For entrants in FY 2016

Appended Form 1

Specifications for Major Program

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

Program name (Japanese)	薬科学プログラム
(English)	Medicinal Sciences Program

1. Degree: Bachelor (medicinal sciences)

2. Outline

Along with the introduction to the six-year Pharmacist Training Program and establishment of the Program in Pharmaceutical Sciences, this is a four-year program in the School of Pharmaceutical Sciences established for the purpose of drug discovery and development, pharmaceutical and medical supply development operations, medical supply information, and for training persons in charge of the environmental and health fields and researchers in pharmaceutics at pharmaceutical companies. Based on a broad education not only within the field of pharmaceutics but also in a range from organic chemistry to life science, this Program shall implement broad basic educational research into life science, and train researchers covering extensive life science and researchers and engineers involved in the development of new drugs. Through educational research in Pharmaceutical Sciences important as the basis for R&D into new drugs, this Program shall also implement research and develop researchers and professional engineers in charge of environmental problems and health. 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 of life sciences, organic & inorganic chemistry, and analytical chemistry but also knowledge that can be acquired only from pharmaceutical fields such as pharmacology and pharmacentics, to foster human resources can play an active role in extensive fields naturally, with different skills from students who completed studies in other fields. In Japan, the field of pharmaceutics has played a leading role in developing human resources involved in pharmaceutical R&D and production technologies, and we need to inherit the circumstances of having implemented four-year programs as an educational system for that purpose and the expertise of having fostered in those circumstances, and to further develop these inheritances in the future.

In addition, based on the present situation where we are short of these human resources compared to other countries, the mission of the four-year medicinal sciences course is of great importance.

While expecting students after graduation to become researchers or professional engineers with a global perspective in governmental agencies related to pharmaceutics or in fields such as pharmaceuticals, food, chemical, and perfumery & cosmetics, this Program will foster human resources who can play a leading social role as front-line researchers after acquiring advanced knowledge and skills from their studies in graduate school.

Although this Program is mainly implemented by members of the Pharmaceutical Sciences faculty, part of the Program, such as Pathology, shall be implemented by members of the School of Medicine and researchers of the Radiation Effects Research Foundation.

In the first step after admission (Attached Sheet 2-2), 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, package 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 III by being divided into groups to be assigned to each classroom. In the assignment of students to each classroom, individual student's wishes will be respected. This graduation research is an introduction to conducting advanced research in a graduate school at a later date, in which the class content is taken into consideration so that students can acquire sufficient knowledge and skills. During the fourth step, applicants for the qualification for the national examination for pharmacists will be allowed to choose the related lectures.

3. Diploma policies (degree conferment policy & Program attainment goals)

In the Medicinal Sciences Program, graduation will be certified for students who have acquired the abilities listed below and who have acquired the predetermined number of credits.

1) Basic abilities in physics, chemistry, biology, mathematics, and ethics, which are required to study medicinal sciences (knowledge, skills, and attitude),
2) Basic knowledge of representative reactions, separation methods, and structure determination methods required to understand the basic reactivity of chemical substances including medical supplies and biological materials, and basic skills to conduct them,
3) Basic abilities related to the structure and functional adjustment of life forms required to understand the formation of life forms on the individual, organic, and cellular levels (knowledge, skills, and attitude),
4) Basic abilities related to the functions, mode of action, and the future effects of medicine in the body in the case of illness required to understand the medicinal action of medical supplies (knowledge, skills, and attitude),
5) Abilities related to basic and applied knowledge on drug therapy (knowledge, skills, and attitude),
6) Basic abilities related to the influence of medical supplies and chemical substances on people, and the relationships between the living environment & global ecosystem and human health (knowledge, skills, and attitude), and
7) The ability to continuously improve their capabilities to assess the organization and the results of experiments, to develop self-awareness, and to strive for lifelong personal development in order to play an active role as a passionate researcher who can flexibly meet diversifying social needs.

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

In the Medicinal Sciences Program, curricula are planned based on the following policies with the aim of developing scientists and engineers with an enriched humanity and broad education based on its educational principles:

1) Set core subjects in liberal arts education, foreign language subjects, information-related subjects, field subjects,

health sports subjects, and fundamental subjects under the university-wide implementation system to enable students to acquire broad and diversified basic knowledge and basic learning skills,

2) Set subjects related to early experience, communication & humanism, the structure & nature of substances, natural medical resources, and the structure & functions of living bodies as basic specialized subjects to enable students to systematically acquire professional methodologies and knowledge,

3) Set subjects related to effects of medical supplies, internal kinetics of medical supplies, health & environment, adjustment of preparations & management of medical supplies, illness and disease states, operations of a pharmacist, pharmaceutical affairs-related laws and regulations, and experimental techniques as specialized subjects for students to choose from to foster the expertise required to achieve their career aims,

4) Set graduation research as a required subject and provide detailed individual guidance to enable students to integrate the knowledge and skills they have acquired, and to foster scientific thinking that will be linked to the solution of problems and creation of new values,

5) Establish a certain standard for assignment to a laboratory,

6) Provide the subjects required for a High School Teaching License for students who wish to obtain the license, and

7) For graduates of this Program to be qualified to take the national examination for pharmacists, they need to meet the following requirements: (1) To be enrolled in a Graduate School of Medicinal Sciences at this university for at least two years and complete the first semester of the doctor course, (2) To earn the additional credits necessary to graduate from the Program of Pharmaceutical Sciences (6-year course), and (3) To take pharmaceutical practical training during the period when they are not enrolled in this University's program or the graduate school (first semester of the doctor course) stated above.

5. Start of the Program / admission conditions

Start of this program is the first year (for choosing this Program).

6. Qualification(s)

a) Qualifications for candidates for the National Examination for Pharmacist *[1]

*[1] Graduates of the Program of Medicinal Sciences need to fulfill the following requirements to qualify for the national examination for pharmacist:

(1) To be enrolled in the Graduate School of Medicinal Sciences at this university for at least 2 years, and complete the first semester of the doctor course,

(2) To earn additional credits necessary to graduate from the Program of Pharmaceutical Sciences (6-year course), and

(3) To take pharmaceutical practical training during the period when they are not enrolled in Hiroshima University's program or graduate school (first semester of the doctor course) stated above.

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

c) 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 class content

See the Table of Registration Standards on Attached Sheet 1 for your class subjects. (Attach the Table of Registration Standards.)

See the syllabus announced in each fiscal year for the class content.

8. Academic achievements

At the end of each semester, evaluation criteria will be shown with a clear indication of attainment standards according to the evaluation items for academic achievements.

Students' academic achievements from admission to the current semester will be indicated based on the mean value of the evaluation of academic achievement according to subjects corresponding to respective evaluation items, based on evaluation criteria. The mean value calculated by numerically converting the evaluation of academic achievement into S = 4, A = 3, B = 2, or C= 1 in each subject, and based on the weighted values, will be used as evaluation criteria.

Evaluation of academic achievement	Converted value
S (Excellent: 90 points or higher)	4
A (Superior: 80 – 89 points)	3
B (Good: 70 – 79 points)	2
C (Fair: 60 – 69 points)	1

Academic achievement	Evaluation criteria
Excellent	3.00 – 4.00
Very Good	2.00 – 2.99
Good	1.00 – 1.99

* See the relationships between the evaluation items and evaluation criteria on Attached Sheet 2.

* See the relationships between the evaluation items and class subjects on Attached Sheet 3.

* See the Curriculum Map on Attached Sheet 4.

9. Graduation thesis (graduation research) (placement and method & time of assignment)

In doing graduation research, students will acquire a series of research methods accepted by international society, and such methods form a basic part of research that provides students with the foundation to further deepen their knowledge in the field of pharmaceutical sciences in graduate school, and to become a global researcher in the future. Students shall be assigned to cover all related fields from the second semester of the third year because overemphasis on only some of the related fields is not considered beneficial for the development of pharmaceutical science in general, also in consideration of the convenience of each laboratory. The method and requirements of assignment shall be specified separately.

10. Responsibility system

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

・ "Plan" and "Do" shall be conducted by the Faculty Council of Pharmaceutical Sciences (Chief: Koichiro Ozawa (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

- Criteria for program assessment

The educational and social effects of this program will be assessed. For the educational effect, the Program's effect on students' learning will be judged based on the evaluation of their academic achievements, evaluation of their attainment levels, and GPA. For the social effect, the social availability of this Program will be judged.

- Implementing the assessment (relationship with class assessment will also count.)

Achievements in this Program will be assessed based on these criteria in the second semester of the fourth year. At the same time, a questionnaire on program assessment will be distributed each semester. Students' program assessments from the questionnaire will be added to the Program assessment conducted every year.

The educational effect shall be assessed in a comprehensive manner based on the evaluations of academic achievement and the achievement levels of students who have studied on this Program, and GPA.

A social assessment shall be conducted by checking the employment rates in companies (such as medical supply, chemical, food, and cosmetic companies) and government offices that are closely related to the content of the Program. At regular intervals, we ask students' main employers to assess the Program. We then ask graduates to assess themselves and the Program.

- The idea and method of feedback for students

At regular intervals, the faculty council in charge distributes questionnaires to and holds interviews with students to inspect and assess the Program, and submits an improvement plan for the Program to the Educational Evaluation Committee and the resulting Improvement Report to the Bachelor Course Meeting. Based on students' assessment of classes and the Program assessment, class subjects in this Program are checked and assessed, and the results are used to improve the Program. These results are fed back to students through "Momiji." Comments from students in the questionnaire on class assessment will be fed back for every class through the Momiji questionnaire on class assessment.

* Please enter the list of faculty members in charge on Attached Sheet 5.

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
Specialized Education Subjects	Basic Specialized Subjects	Lecture	(2)	Introduction to Pharmaceutical Sciences	2	Free elective		2						
			42	Nuclear Pharmacy	2	Required			②					
				General Chemistry	2			②						
				Organic Chemistry I	2				②					
				Biochemistry I	2				②					
				Biochemistry II	2				②					
				Biological Chemistry III	2				②					
				Public Health Chemistry I	2				②					
				Pharmaceutical Analysis	2			②						
				Basic Natural Product Chemistry	2				②					
				Microbiology	2				②					
				Public Health Chemistry II	2				②					
				Functional Morphology	2					②				
				Pharmacognosy	2					②				
				Biological Chemistry IV	2					②				
				Biopharmaceutics	2					②				
				Pharmaceutical Physical Chemistry	2				②					
				Biochemistry V	2					②				
				Bio-Analytical Science	2				②					
				Organic Chemistry Ⅱ	2					②				
				Pharmacology I	2					②				
				AnOutline of Pathology	2								②	
		Total(Basic Specialized Subjects)			44			6	22	14			2	
	Specialized Subjects	Seminar	(2)	Practice for clinical food science	2	Free elective							2	
			2	Research Practice A	1	Required					①			
				Research Practice B	1							①		
			1	Practice of Structural Elucidation	1	Elective/required Ⅰ							1	
				Practice of xenobiotics and molecular toxi	1								1	
				Practice of Organic Reactions	1								1	
				Practice of Structural Biology	1								1	
				Practice of Drug Delivery System	1								1	
				Practice of Analytical Drug Discovery and	1								1	
				Practice of Biochemical Pharmacology	1								1	
				Practice of Clinical Pharmacy	1								1	
		Total(Elective/required Ⅰ)			8								8	
		Lecture	(2)	Clinical food science	2	Free elective							2	
			26	Pharmacology II	2	Elective/required Ⅱ					2			
				Chemistry of Natural Products	2						2			
				Pharmacokinetics	2						2			
				Biochemistry VI	2						2			
				Biophysical Chemistry	2						2			
				Antibiotics and Drug resistance	2						2			
				Physiological Chemistry	2						2			
				Organic Chemistry III	2						2			
				Medicinal Organic Chemistry	2						2			
				Industrial Pharmaceutics	2							2		
				Cell Motility	2							2		
				Genetic Engineering	2							2		
				Organic Chemistry IV	2							2		
				Public Health Chemistry III	2							2		

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
Specialized Education Subjects	Specialized Subjects	Lecture	26	Biological Statistics	2	Elective/required Ⅱ						2		
				Pharmacology III	2							2		
				Clinical Pharmacy	2								2	
				Clinical Medicine and Pharmacotherapy I	2								2	
				Pharmacotherapy A	2								2	
				AnOutline of Immunology	2								2	
				Clinical Medicine and Pharmacotherapy I	2								2	
				Pharmaceutical Affairs Related Laws	2								2	
				Clinical Pharmacology A	2									2
				Pharmacotherapy B	2									2
				Drug Informatics	2									2
				Total(Elective/required Ⅱ)	50						18	14	12	6
		Practice	10	Experiments in Analytical Chemistry	1	Required				①				
				Training of Physical Chemistry	1					①				
				Experiments in Organic Chemistry	1					①				
				Experiments of Cellular and Molecular Bi	1					①				
				Experiments of Biological Chemistry	1					①				
				Experiments of Pharmacognosy	1						①			
				Experiments of Microbial Chemistry	1						①			
				Pharmacology Practice	1						①			
				Practice of Pharmaceutics	1						①			
				Experiments of Public health Chemistry	1						①			
				Total(Practice)	10					5	5			
		Special Study for Graduation	6	Special laboratory Works in Pharmaceuti	2	Required						②		
				Special laboratory Works in Pharmaceuti	2								②	
				Special laboratory Works in Pharmaceuti	2									②
				Total(Special Study for Graduation)	6							2	2	2
				Total(Specialized Subjects)	85					5	25	17	30	8
			87	Total(Specialized Education Subjects)	127									

Note: You need at least 1 credit per subject in Elective/Required Subjects I, and at least 26 credits from 13 subjects in Elective/Required Subjects II.

Note: Subjects with a circle in the “Year in which the subject is taken” column are required subjects.

Graduation requirement	Required No. of credits
Liberal Arts Education Subjects	40
Specialized Education Subjects	87
Basic Specialized Subjects	42
Free elective subjects	(2)
Required Subjects	42
Specialized Subjects	45
Free elective subjects (Seminar)	(2)
Required Subjects (Seminar)	2
Elective/required Ⅰ (Seminar)	1
Free elective subjects (Lecture)	(2)
Elective/required Ⅱ (Lecture)	26
Required Subjects (Practice)	10
Required Subjects (Special Study for Graduation)	6
Total	127

Academic achievements of Medicinal Sciences Program

Relationships between the evaluation items and evaluation criteria

Academic achievements			Evaluation criteria		
Evaluation items			Excellent	Very Good	Good
Knowledge and Understanding	(1)	The knowledge of chemical compounds including medicine.	1. Being able to name representative components and correctly write down the structural formula. 2. Being able to select chemical reaction. 3. Being able to correctly announce results gained by clarifying used procedure or process. 4. Being able to enumerate additives used for medical drug production and to explain their roles and physicochemical character. 5. 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 name representative components and correctly write down the structural formula. 2. Being able to select appropriate chemical reaction. 3. Being able to announce results gained by clarifying used procedure or process. 4. Being able to explain the roles of additives used for medical drug production and their physicochemical character. 5. 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 name representative components and correctly write down the structural formula. 2. Being able to explain the outline the proposed chemical reaction. 3. Being able to present and announce outlines of used process and procedures. 4. Being able to explain the roles of additives used for medical drug production and their physicochemical character. 5. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 60%.
	(2)	Knowledge of human and biological bodies.	1. Being able to enumerate characteristics of representative enzyme and explain the characteristics of reaction comparing to general chemical reaction. 2. Being able to enumerate representative physiological active substances and explain their productive organs, physiological functions, mechanism of secretion adjustment and the related diseases. 3. Being able to briefly explain major human body's protective reaction mechanism in the level of tissue, cells and molecules . 4. 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 enumerate characteristics of representative enzyme and explain the characteristics of reaction comparing to general chemical reaction. 2. Being able to enumerate representative physiological active substances and explain their productive organs, physiological functions, mechanism of secretion adjustment and the related diseases. 3. Being able to briefly explain major human body's protective reaction mechanism in the level of tissue, cells and molecules . 4. 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 compare characteristics of representative enzyme reaction to general chemical reaction and explain them. 2. Being able to explain productive organs, physiological functions and mechanism of secretion adjustment of representative physiological active substances. 3. Being able to briefly explain major human biophylaxis reaction. 4. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 60%.

Academic achievements			Evaluation criteria		
Evaluation items			Excellent	Very Good	Good
Knowled	(3)	The knowledge relating to mutual reaction between chemical compounds including medicine and a human body	1. Being able to enumerate and explain basic matters on nutrition, metabolism, food safety, and hygiene which are necessary for health maintenance. 2. Being able to enumerate and explain about basic matters chemical effects to humans and relation between living environment and ecology and human health. 3. Being able to enumerate representative medicine and to explain basic matters on the action mechanism and the destiny in human body. 4.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 enumerate and explain basic matters on nutrition, metabolism, food safety, and hygiene which are necessary for health maintenance. 2. Being able to enumerate and explain about basic matters chemical effects to humans and relation between living environment and ecology and human health. 3. Being able to enumerate representative medicine and to explain basic matters on the action mechanism and the destiny in human body.	1. Being able to explain basic matters on nutrition, metabolism, food safety, and hygiene which are necessary for health maintenance. 2. Being able to enumerate and explain about basic matters chemical effects to humans and relation between living environment and ecology and human health. 3. Being able to enumerate presented medicine and to explain basic matters on the action mechanism and the destiny in human body. 3. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 60%.
	(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.
	(1)	Development of knowledge of chemical compounds including medicine. (application)	1. Being able to construct synthetic pathways indicating appropriate chemical reaction. 2. Being able to properly announce the acquired results specifying the process and ways. 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 pathways for synthesis combining appropriate chemical reaction among presented ones. 2. Being able to announce results gained by clarifying the used procedure and pathways. 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 construct pathways for synthesis combining presented chemical reaction. 2. Being able to announce results gained by clarifying the used procedure and pathways. 3. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 60%.

Academic achievements			Evaluation criteria		
Evaluation items			Excellent	Very Good	Good
Abilities and Skills	(2)	Development of knowledge about human and biological bodies. (advance)	1. Being able to construct activity measurement methods of representative enzyme. 2. Being able to construct measurements of activation and secretion of representative physiological active substances. 3. Being able to explain major human biophylaxis reaction relating with diseases. 4. 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. 2. Being able to construct ways to measure activation and secretion of presented physiological active substances. 3. Being able to explain human biophylaxis reaction relating to diseases. 4. 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 outline activity measurement methods of presented enzyme. 2. Being able to outline ways to measure activation and secretion of presented physiological active substances. 3. Being able to outline human biophylaxis reaction relating to diseases. 4. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 60%.
	(3)	Development of knowledge relating to mutual reaction between chemical compounds including medicine and a human body (application)	1. Being able to investigate current situation of nutrition in Japan, explain the issues using used data and propose the solution. 2. Being able to investigate examples of drug interaction, explain the mechanism and propose the way of avoidance. 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 investigate current situation of nutrition in Japan and explain the issues using used data. 2. Being able to investigate examples of drug interaction, consider the mechanism and propose the way of avoidance. 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 investigate current situation of nutrition in Japan and enumerate the issues. 2. Being able to investigate examples of drug interaction, consider the mechanism and select the appropriate way of avoidance. 3. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 60%.
	(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%.

Academic achievements			Evaluation criteria		
Evaluation items			Excellent	Very Good	Good
Ab	(5)	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. 4. 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. 4. The learning attainment level is calculated as an average evaluation of grades based on designated formulae. The standard is more than 60%.
	(6)	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%.
	(7)	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%.

Academic achievements			Evaluation criteria		
Evaluation items			Excellent	Very Good	Good
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

Relationships between the evaluation items and class subjects

Subject Classification	Subject Name	Credits	Type of course registration	Grade	Evaluation items																								Total weighted values of evaluation items in the subject
					Knowledge and Understanding								Abilities and Skills												Attitudes		Comprehensive Abilities		
					(1)		(2)		(3)		(4)		(1)		(2)		(3)		(4)		(5)		(6)		(7)		(1)		(1)～(8)		
					Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	Weighted values of evaluation items in the subject	Weighted values of evaluation items	
Liberal Arts Education	Introductory Seminar for Freshmen	2	Required	1																					50	1	50	1	100
Liberal Arts Education	Basic English Usage	2	Required	1～2							80	1							20	1									100
Liberal Arts Education	Communication I	2	Required	1							80	1							20	1									100
Liberal Arts Education	Communication II	2	Required	2							60	1							40	1									100
Liberal Arts Education	Communication III	2	Required	3～4							60	1							40	1									100
Liberal Arts Education	The Second Foreign Languages	0	Free elective	1～2							100	1																	100
Liberal Arts Education	Information Literacy	2	Required	1～2																					60	1	40	1	100
Liberal Arts Education	Health and Sports Courses	2	Required	1～2																									100
Specialized Education	Introduction to Pharmaceutical Sciences	2	Free elective	2																					50	1	50	1	100
Specialized Education	Nuclear Pharmacy	2	Required	3	100	1																							100
Specialized Education	Physical Chemistry I	2	Required	3	100	1																							100
Specialized Education	Organic Chemistry I	2	Required	3	50	1							50	1															100
Specialized Education	Biochemistry I	2	Required	3			50	1							25	1					25	1							100
Specialized Education	Biochemistry II	2	Required	3			60	1							20	1					20	1							100
Specialized Education	Biological Chemistry III	2	Required	3			100	1																					100
Specialized Education	Public Health Chemistry I	2	Required	3					100	1																			100
Specialized Education	Pharmaceutical Analysis	2	Required	3																	100	1							100
Specialized Education	Basic Natural Product Chemistry	2	Required	3	100	1																							100
Specialized Education	Microbiology	2	Required	3			60	1							20	1					20	1							100
Specialized Education	Public Health Chemistry II	2	Required	3					100	1																			100
Specialized Education	Functional Morphology	2	Required	3																									0
Specialized Education	Pharmacognosy	2	Required	4																									0
Specialized Education	Biological Chemistry IV	2	Required	4			100	1																					100
Specialized Education	Biopharmaceutics	2	Required	4					50	1							50	1											100
Specialized Education	Physical Chemistry II	2	Required	4																									0
Specialized Education	Biochemistry V	2	Required	4			100	4																					100
Specialized Education	Bio-Analytical Science	2	Required	4																	100	1							100
Specialized Education	Organic Chemistry II	2	Required	4	50	1							50	1															100
Specialized Education	Pharmacology I	2	Required	4			25	1	30	1					25	1	20	1											100
Specialized Education	AnOutline of Pathology	2	Required	7																									0
Specialized Education	Practice for clinical food science	1	Free elective	7																									0
Specialized Education	Research Practice A	1	Required	5	10	1			10	1			10	1			10	1	10	1	10	1					20	1	20	1	100
Specialized Education	Research Practice B	1	Required	6	10	1			10	1			10	1			10	1	10	1	10	1					20	1	20	1	100
Specialized Education	Practice of Structural Elucidation	1	Elective/required	7									100	1															100
Specialized Education	Practice of xenobiotics and molecular toxicology	1	Elective/required	7																									0
Specialized Education	Practice of Organic Reactions	1	Elective/required	7	50	1							50	1															100

Subject			Type of		Evaluation items																										Total weighted values of
					Knowledge and Understanding								Abilities and Skills														Attitudes		Comprehensive Abilities			
					(1)		(2)		(3)		(4)		(1)		(2)		(3)		(4)		(5)		(6)		(7)		(1)		(1)～(8)			
Specialized Education	Practice of Structural Biology	1	Elective/required	7			10	1							10	1					40	1							40	1	100
Specialized Education	Practice of Drug Delivery System	1	Elective/required	7															100	1											100
Specialized Education	Practice of Analytical Drug Discovery and Evaluation	1	Elective/required	7					25	1							25	1									25	1	25	1	100
Specialized Education	Practice of Biochemical Pharmacology	1	Elective/required	7																									100	1	100
Specialized Education	Practice of Clinical Pharmacy	1	Elective/required	7																											0
Specialized Education	Clinical food science	2	Free elective	7																											0
Specialized Education	Pharmacology II	2	Elective/required	5			25	1	30	1					25	1	20	1													100
Specialized Education	Chemistry of Natural Products	2	Elective/required	5	50	1																							50	1	100
Specialized Education	Pharmacokinetics	2	Elective/required	5					100	1																					100
Specialized Education	Biochemistry VI	2	Elective/required	5																											0
Specialized Education	Physical Chemistry III	2	Elective/required	5																											0
Specialized Education	Antibiotics and Drug resistance	2	Elective/required	5			40	1							30	1					30	1									100
Specialized Education	Physiological Chemistry	2	Elective/required	5			100	1																							100
Specialized Education	Organic Chemistry III	2	Elective/required	5	50	1							50	1																	100
Specialized Education	Medicinal Organic Chemistry	2	Elective/required	5	100	1																									100
Specialized Education	Industrial Pharmaceutics	2	Elective/required	6	100	1																									100
Specialized Education	Cell Motility	2	Elective/required	6			100	4																							100
Specialized Education	Genetic Engineering	2	Elective/required	6			50	1							25	1					25	1									100
Specialized Education	Organic Chemistry IV	2	Elective/required	6	50	1							50	1																	100
Specialized Education	Public Health Chemistry III	2	Elective/required	6					100	1																					100
Specialized Education	Biological Statistics	2	Elective/required	6																											0
Specialized Education	Pharmacology III	2	Elective/required	6			25	1	30	1					25	1	20	1													100
Specialized Education	Clinical Pharmacy	2	Elective/required	7																											0
Specialized Education	Clinical Medicine and Pharmacotherapy I	2	Elective/required	7																											0
Specialized Education	Pharmacotherapy A	2	Elective/required	7			30	1	30	1					20	1	20	1													100
Specialized Education	AnOutline of Immunology	2	Elective/required	7																											0
Specialized Education	Clinical Medicine and Pharmacotherapy II	2	Elective/required	7																											0
Specialized Education	Pharmaceutical Affairs Related Laws	2	Elective/required	7																											0
Specialized Education	Clinical Pharmacology A	2	Elective/required	8			30	1	30	1					20	1	20	1													100
Specialized Education	Pharmacotherapy B	2	Elective/required	8																											0
Specialized Education	Drug Informatics	2	Elective/required	8					40	1							20	1							20	1			20	1	100
Specialized Education	Clinical Tests & Experiments in Clinical Tests	1	Free elective	5																											0
Specialized Education	Training of Chemical Analysis	1	Required	4																											0
Specialized Education	Experiments in Organic Chemistry	1	Required	4	20	1							20	1							20	1							40	1	100
Specialized Education	Experiments of Pharmacognosy	1	Required	5																											0
Specialized Education	Experiments of Cellular and Molecular Biology	1	Required	4																	100	6									100
Specialized Education	Experiments of Biological Chemistry	1	Required	4																											0
Specialized Education	Experiments of Microbial Chemistry	1	Required	5			10	1							10	1					40	1							40	1	100
Specialized Education	Pharmacology Practice	1	Required	5																	50	1	50	1							100
Specialized Education	Practice of Pharmaceutics	1	Required	5																									100	1	100
Specialized Education	Experiments of Public health Chemistry	1	Required	5																			100	1							100
Specialized Education	Special laboratory Works in Pharmaceutical Sciences I	2	Required	6	10	1			10	1			10	1			10	2					10	2			20	5	30	5	100

					Evaluation items																								Total weighted values of
					Knowledge and Understanding								Abilities and Skills												Attitudes		Comprehensive Abilities		
Subject			Type of		(1)		(2)		(3)		(4)		(1)		(2)		(3)		(4)		(5)		(6)		(7)		(1)		(1)～(8)		
Specialized Education	Special laboratory Works in Pharmaceutical Sciences II	2	Required	7	10	1			10	1			10	1			10	2					10	2			20	5	30	5	100
Specialized Education	Special laboratory Works in Pharmaceutical Sciences III	2	Required	8	10	1			10	1			10	1			10	2					10	2			20	5	30	5	100
					870	17	915	23	715	17	380	5	420	12	255	12	245	16	240	7	590	19	180	8	80	2	325	21	685	28	5900

Curriculum Map of Medicinal Sciences Program

Academic achievements / Evaluation items		1st grade		2nd grade		3rd grade		4th grade	
		Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester
Knowledge and Understanding				Peace Science Courses(○)					
		Integrated Courses(○)	Integrated Courses(○)						
		Information Courses(◎)							
		Area Courses(○)	Area Courses(◎○)						

1. The knowledge of chemical compounds including medicine.			Organic Chemistry I(◎)	Organic Chemistry II(◎)	Research Practice A(◎)	Special laboratory Works in Pharmaceutical Sciences I(◎)	Special laboratory Works in Pharmaceutical Sciences II(◎)	Special laboratory Works in Pharmaceutical Sciences III(◎)
			Nuclear Pharmacy◎	Experiments in Organic Chemistry(◎)	Medicinal Organic Chemistry(○)	Industrial Pharmaceutics(○)	Practice of Organic Reactions(○)	
			Basic Natural Product Chemistry (◎)		Organic Chemistry III(○)	Organic Chemistry IV(○)		
					Chemistry of Natural Products (○)	Research Practice B(◎)		
2. Knowledge of human and biological bodies.	Health and Sports Courses(○)	Health and Sports Courses(○)	Biochemistry I(◎)	Pharmacology I(◎)	Pharmacology II(○)	Pharmacology III(○)	Pharmacotherapy A(○)	Clinical Pharmacology A(○)
			Biochemistry II(◎)	Biological Chemistry IV(◎)	Biochemistry VI(○)	Cell Motility(○)		
			Biological Chemistry III(◎)	Biochemistry V(◎)	Physiological Chemistry(○)	Genetic Engineering(○)		
			Microbial Physiology(◎)		Antibiotics and Drug resistance (○)			
3. The knowledge relating to mutual reaction between chemical compounds including medicine and a human body			Public Health Chemistry I(◎)	Biopharmaceutics(◎)	Research Practice A(◎)	Special laboratory Works in Pharmaceutical Sciences I(◎)	Special laboratory Works in Pharmaceutical Sciences II(◎)	Lecture on Learning and Curriculum Development III(◎)
			Public Health Chemistry II(◎)	Pharmacology I(◎)	Pharmacology II(○)	Public Health Chemistry III (○)	Practice of Analytical Drug Discovery and Evaluation(○)	Drug Informatics(○)
					Pharmacokinetics(○)	Research Practice B(◎)	Pharmacotherapy A(○)	Clinical Pharmacology A(○)
						Pharmacology III(○)		
4. Improving English comprehension to acquire capacity of chemical English	Basic English Usage(◎)	Basic English Usage(◎)	Communication III(○)	Communication III(○)				
	Communication I(◎)	Communication II(◎)						
	The Second Foreign Languages (○)	The Second Foreign Languages (○)						
	English subject GPA	English subject GPA	English subject GPA	English subject GPA				
	TOEIC					TOEIC		
1. Development of knowledge of chemical compounds including medicine. (application)			Organic Chemistry I(◎)	Organic Chemistry II(◎)	Research Practice A(◎)	Special laboratory Works in Pharmaceutical Sciences I(◎)	Special laboratory Works in Pharmaceutical Sciences II(◎)	Special laboratory Works in Pharmaceutical Sciences III(◎)
				Experiments in Organic Chemistry(◎)	Organic Chemistry III(○)	Organic Chemistry IV(○)	Practice of Organic Reactions(○)	
						Research Practice B(◎)	Practice of Structural Elucidation (○)	
2. Development of knowledge about human and biological bodies. (advance)			Biochemistry I(◎)	Pharmacology I(◎)	Pharmacology II(○)	Pharmacology III(○)	Clinical Analysis(○)	Clinical Pharmacology A(○)
			Biochemistry II(◎)		Antibiotics and Drug resistance (○)	Genetic Engineering(○)	Pharmacotherapy A(○)	
			Microbial Physiology(◎)					
3. Development of knowledge relating to mutual reaction between chemical compounds including medicine and a human body (application)				Biopharmaceutics(◎)	Research Practice A(◎)	Special laboratory Works in Pharmaceutical Sciences I(◎)	Special laboratory Works in Pharmaceutical Sciences II(◎)	Special laboratory Works in Pharmaceutical Sciences III(◎)
				Pharmacology I(◎)	Pharmacology II(○)	Research Practice B(◎)	Practice of Analytical Drug Discovery and Evaluation(○)	Drug Informatics(○)
						Pharmacology III(○)	Pharmacotherapy A(○)	Clinical Pharmacology A(○)

Abilities and Skills	4. Being able to read English chemical papers and discuss them. (application)					Research Practice A(◎)	Research Practice B(◎)	Practice of Drug Delivery System (○)	
	5. To be able to basically treat major chemical agents, substances related to the living body, and microbes.		Pharmaceutical Analysis(◎)		Bio-Analytical Science(◎)	Pharmacology Practice(◎)	Special laboratory Works in Pharmaceutical Sciences I(◎)	Special laboratory Works in Pharmaceutical Sciences II(◎)	Special laboratory Works in Pharmaceutical Sciences III(◎)
				Organic Chemistry I(◎)	Organic Chemistry II(◎)	Research Practice A(◎)	Organic Chemistry IV(○)	Practice of Organic Reactions(○)	
				Biochemistry I(◎)	Experiments in Organic Chemistry(◎)	Organic Chemistry III(○)	Research Practice B(◎)		
				Biochemistry II(◎)	Experiments of Cellular and Molecular Biology(◎)	Antibiotics and Drug resistance (○)	Genetic Engineering(○)		
				Microbial Physiology(◎)	Experiments in Analytical Chemistry(◎)				
	6. To be able to measure and evaluate major biological reactions.					Experiments of Public health Chemistry(◎)	Special laboratory Works in Pharmaceutical Sciences I(◎)	Special laboratory Works in Pharmaceutical Sciences II(◎)	Special laboratory Works in Pharmaceutical Sciences III(◎)
						Pharmacology Practice(◎)			
	7. Being able to collect assess information on medicine.								Drug Informatics(○)
Attitudes	1. Having ability to act as member of a research team.	Introductory Seminar for Freshmen(◎)	Introduction to Pharmaceutical Sciences(○)			Research Practice A(◎)	Special laboratory Works in Pharmaceutical Sciences I(◎)	Special laboratory Works in Pharmaceutical Sciences II(◎)	Special laboratory Works in Pharmaceutical Sciences III(◎)
							Research Practice B(◎)	Practice of Analytical Drug Discovery and Evaluation(○)	
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 Freshmen(◎)	Introduction to Pharmaceutical Sciences(○)		Training of Physical Chemistry (◎)	Research Practice A(◎)	Special laboratory Works in Pharmaceutical Sciences I(◎)	Special laboratory Works in Pharmaceutical Sciences II(◎)	Special laboratory Works in Pharmaceutical Sciences III(◎)
		Information Courses(◎)			Experiments in Organic Chemistry(◎)	Practice of Pharmaceutics(◎)	Research Practice B(◎)	Practice of xenobiotics and molecular toxicology(○)	Drug Informatics(○)
					Experiments of Pharmacognosy (◎)			Practice of Analytical Drug Discovery and Evaluation(○)	
								Practice of Biochemical Pharmacology(○)	

Liberal Arts Education Subjects | Basic Specialized Subjects | Specialized Education Subjects | Graduation Thesis

(◎) Required (○) Elective/required (△) Free elective