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Appended Form 1

## Specifications for Major Program

Name of School (Program) [School of Pharmaceutical Sciences (Program of Medicinal Sciences)]

Program name (Japanese)	
(English)	Program of Medicinal Sciences
1. Degree to be obtained: Bachelor of Medicinal Science	
2. Overview	
<p>The Program of Medicinal Sciences is a four-year course which was established aiming to foster pharmaceutical specialists such as researchers and developers of drugs, providers of medical information, experts in environment/health when the pharmacist training course was transformed into 6-year system and the Program of Pharmaceutical Sciences was newly established in the School of Pharmaceutical Sciences. Based on a broad education not only within the field of the pharmaceutical sciences but also in a range from organic chemistry to life science, this program cultivates researchers in the wide field of life sciences as well as researchers/technicians engaged in drug development. Researches on environmental problems and hygiene are also conducted widely in this program, and students are trained to be researchers/experts handling these subjects through the essential education and research on pharmaceutical sciences as a foundation of research and development on pharmaceuticals. Although these human resources are not necessarily limited only to people from the field of pharmaceutical sciences, this program offers a wide-ranging education from basics to clinical medicine based on not only knowledge acquired from basic education on life sciences, organic chemistry, inorganic chemistry, physical chemistry, and analytical chemistry but also knowledge that can be acquired only from pharmaceutical fields such as pharmacology and pharmaceutics to foster students who can play an active role in various fields with different skills from students completed studies in other fields. The pharmaceutical sciences have cultivated human resources engaged in research, development, and production of pharmaceuticals in Japan. The history and know-hows to nurture such human resources in the 4-year program should be succeeded and developed more.</p> <p>Besides, such human resources have been insufficient compared to the other countries so that the mission imposed on the four-year course of medicinal sciences is incalculable.</p> <p>This program aims to foster students who are able to develop a new field of knowledge and contribute to local/global communities having a rich humanity by reinventing themselves looking ahead the future society based on the tradition of the pharmaceutical sciences. Specifically, this program provides students education to allow them to acquire 1) the fundamental knowledge and skills required to develop the strong questioning mind in sciences and motivation for learning; 2) the advanced skills required for exercising their creative thinking abilities to try to solve new problems actively and autonomously; and 3) the advanced and the wide-ranging knowledge and skills on pharmaceutical and medical sciences required to become researchers/technicians on drug development, biomedical innovators, providers of advanced medical information, experts in environment/health who are able to work globally as well.</p> <p>Expecting students to be researchers/experts with global prospective in the public agencies or industries such as</p>	

pharmaceuticals, foods chemicals and cosmetics after graduation, this program fosters students to be able to lead the society as researchers at the forefront after acquiring the advanced knowledge and skills in graduate school.

In the first step after admission (Attached Sheet 1), students take liberal arts education subjects necessary for a special course education and develop broad knowledge necessary for their future character-building, such common subjects with the Program of Pharmaceutical Sciences as fundamental subjects, information literacy basics and seminars, and foreign languages focusing on communication. Also, the first step is designed to allow students to participate in the “Early Joint Experience Practice.”

Furthermore, science classes for supplemental education that student did not chose for their individual scholastic ability tests are also prepared.

In the second step, set as the basis of education in pharmaceutical sciences, students will take basic specialized subjects in line with the common educational models and core curricula in pharmaceutical sciences in the program in Pharmaceutical Sciences. At the same time, students will acquire the basics of experimenting by completing practices in all the fields of pharmaceutical sciences starting from basic chemical practice. In the third step, more specialized lectures are arranged and allocated as elective subjects so that students can acquire the knowledge required for pharmaceutical sciences to become their field of expertise in the future. In the fourth step, to take part in research in their desired field of expertise, students will select graduation research from Basic Research I, II, and

- 5) The basic knowledge about drug treatment and the ability to explain it;
- 6) Fundamental knowledge, skills, and attitude regarding the effect of medicines and chemical substances on a human being and the effect of living environment and global ecosystem on human health, and the ability to explain and exercise that knowledge, and those skills;
- 7) The ability to identify the problem and show the direction toward that solution in order to play an active role as a passionate researcher who can flexibly meet diversifying social needs;
- 8) The fundamental capability to identify new information and knowledge, and to autonomously improve one's ability, in order to keep up with progress in pharmacology, science, and medical areas;

#### 4. Curriculum policies (policies for organizing & providing curricula)

### **Program of Medicinal Sciences**

#### **Policy for design, education and learning method of curriculum**

In the Program of Medicinal Sciences, the curriculum (educational course) is arranged according to the policies described below in order to develop scientists and engineers who have abilities mentioned in the diploma policy and have deep humanity and wide-ranging intelligence.

- 1) To allow students to acquire fundamental knowledge such as physics, biology, mathematics and “Psychology for Medical Care Workers” as well as basic study ability in a wide variety of areas, the curriculum provides the peace study subjects, fundamental subjects for university education, disciplinary subjects, foreign language subjects, information and data science subjects, health and sports subjects, society-related subjects, and fundamental subjects, structured in such a way as to provide those subjects to the whole university in the 1<sup>st</sup> and 2<sup>nd</sup> year;
- 2) To allow students to understand the fundamental characteristics on medicines and chemical substances including biological materials, and to learn the fundamental knowledge about typical reactions, separation methods, configuration determination methods, etc., the curriculum provides subjects on the structure and characteristics of materials besides natural medicine resources such as Organic Chemistry and Analytical Chemistry. After learning lectures about these subjects, the curriculum also provides the practical training subjects;
- 3) To allow students to understand structures of living organisms at the level of individuals, organs and cells, and to learn the fundamental knowledge on the structures and functional regulations of living organisms, the curriculum provides subjects related to the structures and functions of living organisms such as Biochemistry as the Basic Specialized Subjects in the 1<sup>st</sup> and 2<sup>nd</sup> year, and subjects including more advanced contents like Physiological Chemistry and Cellular Biology as Specialized Subjects in the 3<sup>rd</sup> year. After taking lectures on these subjects, the practical training subjects are prepared for the fall semester in the 2<sup>nd</sup> year and the spring semester in the 3<sup>rd</sup> year in order to acquire the technical skills based on knowledge;
- 4) To allow students to understand the process of pharmacological actions of medicines, and to get the fundamental knowledge about the medicine’s actions to diseases, the action mechanism and in vivo fate, the curriculum provides subjects related to the actions and the in vivo fate of medicines such as Pharmacology and Biopharmaceutics as the Basic Specialized Subjects in the 1<sup>st</sup> and 2<sup>nd</sup> year, and subjects including more advanced contents like Pharmacokinetics as the Specialized Subjects in the 3<sup>rd</sup> year. After taking lectures on these subjects, the practical training subjects are prepared for the fall semester in the 2<sup>nd</sup> year and the spring semester in the 3<sup>rd</sup> year in order to acquire the technical skills based on knowledge;

- 5) To allow students to learn the fundamental knowledge about the pharmacotherapy, the curriculum provides the lecture subjects related to the diseases and the conditions such as Clinical Pharmacy and Pharmacotherapy in the 4<sup>th</sup> year as Specialized Subjects. These subjects are set as Elective/Required Subjects to foster the specialties for the future;
- 6) To allow students to learn the fundamental knowledge about effects of medicine and chemical substance to the human as well as the human health with the living environments and/or global ecosystem, the curriculum provides Lecture Subjects related to the health and the environment such as Public Health Chemistry in the 2<sup>nd</sup> and 3<sup>rd</sup> year. The practical training subjects are prepared for the 3<sup>rd</sup> year in order to acquire the technical skills and the attitudes based on knowledge;
- 7) To allow students to acquire the essential abilities to find and solve problems to be active as an enthusiastic researcher who can deal flexibly with the multiple needs, the curriculum fosters the ability of scientific abilities which lead to the problem-solving and the creation of the new value integrating the acquired knowledge and skills. Thereby the curriculum provides Seminar Subjects: Research Practices for the fall semester in the 3<sup>rd</sup> year, and subjects including basic contents: Special laboratory Works in Pharmaceutical Sciences I -III for the fall semester in the 3<sup>rd</sup> year and in the whole 4<sup>th</sup> year as the Specialized Study for Graduation, well-instructing students individually;
- 8) To allow students to acquire the fundamental abilities required to keep improving themselves grasping the new information and knowledge in order to deal with progresses of pharmacy, sciences and medical cares, the curriculum provides a more professional foreign language subject: Practical English for Pharmaceutical Students in the 2<sup>nd</sup> year in addition to the Foreign Languages Subjects in the 1<sup>st</sup> and 2<sup>nd</sup> year. Besides, The Specialized Study for Graduation Subjects: Special laboratory Works in Pharmaceutical Sciences I – III are provided from the fall semester in the 3<sup>rd</sup> year, well-instructing individually.
- 9) The curriculum provides subjects in order to get the qualification for Type-1 High School Teaching License (science) for applicants;

### **Evaluation Policy for Learning Achievements**

The learning achievements are evaluated by the suitable ways to each learning method of the curriculum based on the above Curriculum policy 1) to 9), and the program aims to achieve the Diploma policy. Basically, the Lecture Subjects are evaluated by written-examinations or written-examinations besides report assignments. The Practice Subjects are evaluated comprehensively by report assignments, practice notes, etc. The participatory learning subjects are evaluated by report assignments and presentation. The Seminar Subjects are evaluated by written-examinations, report assignments or presentation. The Specialized Study for Graduation Subjects are evaluated by a rubric determined separately.

Besides these evaluations, students are appraised by their attainment of the goals set by the Program of Medicinal Sciences.

To promote the systematic learning, the program sets a certain standard for the assignment to laboratories.

#### **5. Start time and acceptance conditions**

Students select (start) this program in the first year.

6. Obtainable qualifications

a) Type-1 High School Teaching License (science)

b) Drug distributors, engineers responsible for medical equipment manufacturers and import & sales offices, technical managers of garbage disposal facilities, pollution control managers related to noise, dust, and vibration, engineers controlling environmental hygiene in buildings, and managers of water supply technologies

7. Class subjects and their contents

For class subjects, refer to the subject table in Sheet 1. (The subject table is to be attached.)

For the details of the class subjects, refer to the syllabus that is published each academic year.

8. Academic achievement

The evaluation criteria are specified for each evaluation item for academic achievement, and the achievement level against these criteria is designated for each academic year.

The academic achievement, from when the student enters our university to the end of the last semester, is represented based on the average of evaluation scores for each evaluation item. The evaluation score for each subject is converted to a numerical value (S = 4, A = 3, B = 2, and C = 1) and the evaluation standard for the academic achievement is determined using these values while applying weightings.

Achievement evaluation	Numerical conversion
S (Excellent:90 or more points)	4
A (Very good: 80 - 89 points)	3
B (Good: 70 - 79 points)	2
C (Passed: 60 - 69 points)	1
Academic achievement	Evaluation standard
Excellent	3.00 - 4.00
Very Good	2.00 - 2.99
Good	1.00 - 1.99

\* Refer to the relationship between evaluation items and evaluation criteria described in Sheet 2.

\* Refer to the relationship between evaluation items and class subjects described in Sheet 3.

\* Refer to the curriculum map in Sheet 4.

9. Graduation thesis (graduation research) (meaning, student allocation, timing, etc.)

While acquiring a series of research methods working in the society through their graduation research, students continue to graduate school to do pharmaceutical researches more deeply and establish the foundation of a sequence of the research as a basis to be worldwide researchers. Students are allocated to the laboratories to cover all related fields based on the laboratories' conveniences because the overemphasis on a specific field is regarded as not beneficial for the development of pharmaceutical sciences. The allocation method and requirements are defined separately.

10. Responsibility

(1) PDCA responsibility system (“Plan,” “Do,” “Check,” and “Act”)

“Plan” and “Do” shall be conducted by the Faculty Council of Pharmaceutical Sciences (Chief: Takuya Kumamoto (in charge of academic affairs)).

“Check” and “Act” shall be conducted by the dean of the School of Pharmaceutical Sciences, respecting the contents of the report after the dean consults with the committee in charge.

(2) Program assessment

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Table of Registration Standards for Liberal Arts Education Subjects

Medicinal Sciences Program

Type	Subject type		Required No. of credits	Class subjects, etc.	No. of credits	Type of course registration	Year in which the subject is taken(Note 1)														
							1st grade		2nd grade		3rd grade		4th grade								
							Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall							
Common subjects	Basic Courses in University Education				2	Required															
	Introduction to University Education		2	Introduction to University Education	2	Required															
	Introductory Seminar for First-Year Students		2	Introductory Seminar for First-Year Students	2	Required															
	Area Courses (Note 8)		4	Courses in Arts and Humanities/Social Sciences	2	Elective/required															
			4	Courses in Natural Sciences	2	Elective/required															
	Foreign Languages	English (Note 2)	Communication Seminar	2	Communication Seminar I	1															
					Communication Seminar II	1															
							1														
							1														
							1														
							1														
							1														
							1														
							1														
							1														
				Introduction to Information and Data Sciences(Note 4)	2	Required															
				Information and Data Science Courses	2	Elective/required															
	Health and Sports Courses		2		1or2	Elective/required															
	Social Cooperation Courses		0		1or2	Free elective															
	Foundation Courses			Psychology for Medical Care Workers(Note 5)	2	Required															
			Statistics	2																	
			Anatomy for understanding human being I	1																	
			Anatomy for understanding human being II	1																	
			2	Foundation physics for life science(Note 6)	2	Elective/required															
			2	Foundation biology for life science(Note 7)	2																
			4	Species Biology	2	Elective/required															
			2	Basic Calculus	2																
	2	Basic Linear Algebra	2																		
			2 subjects from the three subjects above																		
Total (Liberal Arts Education Subjects)			38																		

- Note 1: The indicated semester represents that in which students typically take the subject. If they have failed to earn the credit in the semester, it is allowed to take the subject after the semester. It is required to confirm the semester in which the subject is provided in the class schedule for liberal arts education subjects that is published every academic year, because some subjects might be provided in a semester other than that which is shown in this document.
- Note 2: The credits for "Field Research in the English-speaking World" that are earned through such activities as a short-term study abroad, and those for "Online English Seminar A" and "Online English Seminar B" that are earned through a program of self-study, are accepted as the credit for English required for graduation (6 credits). Achievement in a foreign language skill test and language training might be accepted as credit. For the details, refer to the description regarding English subjects in the liberal arts education and the item "Credit based on Achievement in Foreign Language Skill Test" in the Students Handbook.
- Note 3: Although 4 credits of "Basic Foreign Language" are not included as those required for graduation, it is recommended to earn those credits.
- Note 4: It is required to take the subject "Introduction to Information and Data Sciences" that is provided in the first year. Only when failing to earn the credit for "Introduction to Information and Data Sciences" is the credit for the subject "Exercise in Information Literacy" accepted as that for the information and data science subjects required for graduation (2 credits).
- Note 5: It is required to take the subject "Psychology for Medical Care Workers" that is provided in the first year. Only when failing to earn the credit for "Psychology for Medical Care Workers" is the credit for the subject "Psychology A" or "Psychology B" accepted as that for the information subjects required for graduation (2 credits).
- Note 6: Students who did not take the subject "Physics" in the Common Test for University Admissions are required to take the subject "Foundation physics for life science."
- Note 7: Students who did not take the subject "Biology" in the Common Test for University Admissions are required to take the subject "Foundation biology for life science."
- Note 8: Of the 4 credits required for the disciplinary subjects (Courses in Arts and Humanities/Social Sciences), 2 credits are required to be earned for the subject "Ethics."

In order to obtain an Educational Staff License, students must complete the "Japanese Constitution" in the area subjects and "Introduction to Earth and Planetary Sciences A" and "Introduction to Earth and Planetary Sciences B" in the Specialized Education of other faculties.

# Table of Registration Standards for Specialized Education Subjects

## Medicinal Sciences Program

Type	Subject type	Lesson Style	Required No. of credits	Class subjects, etc.	No. of credits	Type of course registration	Year in which the subject is taken															
							1st grade		2nd grade		3rd grade		4th grade									
							Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall								
Basic Specialized Subjects	Lecture	43		Practical English for Pharmaceutical Students	2																	
				Introduction to Pharmaceutical Sciences	2																	
								General Chemistry	2													
								Pharmaceutical Analysis	2													
								Nuclear Pharmacy	2													
								Organic Chemistry IA	1													
								Organic Chemistry IB	1													
								Biochemistry I	2													
								Biochemistry II	2													
								Biological Chemistry III	2													
								Public Health Chemistry I	2													
								Basic Kampo Medicine	2	Required												
							Microbiology	2														
								Public Health Chemistry II	2													
								Pharmaceutical Physical Chemistry	2													
								Bio-Analytical Science	2													
								Natural Products Chemistry	2													
								Biological Chemistry IV	2													
								Biopharmaceutics	2													
				Specialized Education Subjects	Seminar	2			1													
	1																					
	2																					
	1																					
	2							Pharmacology I	2													
	1							An Outline of Pathology	1													
	43							Total (Basic Specialized Subjects)	43	4	10	16	12								1	
	2							Practice for clinical food science	2	Free elective											2	
	1								1	Required												
	2							Total (Required Subjects(Seminar))	2						1	1						
Specialized Subjects	Lecture	20			1														1			
					1															1		
					1			Practice of Structural Elucidation	1												1	
					1			Practice of xenobiotics and molecular toxicology	1													1
					1			Practice of Organic Reactions	1													1
					1			Practice of Microbiology	1													1
					1			Practice of Drug Delivery System	1													1
					1			Practice of Analytical Drug Discovery and Evaluation	1													1
					1			Practice of Biochemical Pharmacology	1													1
					1			Practice of Clinical Pharmacy	1													1
Specialized Subjects	Lecture	3			8														8			
					12															10		
					2			Clinical food science	2	Free elective											2	
					1			General Organic Chemistry and Practice	1													1
					2			Pharmacology II	2													
					2			Herbal medicine & Kampo medicine	2													
					2			Pharmacokinetics	2													
					2			Biochemistry VI	2													
					2			Biophysical Chemistry	2	Required												
					2			Antibiotics and Drug resistance	2													
	2			Physiological Chemistry	2																	
	2			Organic Chemistry III	2																	
	2			Medicinal Organic Chemistry	2																	
	2			Biological Statistics	2																	
	20			Total (Required Subjects(Lecture))	20						2	4	12	2				3				
	2			Industrial Pharmaceutics	2													2				
6	Lecture	6			2														2			
					2														2			
					2															2		
	2			Organic Chemistry IV	2							2										



Spring Fall Spring Fall Spring Fall

## Academic achievements of Medicinal Sciences Program

### Relationships between the evaluation items and evaluation criteria

	Excellent	Very Good	Good
(1) The knowledge of chemical compounds including medicine.	<ol style="list-style-type: none"> <li>1. Being able to name representative components and correctly write down the structural formula.</li> <li>2. Being able to select chemical reaction.</li> <li>3. Being able to correctly announce results gained by clarifying used procedure or process.</li> <li>4. Being able to enumerate additives used for medical drug production and to explain their roles and physicochemical character.</li> <li>5. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 80%.</li> </ol>	<ol style="list-style-type: none"> <li>1. Being able to name representative components and correctly write down the structural formula.</li> <li>2. Being able to select appropriate chemical reaction.</li> <li>3. Being able to announce results gained by clarifying used procedure or process.</li> <li>4. Being able to explain the roles of additives used for medical drug production and their physicochemical character.</li> <li>5. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 70%.</li> </ol>	<ol style="list-style-type: none"> <li>1. Being able to name representative components and correctly write down the structural formula.</li> <li>2. Being able to explain the outline the proposed chemical reaction.</li> <li>3. Being able to present and announce outlines of used process and procedures.</li> <li>4. Being able to explain the roles of additives used for medical drug production and their physicochemical character.</li> <li>5. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 60%.</li> </ol>
(2) Knowledge of human and biological bodies.	<ol style="list-style-type: none"> <li>1. Being able to enumerate characteristics of representative enzyme and explain the characteristics of reaction comparing to general chemical reaction.</li> <li>2. Being able to enumerate representative physiological active substances and explain their productive organs, physiological functions, mechanism of secretion adjustment and the related diseases.</li> <li>3. Being able to briefly explain major human body's protective reaction mechanism in the level of tissue, cells and molecules .</li> <li>4. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 80%.</li> </ol>	<ol style="list-style-type: none"> <li>1. Being able to enumerate characteristics of representative enzyme and explain the characteristics of reaction comparing to general chemical reaction.</li> <li>2. Being able to enumerate representative physiological active substances and explain their productive organs, physiological functions, mechanism of secretion adjustment and the related diseases.</li> <li>3. Being able to briefly explain major human body's protective reaction mechanism in the level of tissue, cells and molecules .</li> <li>4. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 70%.</li> </ol>	<ol style="list-style-type: none"> <li>1. Being able to compare characteristics of representative enzyme reaction to general chemical reaction and explain them.</li> <li>2. Being able to explain productive organs, physiological functions and mechanism of secretion adjustment of representative physiological active substances.</li> <li>3. Being able to briefly explain major human biophylaxis reaction.</li> <li>4. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 60%.</li> </ol>
(3) The knowledge relating to mutual reaction between chemical compounds including medicine and a human body	<ol style="list-style-type: none"> <li>1. Being able to enumerate and explain basic matters on nutrition, metabolism, food safety, and hygiene which are necessary for health maintenance.</li> <li>2. Being able to enumerate and explain about basic matters chemical effects to humans and relation between living environment and ecology and human health.</li> <li>3. Being able to enumerate representative medicine and to explain basic matters on the action mechanism and the destiny in human body.</li> <li>4. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 80%.</li> </ol>	<ol style="list-style-type: none"> <li>1. Being able to enumerate and explain basic matters on nutrition, metabolism, food safety, and hygiene which are necessary for health maintenance.</li> <li>2. Being able to enumerate and explain about basic matters chemical effects to humans and relation between living environment and ecology and human health.</li> <li>3. Being able to enumerate representative medicine and to explain basic matters on the action mechanism and the destiny in human body. The standard is more than 70%.</li> </ol>	<ol style="list-style-type: none"> <li>1. Being able to explain basic matters on nutrition, metabolism, food safety, and hygiene which are necessary for health maintenance.</li> <li>2. Being able to enumerate and explain about basic matters chemical effects to humans and relation between living environment and ecology and human health.</li> <li>3. Being able to enumerate presented medicine and to explain basic matters on the action mechanism and the destiny in human body.</li> <li>4. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 60%.</li> </ol>
(4) Improving English comprehension to acquire capacity of chemical English	The level of achievement will be assessed based on a formula that includes the average points calculated based on the student's TOEIC score and an evaluation in class. 80% is minimum.	The level of achievement will be assessed based on a formula that includes the average points calculated based on the student's TOEIC score and an evaluation in class. 70% is minimum.	The level of achievement will be assessed based on a formula that includes the average points calculated based on the student's TOEIC score and an evaluation in class. 60% is minimum.
(1) Development of knowledge of chemical compounds including medicine. (application)	<ol style="list-style-type: none"> <li>1. Being able to construct synthetic pathways indicating appropriate chemical reaction.</li> <li>2. Being able to properly announce the acquired results specifying the process and ways.</li> <li>3. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 80%.</li> </ol>	<ol style="list-style-type: none"> <li>1. Being able to construct pathways for synthesis combining appropriate chemical reaction among presented ones.</li> <li>2. Being able to announce results gain.</li> </ol>	

Academic achievements		Evaluation criteria		
Evaluation items		Excellent	Very Good	Good
Abilities and Skills	(4) Being able to read English chemical papers and discuss them. (application)	1. The learning attainment level is generally calculated combining grades, average scores of TOEIC tests and scores of graduation research based on designated formulae. The standard is more than 80%.	1. The learning attainment level is generally calculated combining grades, average scores of TOEIC tests and scores of graduation research based on designated formulae. The standard is more than 70%.	1. The learning attainment level is generally calculated combining grades, average scores of TOEIC tests and scores of graduation research based on designated formulae. The standard is more than 60%.
	To be able to basically treat major chemical agents, substances related to the living body, and microbes.	1. Being able to construct pathways for synthesis of compounds including representative functional compounds and to synthesize them. 2. Being able to construct fixing tests, ways of separate refinement, ways of constructive decision and to identify them. 3. Being able to construct separate cultivation measures and authentic cultivation measures of representative micro-organism and to carry out them. 4. Being able to construct identification measures of representative bacteria and to identify them. 5. Being able to construct various kinds of experiments on biological related materials. 6. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 80%.	1. Being able to construct pathways for synthesis combining presented chemical reaction and synthesize them. 2. Being able to construct ways of qualitative tests, separation and refinement, and structural determination and identify them. 3. Being able to construct ways of separate cultivation and authentic cultivation and conduct them. 4. Being able to construct ways of identification of presented bacteria and conduct them. 5. Being able to conduct various kinds of experiments relating presented biologically relevant materials and conduct them. 6. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 70%.	1. Being able to synthesize using pathways for synthesis combining presented chemical reaction. 2. Being able to identify using ways of qualitative tests, separation and refinement, and structural determination. 3. Being able to construct ways of separate cultivation and authentic cultivation and conduct them. 4. Being able to construct ways of identification of presented bacteria and conduct them. 5. Being able to conduct various kinds of experiments relating presented biologically relevant materials and conduct them. 6. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 60%.
	To be able to measure and evaluate major biological reactions.	1. Being able to construct activity measurement methods of representative enzyme and measure them. 2. Being able to construct measurements of activation and secretion of representative physiological active substances and measure them. 3. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 80%.	1. Being able to construct activity measurement methods of presented enzyme and conduct them. 2. Being able to construct ways to measure activation and secretion of presented physiological active substances and conduct them. 3. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 70%.	1. Being able to conduct activity measurement methods of presented enzyme. 2. Being able to conduct ways to measure activation and secretion of presented physiological active substances. 3. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 60%.
	Being able to collect assess information on medicine.	1. Being able to find out necessary information on medicine and to collect them by themselves and estimate them. 2. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 80%.	1. Being able to find out necessary information on medicine and to estimate them. 2. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 70%.	1. Being able to find out necessary information. 2. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 60%.
Attitudes	(1) Having ability to act as member of a research team.	1. Being able to lead a team actively acting as a member of the team. 2. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 80%.	1. Being able to actively act as a member of a research team. 2. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 70%.	1. Being able to act as a member of a research team. 2. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 60%.
Comprehensive Abilities	(1) 1. The active attitude of dealing with issues on drug development and environmental hygiene. 2. The social responsibility as a specialist of drug development and environmental hygiene. 3. The comprehensive, scientific and calm attitude to solve problems. 4. The cooperative attitude in team research. 5. The ability to make communication and presentation. 6. The ability of assessment and analysis. 7. The active usage of information technology and the management ability. 8. The ethical consideration toward genetically modified foods and animal experiments	1. Being able to investigate and estimate the research results on issues so far. 2. Being able to select must-be-solved issues for the attainment of goals. 3. Being able to find issues by themselves and make a experiment plan. 4. Being able to carry out the experiments along with the plan. 5. Being able to integrate the results, consider them and present them. 6. Being able to integrate the results in reports or theses. 7. Being able to propose the next research issues based on their own research results. 8. The learning attainment level is comprehensively calculated based on designated formulae combining average evaluation of grades and results of graduation research . The standard is more than 80%.	1. Being able to investigate and estimate the research results on issues so far. 2. Being able to select must-be-solved issues for the attainment of goals. 3. Being able to make a experiment plan on proposed issues. 4. Being able to carry out the experiments along with the plan. 5. Being able to integrate the results, consider them and present them. 6. Being able to integrate the results in reports or theses. 7. The learning attainment level is comprehensively calculated based on designated formulae combining average evaluation of grades and results of graduation research . The standard is more than 70%.	1. Being able to investigate and estimate the research results on issues so far. 2. Being able to select must-be-solved issues for the attainment of goals. 3. Being able to carry out research based on experiment plans of proposed issues. 4. Being able to integrate the results, consider them and present them. 5. Being able to integrate the results in theses. 6. The learning attainment level is comprehensively calculated based on designated formulae combining average evaluation of grades and results of graduation research . The standard is more than 60%.

## Placement of Liberal Arts Education in the Major Program

Liberal arts education in this Program shall play a role in establishing the academic base to receive specialized education, and is placed as education for cultivating scientific thinking on the basis of respect for a voluntary and independent attitude, and of information gathering capabilities, analytical capabilities, and critical power. Furthermore, it is expected through the liberal arts education of this Program to develop a problem-solving ability, to cultivate a linguistic ability, and to strengthen interest in matters related to peace. Through these processes, students will foster an enriched humanity, and acquire a broader education.





# Curriculum Map of Medicinal Sciences Program

Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester
Foundation Courses Organic Chemistry IA Organic Chemistry IB General Chemistry	Foundation Courses Organic Chemistry A Organic Chemistry B	Nuclear Pharmacy Pharmaceutical Physical Chemistry Natural Products Chemistry Organic Chemistry III	Experiments in Organic Chemistry Experiments in Analytical Chemistry Training of Physical Chemistry Organic Chemistry IV	Research Practice Medicinal Organic Chemistry Herbal medicine & Kampo medicine Biophysical Chemistry Experiments of Pharmacognosy	Special laboratory Works in Pharmaceutical Sciences I Industrial Pharmaceutics Research Practice	Special laboratory Works in Pharmaceutical Sciences Practice of Organic Reactions General Organic Chemistry and Practice	Special laboratory Works in Pharmaceutical Sciences
Foundation Courses	Foundation Courses Biochemistry I Biochemistry II	Biological Chemistry III Biological Chemistry IV	Pharmacology I Microbiology Biochemistry V Experiments of Biological Chemistry Pharmacology II Biochemistry VI	Physiological Chemistry Antibiotics and Drug resistance Experiments of Microbial Chemistry Pharmacology III	Pharmacology IV Cell Motility Genetic Engineering	AnOutline of Pathology Pharmacotherapy A Practice of Microbiology Practice for clinical food science Practice of Clinical Pharmacy Clinical food science Clinical Pharmacy Clinical Medicine and Pharmacotherapy I AnOutline of Immunology Pharmacotherapy B	Clinical Pharmacology A Clinical Medicine and Pharmacotherapy II
		Public Health Chemistry I Public Health Chemistry II	Biopharmaceutics Pharmacology I Basic Kampo Medicine Experiments in Analytical Chemistry Pharmacology II	Research Practice Pharmacokinetics Biophysical Chemistry Pharmacology III	Special laboratory Works in Pharmaceutical Sciences I Public Health Chemistry III Research Practice Pharmacology IV	Special laboratory Works in Pharmaceutical Sciences Practice of Analytical Drug Discovery and Evaluation Pharmacotherapy A Practice of Clinical Pharmacy Clinical Pharmacy Clinical Medicine and Pharmacotherapy I Pharmacotherapy B Pharmaceutical Affairs Related Laws	Special laboratory Works in Pharmaceutical Sciences Drug Informatics Clinical Pharmacology A Clinical Medicine and Pharmacotherapy II
English subject GPA TOEIC Communication Seminar Communication	English subject GPA Communication Seminar Communication	English subject GPA	English subject GPA Practical English for Pharmaceutical Students		TOEIC		

Academic achievements		1st grade		2nd grade		3rd grade		4th grade	
		Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester
Abilities and Skills	Development of knowledge relating to mutual reaction between chemical compounds including medicine and a human body (application)				Biopharmaceutics	Research Practice	Special laboratory Works in Pharmaceutical Sciences I	Special laboratory Works in Pharmaceutical Sciences	Special laboratory Works in Pharmaceutical Sciences
					Pharmacology I	Biophysical Chemistry	Research Practice	Practice of Analytical Drug Discovery and Evaluation	Drug Informatics
					Basic Kampo Medicine	Pharmacology III	Pharmacology IV	Pharmacotherapy A	Clinical Pharmacology A
					Experiments in Analytical Chemistry			Practice of Clinical Pharmacy	Clinical Medicine and Pharmacotherapy II
					Pharmacology II			Clinical Pharmacy	
							Clinical Medicine and Pharmacotherapy I		
							Pharmacotherapy B		
	Being able to read English chemical papers and discuss them. (application)	Communication Seminar Communication	Communication Seminar Communication		Practical English for Pharmaceutical Students	Research Practice	Research Practice	Practice of Drug Delivery System	
	To be able to basically treat major chemical agents, substances related to the living body, and microbes.		Pharmaceutical Analysis	Bio- Analytical Science	Microbiology	Pharmacology Practice	Research Practice	Practice of Microbiology	Clinical Medicine and Pharmacotherapy II
			Biochemistry I		Experiments in Organic Chemistry	Research Practice	Genetic Engineering	Clinical Pharmacy	
			Biochemistry II		Experiments of Cellular and Molecular Biology	Antibiotics and Drug resistance		Clinical Medicine and Pharmacotherapy I	
						Experiments of Microbial Chemistry			
						Experiments of Pharmacognosy			
	To be able to measure and evaluate major biological reactions.				Experiments in Analytical Chemistry	Experiments of Public health Chemistry	Special laboratory Works in Pharmaceutical Sciences I	Special laboratory Works in Pharmaceutical Sciences	Special laboratory Works in Pharmaceutical Sciences
					Experiments of Biological Chemistry	Pharmacology Practice		Clinical Pharmacy	Clinical Medicine and Pharmacotherapy II
								Clinical Medicine and Pharmacotherapy I	
	Being able to collect assess information on medicine.	Information and Data Science Courses	Information and Data Science Courses					Clinical Pharmacy	Drug Informatics
								Clinical Medicine and Pharmacotherapy I	Clinical Medicine and Pharmacotherapy II
Attitudes	Having ability to act as member of a research team.	Introductory Seminar for First-Year Students	Health and Sports Courses			Research Practice	Special laboratory Works in Pharmaceutical Sciences I	Special laboratory Works in Pharmaceutical Sciences	Special laboratory Works in Pharmaceutical Sciences
		Health and Sports Courses	Introduction to Pharmaceutical Sciences				Research Practice	Practice of Analytical Drug Discovery and Evaluation	Clinical Medicine and Pharmacotherapy II
								Clinical Pharmacy	
							Clinical Medicine and Pharmacotherapy I		
Comprehensive Abilities	1. The active attitude of dealing with issues on drug development and environmental hygiene. 2. The social responsibility as a specialist of drug development and environmental hygiene. 3. The comprehensive, scientific and calm attitude to solve problems. 4. The cooperative attitude in team research. 5. The ability to make communication and presentation. 6. The ability of assessment and analysis. 7. The active usage of information technology and the management ability. 8. The ethical consideration toward genetically modified foods and animal experiments	Introductory Seminar for First-Year Students	Area Courses	Peace Science Courses	Training of Physical Chemistry	Research Practice	Special laboratory Works in Pharmaceutical Sciences I	Special laboratory Works in Pharmaceutical Sciences	Special laboratory Works in Pharmaceutical Sciences
		Information and Data Science Courses	Information and Data Science Courses		Experiments in Organic Chemistry	Practice of Pharmaceutics	Research Practice	Practice of xenobiotics and molecular toxicology	Drug Informatics
		Introduction to University Education	Social Cooperation Courses		Experiments of Pharmacognosy	Herbal medicine & Kampo medicine	Biological Statistics	Practice of Analytical Drug Discovery and Evaluation	
		Area Courses	Introduction to Pharmaceutical Sciences		Experiments in Analytical Chemistry	Experiments of Microbial Chemistry		Practice of Biochemical Pharmacology	
		Social Cooperation Courses			Experiments of Biological Chemistry	Experiments of Pharmacognosy		Practice of Microbiology	
						Experiments of Public health Chemistry			

Liberal Arts Education Subjects Basic Specialized Subjects Specialized Education Subjects Graduation Thesis Required Elective/required Free elective