For entrants in AY 2021

Appended Form 1

Specifications for Major Program

Name of School (Program) [School of Science (Department of Physics)]

Program name (Japanese)	物理学プログラム
(English)	Physics

1. Degree to be obtained: Bachelor of Science

2. Overview

In the educational program provided by the Department of Physics, students study the specialized basic subjects and specialized subjects related to physics in the specialized education course of the major program. They are able to select specialized subjects in which they can study state of the art knowledge in areas such as space, elementary particles, materials science, and optics.

The study of physics is a bottom-up process. In the Physics Program, subjects are arranged as a hierarchy as liberal arts education subjects, specialized basic subjects, and specialized subjects, in order to enable students to acquire knowledge, abilities, and skills related to physics. In the courses before students take specialized subjects, they are educated to acquire the basic academic skills required for science studies in general, not limited to fields of physics. In particular, for the fundamental subjects and specialized fundamental subjects, lectures are provided based on a model syllabus in which important items students are required to learn in this program are systematically organized into a step-by-step process. In the specialized courses, students are permitted to observe the research activities of faculty members, in order to gain an understanding of the details of state-of-the-art research in the area they have chosen, and to acquire knowledge, abilities, and skills related to physics. The study in specialized courses is designed to have a certain continuity with courses in the graduate school. The liberal arts subjects which are not directly related to the basics for physics are intended to achieve the aim of liberal arts education in Hiroshima University, namely to allow students to broaden their personality and vision, and to develop the ability to take various situations into consideration from broad perspective. As such, the time at which students have to take these subjects is not precisely stipulated.

This program also provides sufficient education to meet the requirements for students who want to obtain the certification for science teacher at junior and senior high school.

3. Diploma policy (policy for awarding degrees and goal of the program)

This program aims to educate students to acquire the basic and specialized knowledge, abilities, and skills related to physics listed below, and then obtain the capabilities required for specialized education and research in the graduate school, so that they can become researchers at universities or public research institutes or engineers and experts working in companies. Based on the aim above, this program will award the degree of bachelor of science to the students who will have earned the required credits defined for the education course, in addition to the following:

· Basic knowledge, abilities, and skills related to physics;

- The ability to think logically while fully applying knowledge, abilities, and skills related to physics to objective facts derived from experiments, observations, and the results of model calculations;
- The qualities necessary for working in various areas such as scientific research, education, and business, with a broad perspective that is not limited to the fields of physics and ethics; and
- · An international consciousness, and the ability to report, discuss, and present scientific contents in English.

4. Curriculum policy (policy for organizing and implementing the curriculum)

To allow students to obtain the knowledge, abilities, and skills related to physics that represent the culmination of the learning process, this program is composed of subject groups that are organized hierarchically into those of liberal arts subjects, specialized basic subjects, and specialized subjects. Courses taken before students take specialized subjects are designed to educate students to acquire the basic academic skills required for scientific studies in general, not limited to the fields of physics. For specialized basic subjects, practical lessons are provided, corresponding to each lecture, to educate students to develop their understanding and ability in the application of physics. Their academic achievement is evaluated based on their grade scores for the subjects and their achievement level against the target set for this program. The educational courses are organized and implemented according to the following policies:

- Students are able to acquire the basics of physics through the study of subjects such as mathematics in physics,
 mechanics, electromagnetism, quantum mechanics, and thermodynamics and statistical mechanics. Furthermore,
 students enhance their knowledge and understanding in their specialized area through specialized subjects provided
 for advanced expertise. In addition to this, students learn experiment techniques in the subject "experiments in
 general physics";
- Students receive education in the subject "experiments in general physics" and their graduation research to obtain the ability to think logically while fully applying their knowledge, abilities, and skills related to physics to objective facts derived from experiments, observations, and the results of model calculations;
- Students are able, through liberal arts subjects, seminars, and graduation research to acquire the necessary qualities for working in various areas such as scientific research, education, and business, with a broad perspective that is not limited to the fields of physics and ethics; and
- Students are able, through the study of foreign languages, seminars, and graduation research to acquire an international consciousness and the ability to report, discuss, and present scientific contents in English.

5. Start time and acceptance conditions

The School of Science holds entrance examinations for each department and stipulates detailed requirements for admission to the departments in its application guidelines. This program is organized primarily for students of the Department of Physics. Students choose this program when they enter the university. Students who enter the Department of Physics are expected to have mastered the following subjects in high school:

Subject name: Mathematics, Physics

This program also accepts other students of the university. Requirements for when a student not from the Department of Physics chooses this program are stipulated separately, based on the provisions regarding transfer between schools or departments.

6. Obtainable qualifications

- O Educational personnel certification
 - 1: Type 1 License for Junior High School Teacher (Science)
 - 2: Type 1 License for High School Teacher (Science)
- Curator license
- Assistant registered surveyor

7. Class subjects and their contents

- * For the class subjects, refer to the subject table in Attachment 1.
- * For the details of the class subjects, refer to the syllabus that is published for each academic year.

8. A cademic achievement

The evaluation criteria are specified for each evaluation item for academic achievement, and the level of achievement against these criteria is designated at the end of the semester.

The evaluation score for each evaluation item is converted to a numerical value (S = 4, A = 3, B = 2, and C = 1) and the evaluation standard for academic achievement, from when the student entered the university to the current semester, is determined using these values while applying weightings. The evaluation standards consist of three levels, i.e. Excellent, Very Good, and Good.

Evaluation of academic	Converted
achi evement	value
S (90 or more points)	4
A (80 – 89 points)	3
B (70 – 79 points)	2
C (60 – 69 points)	1

A cademic achievement	Evaluation
A cademic achievement	criteria
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 Attachment 2.
- * Refer to the relationship between evaluation items and class subjects described in Attachment 3.
- * Refer to the curriculum map in Attachment 4.

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

1. Purpose

Students are able to observe the research activities of faculty members in order to broaden their understanding of state-of-the-art research in their area of choice. In addition to organizing the knowledge of physics that they have acquired up to the third year, they are able to acquire further specialized understanding that can be used in graduate school courses, as well as the abilities and skills required by independent researchers.

2. Overview

The contents of the graduation research vary widely depending on the laboratory to which the student is allocated. Students are able to get to know the specialty of each mentor while taking the subject "advanced

physics." The topic for graduation research in the laboratory made known during a focused guidance session.

3. Student allocation timing and method

- 1 Students are allocated to a laboratory at the beginning of the fourth academic year. To be allocated to a laboratory, students must satisfy the "Conditions for Starting Graduation Research."
- 2 For the "Conditions for Starting Graduation Research," refer to "Criteria for Attendance 2" in "Study Guidance for the Physics Program" in the "Students Handbook" (received when the student enters the university).

10. Responsibility

(1) Responsibility for PDCA (plan, do, check, and act) cycle

The faculty committee of the Physics Program (chief: chair of the Department of Physics) is engaged in the "plan" and "do" processes.

For the processes "check" and "act", the chair of the Department of Physics consults with the committee responsible (the education affairs committee) and carries out the required actions while taking the results of the consultation into consideration.

The faculty members who constitute the faculty committee for each major program are listed in Attachment 5.

(2) Evaluation of the program

1 Perspectives for evaluation of the program

The program is reviewed and evaluated in general for its contents and composition, based on the level of understanding and achievement of students, taking into account the standard levels of knowledge in physics.

2 Evaluation method (also describing the relationship to class evaluation)

The program is reviewed and evaluated by the faculty committee based on evaluation from the perspective both of the students and of the faculty members.

From the perspective of the students, the program is reviewed based on the results of the analysis of the "class questionnaire", as well as on the opinions and requests expressed during the "roundtable meeting with students". From the perspective of members of faculty, the program is reviewed based on the analysis of the "faculty members' evaluation of achievement in the subject" using such measures as score distribution and results of follow-up checks. The education affairs committee prepares a draft of the report on the review and evaluation, and the faculty committee discusses it.

3 Policy and method for feedback to students

Based on the evaluation of the level of understanding and achievement of students, feedback is provided regarding the methodology and contents of classes, the teachers in charge of the classes, and the composition of the program.

(1) Methodology and contents of class

Based on the results of the analysis of the "class questionnaire" and the analysis of the "faculty members' evaluation of achievement in the subject", advice is provided to the faculty members who are in charge of the classes for the purpose of reviewing or improving of the methodology and contents of the classes.

(2) Teachers in charge of the classes

Although an appropriate faculty member is assigned to each subject, consideration may be given to possibly changing the faculty member based on evaluation of the analysis of the "class questionnaire".

(3) Review of the composition of the program

Revision of the program that requires revision of the curriculum is conducted from both mid- and long-term perspectives. Even in the case of minor revisions, while taking into account the current stage that has been reached in the academic year, these revisions are made in order to help students improve their understanding and achievement.

From eration Courses" 1 or 2 Free elect Calc 2 Calc 2 Linea 2 Linea 2 Exper and Laboratory Work in Physics 1 Exper and Laboratory Work in Physics 1 From Courses" 1 or 2 Free elect d semester represents that in which studer ike the subject. It is permitted to take the subject ame (first or second) semester in the follow it is required to confirm the details in syl academic year, because the subject might be prov different semester or term I to earn 4 credits in "Human & Social Scie nust take the subject "Japanese Constitution and 4 credits in "Natural Science Subjects". Stud want to acquire an educational personnel man & Social Science Subjects. ed through the subject "Advanced English cation", "Foreign Languages: Intensive Studies" a erseas Language Seminar (German, French, accepted as the credits required for "Human & So an, Chinese, and Korean)" in "Foreign Lar nce Subjects' or "Field Research in the English-speaking sh Seminar B", that is earned through selfs earned through such activities as a short-term s road, and that for "Online English Seminar epted as the credit for the subject "Communicati t in a foreign language skill test might also on Achievement in Foreign Language Skil credit. For the details, refer to the description h subjects in Liberal Arts Education and th Student Handbook. f the subject "Social Cooperation Courses' as credit for the category of "Any subject". lized Education Subjects" listed in the nex the 82 credits required for the "Specialized "Specialized Basic Subjects") and free el bjects", it is required to earn 12 or more credits (s, as well as 54 credits for required subjects and 1 ve required subjects(except the elective re s for elective required subjects. arned that exceeds 4 credits is accepted as category of "Any subject". recommended to take the subject as a red t for Physics Program

er and term in which the subject is provided

1 or 2 Elective/req

n 10 or more credits, regardless of the categoriza category (118 credits in total, that consist of 36 o Liberal Arts Education Subjects and Special or Liberal Arts Education Subjects and 82 of jects in addition to the required credits fo Education Subjects). e credit for the subjects described belowis as the required credit for graduation: For the details of subjects related to educational personnel certification, refer to the list of required credits in "Acquisition of Educational Personnel Certification" in the Student Handbook.

Any credit that exceeds 2 credits for the subject "Basic Foreign Language", and " for "second foreign languages" Any credit for subjects only related to educational personnel certification

ldy Guidance for the Physics Program. Check the

Sports Courses"

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ne subject "Special Lectures in Physics", r

subjects might be provided in an intensive

3 credits are required for graduation, it is r

s Education Subjects)

Credits for "Experiments in General Physics A", "Experiments in Chemistry A", "Laboratory Work in Biology A" and "Experiments in General Geology A"

"Basic Specialized Subjects" and "Specialized Subjects" provided in other programs in other schools (except those admitted by the faculty committee of Physics Program)

Introduction to Mathematics Introduction to Information Mathematics Introduction to Chemistry A 2 Introduction to Chemistry B 2 Introduction to Biological Sciences A 2 2 Introduction to Biological Sciences B Introduction to Earth and Planetary Sciences A 2 Introduction to Earth and Planetary Sciences B Mechanics A 2 Mechanics B 2 2 Exercises in Mechanics 2 Mathematics for Physics 2 Analytical Mechanics Thermodynamics Mechanics Electromagnetism Exercises in Electromagnetism 2 Mathematics for Physics 2 Electromagnetism 2 3 Quantum Mechanics Mathematics for Physics 2 Quantum Mechanics Exercises in Quantum Mechanics 2 Statistical Mechanics 2 Statistical Mechanics 2 Exercises in Statistical Mechanics Exercises of Physics Note 8 Mathematics for Physics Note 8 Introduction of Physics Note 8 Exercise in Electromagnetism and Quantum Mechanics Note 8 Computational Physics Note 8 2 English on Physics Physics Internship 1 Experimental Methods in Physics Laboratory in Physics 3 Laboratory in Physics 3 Physics Seminar 3 Special Study for Graduation 4 4 Special Study for Graduation 2 Advanced Mathematics Advanced Physics Advanced Chemistry Advanced Biology Advanced Earth and Planetary Science 2 Structural and Physical Properties of Solid Theory of Relativity Note 8 2 2 Applied Electromagnetic Mechanics Molecular Physics 2 Quantum Mechanics Note 8 2 Solid State Physics 2 Nuclear and Particle Physics A strophysics Mechanics of Continuous Media Note 8) Relativistic Quantum Mechanics Solid State Physics "Special Lectures in Physics" (Note 9

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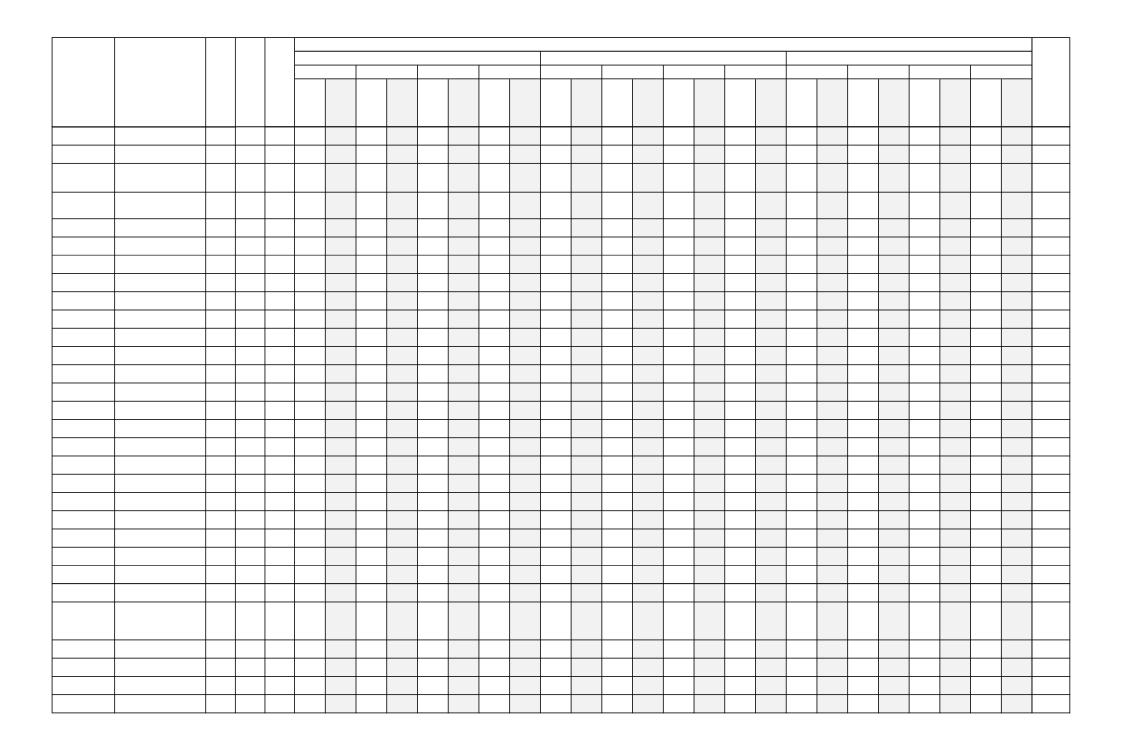
A cademic achievements of Physics Program Relationships between the evaluation items and evaluation criteria

	Excellent	Very Good	Good
mathematics, mechanics, (1) electromagnetism, thermodynamics, statistical mechanics and quantum	To be able to sufficiently understand and consider physical mathematics, mechanics, electromagnetism, thermodynamics, statistical mechanics and quantum mechanics. Also, to be able to further consider.	To be able to sufficiently understand and consider physical mathematics, mechanics, electromagnetism, thermodynamics, statistical mechanics and quantum mechanics.	To be able to understand the basics of physical mathematics, mechanics, electromagnetism, thermodynamics, statistical mechanics and quantum mechanics.
specialized field of elementary particle (2) physics, cosmophysics, astrophysics, solid-state physics, condensed matter	To be able to precisely understand technical knowledge of elementary particle physics, cosmophysics, astrophysics, solid-state physics, condensed matter physics and radiation physics. Also, to be able to evolve opinions logically.	To be able to precisely understand and examine basic technical knowledge about elementary particle physics, cosmophysics, astrophysics, solid-state physics, condensed matter physics and radiation physics.	To be able to understand and examine basic technical knowledge about elementary particle physics, cosmophysics, astrophysics, solid-state physics, condensed matter physics and radiation physics.
Acquiring science english foreign language that you can practice reading comprehension, journal publication, conference presentation.	 Being able to correctly understand the contents of papers written in English or other languages. Being able to appropriately write scientific contents in English or other languages. Being able to make well - grounded discussion and effective presentations in English or other languages. 	1. Being able to understand the contents of papers written in English or other languages. 2 Being able to write scientific contents in English or other languages. 3. Being able to make discussion and presentations in English or other languages.	Being able to understand the contents of papers written in English or other languages. Being able to write scientific contents in English or other languages.
(4) construction and development process and relations with culture and society of each		Being able to understand and explain construction and development process and relations with culture and society of each academic discipline.	Being able to understand construction and development process and relations with culture and society of each academic discipline.
(1) Ability to formulate and solve physical problems	1. Being able to assume appropriate physical principles. 2. Being able to set up models and assume quantities to solve issues. 3. Being able to release results based on clear hypotheses and similarities.	Being able to assume appropriate physical principles. 2 Being able to set up models to solve issues. 3. Being able to release results based on hypotheses and similarities.	To be able to formulate and solve physical problems.
(2) Mathematical ability to describe so	e to se ab le T c	e ue l	

A cademic achievements	Evaluation criteria										
Evaluation items	Excellent	Very Good	Good								
Acquisition of understanding of the (4) principles, research methods and skills of physics.	Being able to understand principles of physical experiments and detailed ways and procedures to get correct data. 2. Having acquired experimental technique to develop the experiments. 3. Being able to analyze experimental data appropriately, estimate errors correctly and deepen the consideration to the results accurately.	Being able to correctly understand principles of physical experiments and detailed ways and procedures. Having acquired experimental technique to get accurate experimental results. Being able to analyze experimental data, estimate errors and deepen the consideration to the results.	f 1. Being able to understand principles of physical experiments and to consider detail ways and procedures to get accurate experimental data. 2 Having acquired experimental technique to develop experiments. 3. Being able to analyze experimental data appropriately, estimate errors correctly and consider the results.								

(1) Problem-solving ability a n

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Curriculum Map of Physics

	Academic achievements	1st	grade	2nd	grade	3rd	grade	4th g	grade
	Evaluation items	Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester	Spring semester	Fall semester
	Knowledge and understanding of physical	Mechanics A	Mechanics B	Analytical Mechanics	Electromagnetism II	Quantum Mechanics II	Statistical Mechanics II		
	mathematics, mechanics,		Introduction of Physics	Thermodynamics Mechanics	Quantum Mechanics I	Statistical Mechanics I			
	electromagnetism, thermodynamics, statistical mechanics and quantum mechanics.			Electromagnetism I					
				English on Physics	Advanced Physics(O)	Structural and Physical Properties of Solid(O)	Molecular Physics(O)	Relativistic Quantum Mechanics()	
	Knowledge and understanding of					Theory of Relativity(O)	Quantum Mechanics III (O)	Solid State Physics II(O)	
	specialized field of elementary particle					Applied Electromagnetic Mechanics(Solid State Physics I(O)		
	physics, cosmophysics, astrophysics,					11	Nuclear and Particle Physics(O)		
and Understanding	solid-state physics, condensed matter physics and radiation physics.						Astrophysics(O)		
star							Mechanics of Continuous Media(O)		
der		Communication IA	Communication IIA				medianios di donernadas media (O)		
占		Communication IA	Communication IIA						
and	Acquiring science english foreign	Communication IB	Communication IIB						
owledge	language that you can practice reading	Basic English Usage I	Basic English Usage II						
γlec	comprehension, journal publication, conference presentation.	Foreign Languages: Basic Studies I	Foreign Languages: Basic Studies	English on Physics					
Kno	correctice presentation.	Foreign Languages: Basic Studies	Foreign Languages: Basic Studies						
×		Introductory Seminar for First-Year Students							
		Area Courses	Area Courses	Area Courses	Area Courses				
		Introduction to Chemistry	Introduction to Chemistry B						
	The knowledge and understanding on	Introduction to Biological Sciences A	Introduction to Biological SciencesB						
	construction and development process	Introduction to Earth and Planetary	Introduction to Earth and Planetary						
	and relations with culture and society of each academic discipline.	Sciences Introduction to Mathematics	Sciences B Introduction to Information						
	ederi deddernie discipline.	Peace Science Courses	Mathematics						
		Introduction to University Education							
	 	Function of Dhusins (A)	Constant to Machineton	[: [Exercise in Electromagnetism and	Exercises in Quantum	Exercises in Statistical		
	Ability to formulate and solve physical problems.	Exercises of Physics(△)	Exercises in Mechanics	Exercises in Electromagnetism(©)	Quantum Mechanics(△)	Mechanics (©)	Mechanics (@)		
	ľ	Mathematics for Physics A	Mathematics for Physics B	Mathematics for Physics C	Mathematics for Physics D				
Skills	Mathematical ability to describe physical items.	Calculus	Calculus						
and S	Items.	Linear Algebra	Linear Algebra						
es ar	The ability skills to compile research and	Introductory Seminar for First-Year		Experimental Methods and Laboratory Work in Physics ()	Experimental Methods in Physics(⊚)	Laboratory in Physics I(©)	Laboratory in Physics II(©)	Special Study for Graduation A()	Special Study for Graduation B()
Abilities	experiment results and solution to given issues into report.	Students		Experimental Methods and Laboratory	,505(@/				
1	Acquisition of understanding of the			Work in Physics () Experimental Methods and Laboratory Work in Physics ()	Experimental Methods in Physics(©)	Laboratory in Physics I(©)	Laboratory in Physics II(©)		
	principles, research methods and skills of physics.			Experimental Methods and Laboratory	i ilyotes (@)				
	, ,	Social Cooperation Courses	Social Cooperation Courses	Work in Physics ()		Laboratory in Physics I(©)	Laboratory in Physics II(©)	Special Study for Graduation ()	Special Study for Graduation B()
	Problem- solving ability ability of research	Social Cooperation Courses	30ciai Cooperation Courses			Laboratory III Thysics I(@)	Laboratory III Thysics II(@)	Special Study for Graduation ()	Special Study for Graduation b()
Abilities		Introductory Seminar for First-Year		Diversion Internalsia				Consolal Church for Construction (Consolal Charles for Constanting D/
Abil	Communication skills	Students		Physics Internship				Special Study for Graduation ()	Special Study for Graduation B()
		Introduction to Information and Data							
Comprehensive	The capacity of analysis and IT literacy	Sciences	Intelligence and Computer		Computational Physics			Special Study for Graduation ()	Special Study for Graduation B()
reh		Computer Programming	Ground zero programming					Exercises of Physics (©)	
dwo			Fundamental Date Science						
Ö	Fitness and health promotion	Health and Sports Courses	Health and Sports Courses						
	The foundation of the first of								
			Liberal Arts Education Subjects	Basic Specialized Subjects	Specialized Education Subjects	Graduation Thesis	Required	Elective/required	Free elective