional
Total	28	6	16	

Required number of credits:	
Lecture (Elective)	10
Pharmacy seminar (Required subject)	6
Pharmaceutical science special research (Required subject)	14
Total	30

Required number of credits in the Master's program: 30 credits or more

Appendix II

Outline of the Subjects

Pharmaceutical Basic Sciences

Subject	Outline
Molecular Chemistry	<ol style="list-style-type: none">1. Synthetic method for nitrogen-containing drugs2. Development of versatile synthetic reactions3. Synthesis and functionalization of biologically active molecules4. Medicinal research based on molecular characteristics
Molecular Design	This class discusses the following subjects; 1) design of biomolecular and pharmacologically active compounds 2) strategy for the synthesis of target compounds.
Physical and Structural Biology	We review in this lecture the physical property of molecular assemblies in drug design. NMR spectroscopy and X-ray crystallography of proteins are also reviewed.
Pharmacology	We review experimental approaches to the study of following diseases and pharmacological agents: (1) painful diseases, (2) pruritic diseases, (3) digestive tract disorders, (4) diabetes mellitus, (5) neuropsychiatric disorders, (6) inverse agonists, and (7) psychotropic agents.
Advanced Topics in Molecular Physiology	Molecular mechanisms of ion transports by pumps and channels in gastrointestinal tracts. Molecular aspects for drug discovery focused on cancer, genetic disease, ulcer and diarrhea in gastrointestinal tracts.
Biopharmaceutics and Pharmacokinetics	Application of biopharmaceutical and pharmacokinetic theory to clinical problems involved in optimizing and monitoring drug use in patients.
Special lecture course of gene regulation	<ol style="list-style-type: none">1. Genetic information and epigenetics2. Chromatin3. Signal trasduction4. Replication and repair of genetic information5. Expression of genetic information6. Broken regulation and diseases
Genetic approach for analyzing the molecular mechanisms of life	<ol style="list-style-type: none">1. Genetic analyses for the development of animals.2. Regulation of gene expression responsible for the development of animals.3. Molecular mechanisms of neuronal cell death and disorders.4. Effects of environmental disruptors on the development of the brain.5. Molecular mechanisms of synaptic plasticity.6. Molecular analyses of pathogenesis of neuronal disorders.
Molecular Regulation of Disorder	<ol style="list-style-type: none">1. Lipid traffic through transporter and related disease2. Studies on molecular pathology of lifestyle-related diseases
Cell Signaling	We review the regulation of signal transduction molecules, including receptors and protein kinases, and their pathophysiological functions in human diseases.
Advanced Bioanalytical Chemistry	Analytical chemistry regarding biomolecules including protein and DNA for studies in the fields of life sciences and drug discovery
Advanced Chemistry of Natural Products	Recent developments and findings for bioactivities, biosyntheses, and metabolic engineering of natural products in plants and microorganisms.

Subject	Outline
Medical and Pharmaceutical Basis of Kampo Medicine (Traditional Japanese - Chinese Medicine)	In this class, students will be lectured about experience-based and evidence-based clinical applications of Kampo medicine, fundamental factors involved in alteration of pharmacological activities and chemical constituents of Kampo medicines, etc, focusing particularly on recent advances in preclinical/clinical studies on Kampo medicines.
Advanced Pharmaceutics	Advanced pharmaceutical formulations and administration forms of the drugs for enhancing the effectiveness, safety and reliability of them are lectured. Importance and usefulness of drug delivery system (DDS) is also summarized.
Introduction to Clinical Biostatistics	Statistical thinking, research design and protocol development, basic statistics, multivariate analysis, exercises in statistical analysis, statistics in research papers.
Designing Clinical Research	Genetic statistics, genetic epidemiology, principal component analysis, cluster analysis, design and analysis of microarray experiments, multi-factor dimensionality reduction (MDR) method.
Special Lecture on Clinical Pharmacy at University of Southern California	Students should participate in the summer clinical education program (for 2 weeks) held at University of Southern California (USC) School of Pharmacy, which has concluded academic agreement with us. This will be a good opportunity for them to understand educational system of pharmacy in US and to acquire an international sense. They may also notice difference in clinical pharmacy between US and Japan.
Japanese Language & Culture (for foreign students)	This class aims to support adaptation of international students to living Japan, giving advices about Japanese language and culture. Students will acquire necessary linguistic skills to understand lectures, and they will gain sufficient knowledge of Japanese society and culture to have a sound life in Japan.

Appendix III

List of Academic Advisors and Their Research Themes

Major	Field	Laboratory	Academic Advisor	Research Theme
Pharmaceutical Basic Sciences	Drug Design and Medicinal Chemistry	Chemical Biology	Professor Masahiko Inouye Associate Professor Hajime Abe	<ul style="list-style-type: none"> • Chemical biology based on synthetic chemistry, particularly three projects in artificial DNA, protein control, and saccharide recognition
		Synthetic and Medicinal Chemistry	Professor Yuji Matsuya Associate Professor Kenji Sugimoto	<ul style="list-style-type: none"> • Development of new organic reactions for drug discovery • Search for novel seeds of new drugs and structure-activity relationship research • Synthesis and structural optimization of bioactive compounds
		Synthetic and Biomolecular Organic Chemistry	Professor Takayuki Yakura Associate Professor Hisanori Nambu	<ul style="list-style-type: none"> • Development of environmentally benign organic reactions • Synthesis of biologically active natural products • Pharmaceutical chemical research in bioactive substances
		Biointerface Chemistry	Professor Minoru Nakano Associate Professor Keisuke Ikeda	<ul style="list-style-type: none"> • Study of membrane lipid dynamics and elucidation of lipid transfer machinery • Elucidation of lipid flip-flop mechanisms • Biophysical research for interaction of amyloid beta with membranes • Structural and functional investigation and pharmaceutical application of lipid nanoparticles
		Structural Biology	Professor Mineyuki Mizuguchi Associate Professor Takayuki Obita	<ul style="list-style-type: none"> • Studies on the conformations of disease related proteins • Structural basis for intracellular membrane trafficking • Protein structure-based drug discovery
		Natural Products Chemistry	Professor Hiroyuki Morita Associate Professor Takuya Ito	<ul style="list-style-type: none"> • Studies on biosynthesis of naturally occurring bioactive compounds • Structural basis for secondary metabolite enzymes • Enzyme engineering for novel drug development • Isolation of bioactive compounds from plants, microorganisms, and marine organisms • Investigation of Asia's natural resources not fully utilized

Pharmaceutical Basic Sciences	Pharmacology and Biopharmaceutics	Biopharmaceutics	Professor Ken-ichi Hosoya Associate Professor Yoshiyuki Kubo	<ul style="list-style-type: none"> • Blood-retinal barrier transport function analysis and drug delivery to the retina • Blood-retinal barrier cell reconstruction and analysis of interaction between cells • Elucidation of biological function and transport function in in vivo barrier tissue
		Applied Pharmacology	Associate Professor Tsugunobu Andoh	<ul style="list-style-type: none"> • Development of animal model of diseases that exhibit the sensory symptoms, such as itch, pain and dysesthesia • Study of the mechanisms of itch, pain and dysesthesia. • Search and development of therapeutic and prophylactic medicines for itch, pain and dysesthesia.
		Pharmaceutical Physiology	Professor Hideki Sakai Associate Professor Takahiro Shimizu	<p>Physiological, biochemical and pharmacological studies in epithelial cells to clarify</p> <ol style="list-style-type: none"> 1) interactions between drugs and ion-transporting proteins 2) transportsome functions 3) functional relations among ion-transporting proteins
		Gastrointestinal Pathophysiology	Professor Makoto Kadowaki	<ul style="list-style-type: none"> • Elucidation of the pathogenesis and mechanism underlying the enteric immune diseases • Research on new seeds of the therapeutic medicine against the enteric immune diseases • Elucidation of the cross-talk between the enteric nervous system and the mucosal immune system
		Neuromedical Science	Professor Chihiro Tohda	<ul style="list-style-type: none"> • Integrative elucidation of the molecular mechanism of restoring the neuronal network in the central nervous system. • Traditional medicine research seeking fundamental therapeutic drugs for Alzheimer's disease, spinal cord injury or depression. • The molecular mechanism of recovery of neurodegenerative diseases based on the glial cell-neuron interaction. • Drug development for skeletal muscle atrophy. • Proof of concept in humans aiming to develop new botanical drugs and new Kampo formulas.
		Pharmaceutical Technology	Professor Yoshinori Onuki	<ul style="list-style-type: none"> • Development of optimization techniques for designing pharmaceutical formulations and manufacturing processes • Studies on pharmaceutical characteristics using molecular imaging techniques

Pharmaceutical Basic Sciences	Biochemistry and Molecular Biology	Biorecognition Chemistry	Professor Takenori Tomohiro	<ul style="list-style-type: none"> • Chemical biology for efficient drug discovery: target identification, visualization, utilization, and manipulation • Drug activity-based functional proteomics
		Cancer Cell Biology	Professor Hiroaki Sakurai Associate Professor Tsutomu Sakuma	<ul style="list-style-type: none"> • Elucidation of the molecular mechanisms of tumor progression via inflammatory signaling pathways • Study on the activation mechanisms of molecular targets in cancer therapy • Study of the gene expression mechanisms of drug-metabolizing enzymes
		Molecular Neurobiology	Associate Professor Akiko Tabuchi	<ul style="list-style-type: none"> • Elucidation of the molecular mechanisms underlying regulation of neuronal function and plasticity by gene expression and cellular communication between synapses and a nucleus • Studies on neurological disorders caused by dysfunction of transcription factors and synaptic molecules. • Basic studies on transcription factors and synaptic molecules toward drug development targeted for neurological disorders.
		Gene Regulation	Associate Professor Yutaka Hirose	<ul style="list-style-type: none"> • Study on the molecular mechanism of transcription initiation by RNA polymerase II • Study on the role of mammalian Mediator complex in controlling gene expression • Study on the regulatory mechanism of pre-mRNA processing coordinated with transcription • Study on the pathological mechanism of human diseases associated with misregulation in gene expression program
		Molecular Cell Biology	Professor Takanori So Associate Professor Masashi Morita	<ul style="list-style-type: none"> • Elucidation of immunoregulatory mechanisms of TNF-related family molecules • Analysis of structure and function of ABC protein subfamily D • Elucidation of molecular pathology of X-linked adrenoleukodystrophy and development of therapeutic agents
		Pathogenic Biochemistry	Professor Yoshihiro Hayakawa	<ul style="list-style-type: none"> • Study of NK cell biology and its roles in immunity • Role of innate immune responses in cancer progression • Immunological study of inflammatory & allergic diseases • Modulation of immune responses and immunological diseases by Kampo medicines • Study to regulate cancer progression & metastasis

Pharmaceutical Basic Sciences	Biochemistry and Molecular Biology	Nutritional Biochemistry	Associate Professor Shiro Watanabe	<ul style="list-style-type: none"> ▪ Mechanistic elucidation for lipid metabolic abnormality in cancer cachexia and its modulation by lipid nutritional interventions ▪ Nutritional assessment of the differential actions of α-linolenic acid, eicosapentaenoic acid and docosahexaenoic acid in the modulation of immuno-inflammatory responses ▪ Mechanistic elucidation for the novel actions of Kampo medicines from toxicological aspects
		Molecular Genetics	Professor Yoshiaki Tabuchi	<ul style="list-style-type: none"> • Mechanical control of cell differentiation • Elucidation of molecular mechanism of cellular stress response • Reconstruction of tissue functions by immortalized cells
	Natural Medicine	Medicinal Bioresources	Professor Fumiya Kurosaki <i>(will be retired in March 2019)</i>	<ul style="list-style-type: none"> • Relationship between structures and catalytic activities of biosynthetic enzymes of natural products accumulated in medicinal plants • Elucidation of signal transduction mechanisms involved in enhancement of transcriptional activity of secondary metabolism-related genes of plant cells
			Associate Professor Futoshi Taura	
		Pharmacognosy	Professor Katsuko Komatsu	<ul style="list-style-type: none"> • Pharmacognostical study on medicinal plants and herbal drugs by molecular systematic, chemical and pharmacological approaches • Study on quality standardization of herbal drugs as well as health supplements • Field investigation on herbal drug resources and traditional medicine around the world • Chemometric profiling of multiple components in crude drugs and Kampo formula • Discovery of bioactive natural compounds from traditional medicines
			Associate Professor Kazufumi Toume	
	Medicinal Pharmacology	Professor Kinzo Matsumoto <i>(will be retired in March 2019)</i>	<ul style="list-style-type: none"> • Neuropharmacological studies on pathophysiological mechanisms and experimental drug therapy of cognitive and emotional disorders • Molecular pharmacological studies on underlying mechanisms and chemical regulation of neurodegeneration • Psychological and social stress-induced Neuropsychiatric disorders and experimental (crude) drug therapy 	
		Associate Professor Michihisa Tohda		
	Kampo Diagnostics	Professor Naotoshi Shibahara	<ul style="list-style-type: none"> • Pharmacological effects of Kampo medicines and their herbal components, as well as their mechanisms of action • Search for indicators of clinical pathology of Kampo medicine and “sho” • Research on mucosal immune activity and mucosal vaccine adjuvant effect 	
		Associate Professor Keiichi Koizumi		

Pharmaceutical Basic Sciences	Natural Medicine	Natural Drug Discovery	Associate Professor Suresh Awale	<ul style="list-style-type: none"> • Discovery of natural anticancer agents from medicinal plant resources by employing a novel antiausterity screening strategy. • Chemical investigation of medicinal plants and search for novel bioactive secondary metabolites. • Investigation of the structure-activity relationship of the active natural compounds and their mechanism of action against cancer cell survival pathways. • Discovery of metabolomic biomarkers associated with cancer cells by utilizing FT-NMR and MS strategy.
	Clinical Medicine	Clinical Pharmacology	Professor Toshiyasu Sasaoka Associate Professor Hiroschi Tsuneki Lecturer Tsutomu Wada	<ul style="list-style-type: none"> • Development of new insulin sensitizers based on the mechanisms of type 2 diabetes and insulin resistance • Elucidation of central mechanisms regulating energy and glucose homeostasis via intra-organ metabolic pathway • Development of a novel treatment of diabetic complications based on the pathogenic mechanisms
		Clinical Pharmacokinetics	Professor Yukiya Hashimoto Associate Professor Masato Taguchi	<ul style="list-style-type: none"> • Basic and clinical research on pharmacokinetics and drug efficacy/toxicity: especially, analysis of effects of disease states, concurrently-administered drugs, and genetic polymorphisms on the function of the drug-metabolizing enzyme and transporter; furthermore, development of individualized dosage regimens based on the influencing factors identified
		Pharmaceutical Therapy and Neuropharmacology	Professor Atsumi Nitta Associate Professor Yoshiaki Miyamoto	<ul style="list-style-type: none"> • Behavioral pharmacological, molecular biological and cell biological studies to clarify the function of the novel molecules for the psychiatric diseases • Study for the clarification of the mechanisms of establishment of addiction of nicotine, THC and methamphetamine • Investigation of the mechanism of aging and functional foods on learning memory. • Pharmaceutical studies and Pharmaceutical educational methods
		Medical Pharmaceutics	Professor Hideto To Associate Professor Yasuhiro Tsuji	<ul style="list-style-type: none"> • Translational research for clinical application of chronotherapy • Development of new drugs targeting factors regulating the circadian rhythm of morbid states • Application of chronotherapy for individualized medicine • Emerging infections and special population pharmacokinetics modelling for dose personalization

Pharmaceutical Basic Sciences	Clinical Medicine	Clinical Pharmaceutics	Professor Isao Adachi Associate Professor Atsushi Kato	<ul style="list-style-type: none"> • Drug seed discovery research and evaluation of drugs targeting diabetes, allergic disorders, and other illnesses centered on glycomimetic alkaloids and herbal medicine-derived compounds • Biochemical research concerning glucolipid metabolic disorders focused on the properties of glycoproteins, glycohydrolases, and glycosyltransferases • Medical pharmaceutical research concerning the interaction of pharmaceuticals and biological membranes in clinical settings
-------------------------------	-------------------	---------------------------	---	--

Notes:

- The Graduate School of Medicine and Pharmaceutical Sciences for Education (Master's Program) has the laboratories specified below in addition to those listed above.
Biology, Chemistry