

# HANDBOOK

for Graduate Students in  
the International Program in  
Science and Engineering  
WASEDA UNIVERSITY

2016 Fall  
2017 Spring





# **HANDBOOK**

**for Graduate Students in the  
International Program in  
Science and Engineering**

**2016 Fall /2017 Spring**

**Faculty of Science and Engineering  
Waseda University**

This handbook contains information on academic policies, curriculum, graduation requirements, and school life that applies to graduate students in the Faculty of Science and Engineering. Please be careful not to lose this handbook. Even though new handbooks are issued each year, the academic policies, curriculum, and graduation requirements stated in the handbook issued in the year that you entered applies to you until you graduate.

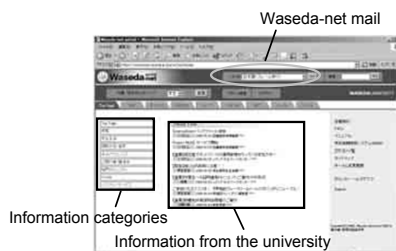
Please read through this handbook at least once and consult it whenever you have questions related to your studies at Waseda University. In addition to the information in this handbook, the university posts important announcements on the websites listed on the next page. Students should check these websites periodically.

### MyWaseda / Waseda-net mail

This is an infrastructure system used by students, faculty and staff, and alumni of Waseda University. By logging into the system from this portal, you can get information or services tailored to your qualifications or attributes (course information such as information on course registration, examinations, and reports, or information on public events such as lecture meetings, seminars, and symposiums).

Waseda-net mail is a web mail service that you can use over a web browser from anywhere. You can also use this email address after you graduate from the university.

<https://my.waseda.jp/login/login!languageChange>



To log into the website, you must enter your Waseda-net ID and password issued to you when you entered the university.

### Class support portal “Course N@vi”

Course N@vi is a tool that has class support functions such as a lecture material download function. To use Course N@vi, log into MyWaseda and select “Course N@vi” from “Classes” in the left menu.

### Students of Science and Engineering Schools website

This website for Students of Science and Engineering Schools was created by the Faculty of Science and Engineering for purposes such as class support. To access the page, log into MyWaseda and select “Students of Science and Engineering Schools website” from the left menu. You can access information tailored to individual students, such as the result of course registration and class cancellation.

You should check these pages at least once a week.



Students of Science and Engineering Schools website

### Faculty of Science and Engineering website

This website provides various types of information from the Faculty of Science and Engineering. Course registration, scholarship information, and other important information are updated as needed.

<http://www.waseda.jp/fsci/en/students/>

### Mobile Phone website

WW Mobile, a website accessible from mobile phones, has been set up. Messages from the Faculty of Science and Engineering, information on class cancellation or on lecture meetings, the availability of computer rooms and other information are accessible from mobile phones anytime, anywhere. An access code must be entered to check information on class cancellation. Check the access code in the Students of Science and Engineering School website.



QR code for WW Mobile, a website accessible from mobile phones

\* Check these web pages on a regular basis since the content of this handbook is subject to change.

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# I

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## Features of the Faculty of Science and Engineering

Welcome to Waseda University! We are very happy that you have decided to study at Waseda University's Faculty of Science and Engineering. We look forward to working with you and hope that your graduate education here will be an exciting and rewarding experience. This handbook contains information to help you make most of your time here at Waseda. It explains the academic policies, the curricula, and the graduation requirements for students in the International Program in Science and Engineering (IPSE) at Waseda University. In this handbook, we will refer to students in this program as "IPSE students". IPSE has academic policies, curricula, and graduation requirements distinct from other programs.

The Faculty of Science and Engineering is composed of three undergraduate schools and six graduate schools. The names of the graduate schools and the departments belonging to each of them are shown below.

### **Graduate School of Fundamental Science and Engineering**

Department of Pure and Applied Mathematics  
Department of Applied Mechanics  
Department of Electronic and Physical Systems  
Department of Computer Science and Communications Engineering  
Department of Intermedia Studies

### **Graduate School of Creative Science and Engineering**

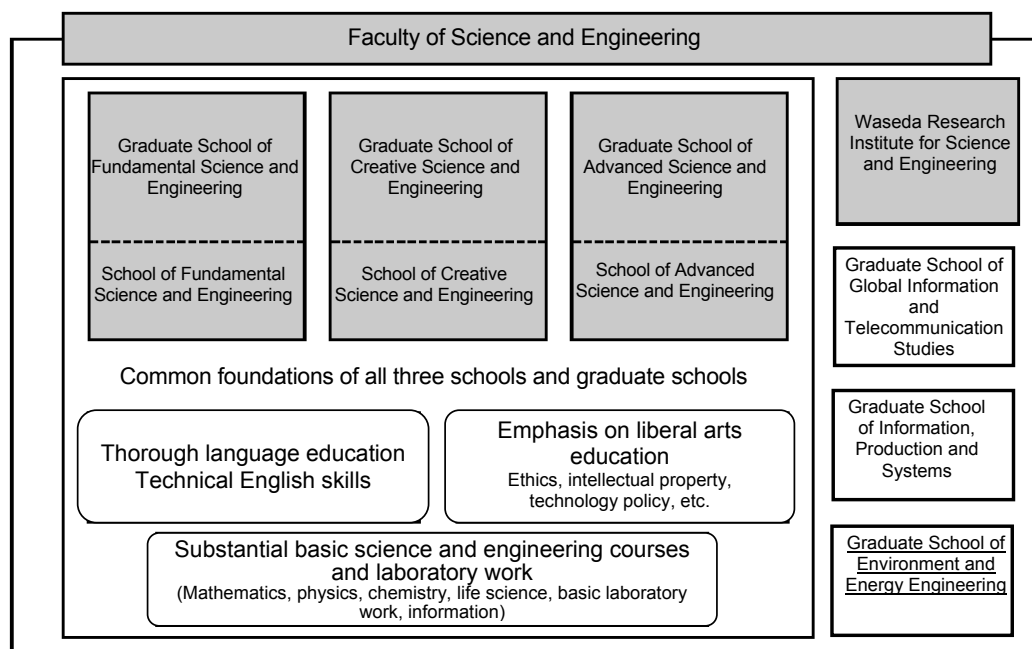
Department of Architecture  
Department of Modern Mechanical Engineering  
Department of Industrial Management and Systems Engineering  
Department of Business Design & Management  
Department of Civil and Environmental Engineering  
Department of Earth Sciences, Resources and Environmental Engineering

### **Graduate School of Advanced Science and Engineering**

Department of Pure and Applied Physics  
Department of Chemistry and Biochemistry  
Department of Applied Chemistry  
Department of Life Science and Medical Bioscience  
Department of Electrical Engineering and Bioscience  
Department of Integrative Bioscience and Biomedical Engineering  
Department of Nanoscience and Nanoengineering  
Cooperative Major in Advanced Biomedical Sciences  
Cooperative Major in Advanced Health Science  
Cooperative Major in Nuclear Energy  
Department of Advanced Science and Engineering

It is important to note that not all departments accept IPSE students to the master's program. The Graduate School of Fundamental Science and Engineering accepts IPSE master students into the Department of Pure and Applied Mathematics and the Department of Computer Science and Communications Engineering. The Graduate School of Creative Science and Engineering accepts IPSE master students into the Department of Modern Mechanical Engineering, the Department of Civil and Environmental Engineering, and the Department of Earth Science, Resources and Environmental Engineering. Except for three cooperative majors and the Department of Advanced Science and Engineering, all departments of the Graduate School of Advanced Science and Engineering accept IPSE master students. Regarding the doctoral program, all departments of the three graduate schools except for Cooperative Major in Advanced Biomedical Sciences, Cooperative Major in Advanced Health Science and Department of Advanced Science and Engineering accept IPSE doctoral students.

## <Organization of the Faculty of Science and Engineering>



# II

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## History and Profile of the Faculty of Science and Engineering

In February 1908, Shigenobu Okuma, the founder of Waseda University, keenly realizing the importance of educating scientists and engineers, established a school of science and engineering, an achievement that had been thought to be impossible for a private university. Among private universities in Japan, it remains the science and engineering educational institution with the longest history. Since the first class of 37 graduates set out into the world in 1912, many graduates have followed in their footsteps and continue to contribute actively in various areas of society.

## Profile

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**The Graduate School of Fundamental Science and Engineering** focuses on areas related to information, machines, electronics, materials, and energy, and on the foundation on which these areas rest upon: mathematics. The Graduate School consists of the Department of Pure and Applied Mathematics, the Department of Applied Mechanics, the Department of Electronic and Physical Systems, the Department of Computer Science and Communications Engineering and the Department of Intermedia Studies. The Graduate School aims to educate individuals who have the ability to think deeply and imaginatively about modern science and technology, as well as the fundamental principles on which they are based.

**The Graduate School of Creative Science and Engineering** focuses on a wide range of urgent problems that the world faces today, especially problems concerning population growth, the environment, natural resources, energy, and food. The Graduate School consists of the Department of Architecture, the Department of Modern Mechanical Engineering, the Department of Industrial Management and Systems Engineering, the Department of Business Design & Management, the Department of Civil and Environmental Engineering and the Department of Earth Sciences, Resources and Environmental Engineering. The Graduate School aims to educate scientists and engineers who can develop technologies that address the most pressing scientific and technological problems of today's world.

**The Graduate School of Advanced Science and Engineering** focuses on the traditional areas of natural science as well as on applications of fundamental research. The Graduate School consists of the Department of Pure and Applied Physics, the Department of Chemistry and Biochemistry, the Department of Applied Chemistry, the Department of Life Science and Medical Bioscience, the Department of Electrical Engineering and Bioscience, the Department of Integrative Bioscience and Biomedical Engineering, the Department of Nanoscience and Nanoengineering, the Cooperative Major in Nuclear Energy and the Department of Advanced Science and Engineering. The graduate school aims to educate students to become researchers working at the frontiers of science and engineering as well as future global leaders in a wide variety of fields.

### III

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# Bulletin of the International Program in Science and Engineering

1	Guidelines on Course Selection
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4	Internships and Volunteers
5	Tuition and Fees
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	Department of Electronic and Physical Systems
	Department of Computer Science and Communications Engineering
	Department of Intermedia Studies
	Department of Architecture
	Department of Modern Mechanical Engineering
	Department of Industrial and Management Systems Engineering
	Department of Business Design & Management
	Department of Civil and Environmental Engineering
	Department of Earth Sciences, Resources and Environmental Engineering
	Department of Pure and Applied Physics
	Department of Chemistry and Biochemistry
	Department of Applied Chemistry
	Department of Life Science and Medical Bioscience
	Department of Electrical Engineering and Bioscience
	Department of Integrative Bioscience and Biomedical Engineering
	Department of Nanoscience and Nanoengineering
	Cooperative Major in Nuclear Energy
7	How to Obtain a Teacher's Specialized License
8	Class Time Slots
9	Notes on Preparing Reports or Theses
10	Posting of Grades
11	Research Students

# 1 Guidelines on Course Selection

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## [Master's Program]

- (1) The instructor in charge of research guidance selected at the time of admission will become your supervisor.
- (2) To start working on your master's thesis, you have to earn the credits required for the first year prescribed by each department and submit a research plan for the master's thesis at the end of the first year.
- (3) To receive a master's degree, you have to be in the master's program for two years or longer, earn 30 or more credits, receive required research guidance, and pass a master's thesis defense. For students who are recognized by the Graduate School Steering Committee to have achieved outstanding performance, however, attendance for less than two years be deemed as fulfilling the attendance period.
- (4) Students must register (apply for and confirm the registration of) courses to take for that year during the specified course registration period.

When selecting courses, read this handbook, the syllabus on the web, etc. thoroughly and set your own learning goals. Be careful not to register for the wrong courses or fail to register for the courses you want to take.

**Syllabus on the web** <https://www.wsl.waseda.jp/syllabus/JAA101.php?PLng=en>

You are not allowed to attend courses that you have not registered for. You cannot earn credits if you attend courses that you have not registered for even if you attend the courses and/or take examinations.

You are not allowed to change or cancel courses once you have registered for them outside of the designated period. Register courses carefully in person. Be sure to confirm the results of registration.

When taking courses, be sure to confirm your selections with your supervisor in advance and only apply for approved courses.

For actual application procedures, check the instructions on the website of the Faculty of Science and Engineering.

- (5) When taking courses whose names are numbered I and II, you must take them in that order. When taking courses whose names are followed by A, B, C, and D, there is no specific order for the courses.
- (6) When the number of credits earned in seminar courses exceeds the limit of credits specified by each department, the excess credits are not counted toward the number of credits required for graduation.
- (7) In principle, lecture courses are to be selected from the courses provided by your department, but you may select courses in other departments in the Faculty of Science and Engineering and, with the permission of your supervisor, courses offered by other Faculties. Depending on your department's policy, some credits earned in such courses may be counted as part of the required 30 credits for the Master's degree. Each department's policy regarding the upper limit on the number of credits that may be counted in this way is shown in the table below. Some courses, however, such as those offered by the Center for Japanese Language, Global Education Center, and Center for International Education, cannot be counted among the 30 credits required for the Master's degree.

Department	Non-IPSE lecture courses offered by any department in FSE ( <i>note: Non-IPSE means existing regular programs taught mostly in Japanese</i> )	IPSE lecture courses offered by sub-programs other than one's home sub-programs	Courses of other graduate schools of the Faculty of Science and Engineering	Lecture courses offered by Graduate Schools belonging to Faculties other than FSE
Pure and Applied Mathematics	6	No limit	No limit	No limit
Computer Science and Communications Engineering	6	No limit	No limit	No limit
Modern Mechanical Engineering	10	No limit	No limit	No limit
Civil and Environmental Engineering	No limit	No limit	No limit	No limit
Earth Sciences, Resources and Environmental Engineering	No limit	No limit	No limit	No limit
Pure and Applied Physics	18	No limit	No limit	No limit
Chemistry and Biochemistry	18	No limit	No limit	No limit
Applied Chemistry	18	No limit	No limit	No limit
Life Science and Medical Bioscience	18	No limit	No limit	No limit
Electrical Engineering and Bioscience	18	No limit	No limit	No limit
Integrative Bioscience and Biomedical Engineering	18	No limit	No limit	No limit
Nanoscience and Nanoengineering	18	No limit	No limit	No limit

- (8) If you have a special reason, you are allowed to change your academic supervisor within the same research area at the beginning of your second year with the approval of the relevant faculty members.
- (9) In preparing a master's thesis, follow the instructions of your supervisor.
- (10) The maximum period of study in a master's program is four years.



- (11) From the viewpoint of coherent education between undergraduate and graduate programs, each school adopts a system under which fourth year students can take specified lecture courses offered by the graduate school in which they plan to study. Earned credits under this system are counted toward the credits required for completion of master's programs (30 credits) up to upper limits set by individual departments, as shown on the following table:

Graduate School	Dept. of	Upper limit on the number of credits (earned under this system) to be counted toward completion of master's programs
Fundamental Science and Engineering	Pure & Applied Mathematics	10
	Computer Science & Communications Engineering	10
Creative Science and Engineering	Modern Mechanical Engineering	10
	Civil & Environmental Engineering	0
	Earth Sciences, Resources and Environmental Engineering	10
Advanced Science and Engineering	Pure & Applied Physics	10
	Chemistry & Biochemistry	10
	Applied Chemistry	10
	Life Science & Medical Bioscience	10
	Electrical Engineering & Bioscience	10
	Integrative Bioscience & Biomedical Engineering	10
	Nanoscience & Nanoengineering	10

- (12) If it is recognized as beneficial for educational and research purposes by the supervisor, undergraduate courses in the Faculty of Science and Engineering may be taken but not counted as credits required for completion (30 credits). A student cannot take a course that he/she already took as an undergraduate student.

### **[Doctoral Program]**

- (1) The instructor in charge of research guidance selected at the time of admission will become your supervisor.
- (2) The doctoral program does not specify the number of credits that must be earned, but students can take classes provided for students of the doctoral program. Furthermore, students may audit lecture courses offered in other programs by Faculty of Science and Engineering and other graduate schools with prior approval from the faculty in charge of those classes.
- (3) Preparing the doctoral dissertation, completing the program requirements, and following all other matters pertaining to research in general must be in accordance with the instructions of your supervisor.
- (4) Students are not permitted to enroll in a doctoral program for more than six years.
- (5) If a student withdraws from the doctoral program before submitting his/her doctoral dissertation, he/she is eligible to submit it and take the final examination within a period of three years from date of withdrawal from the program, provided he/she has attended the program for at least three years and received the necessary research guidance.
- (6) The doctoral dissertation will be accepted on the condition that students must undertake a course on research ethics prescribed by the graduate school.

## 2 Degree

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### [Master's Program]

Department	Degree
Pure and Applied Mathematics	Master of Engineering or Master of Science
Computer Science and Communications Engineering	Master of Engineering
Modern Mechanical Engineering	Master of Engineering
Civil and Environmental Engineering	Master of Engineering
Earth Sciences, Resources and Environmental Engineering	Master of Engineering or Master of Science
Pure and Applied Physics	Master of Engineering or Master of Science
Chemistry and Biochemistry	Master of Science
Applied Chemistry	Master of Engineering
Life Science and Medical Bioscience	Master of Engineering or Master of Science
Electrical Engineering and Bioscience	Master of Engineering or Master of Science
Integrative Bioscience and Biomedical Engineering	Master of Engineering or Master of Science
Nanoscience and Nanoengineering	Master of Engineering or Master of Science

### [Doctoral Program]

Department	Degree
Pure and Applied Mathematics	Doctor of Engineering or Doctor of Science
Applied Mechanics	Doctor of Engineering
Electronic and Physical Systems	Doctor of Engineering or Doctor of Science
Computer Science and Communications Engineering	Doctor of Engineering
Intermedia Studies	Doctor of Engineering
Architecture	Doctor of Architecture or Doctor of Engineering
Modern Mechanical Engineering	Doctor of Engineering
Industrial and Management Systems Engineering	Doctor of Engineering
Business Design & Management	Doctor of Management Engineering
Civil and Environmental Engineering	Doctor of Engineering
Earth Sciences, Resources and Environmental Engineering	Doctor of Engineering or Doctor of Science
Pure and Applied Physics	Doctor of Engineering or Doctor of Science
Chemistry and Biochemistry	Doctor of Science
Applied Chemistry	Doctor of Engineering
Life Science and Medical Bioscience	Doctor of Engineering or Doctor of Science
Electrical Engineering and Bioscience	Doctor of Engineering or Doctor of Science
Integrative Bioscience and Biomedical Engineering	Doctor of Engineering or Doctor of Science
Nanoscience and Nanoengineering	Doctor of Engineering or Doctor of Science
Cooperative Major in Nuclear Energy	Doctor of Engineering or Doctor of Science

### **3 Special Research, Seminars, and Laboratory Work (4 credits)**

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These are seminars or laboratory classes related to specific topics planned and provided by each department as needed in response to the rapid development of science and technology. They can be selected only in the year when they are indicated as intensive lectures or intensive seminars in the relevant fields.

### **4 Internships and Volunteers**

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#### **【Internships】**

Internships provide an opportunity for students to experience how what they have studied is used in actual production sites in a related company or research institution during summer or spring holidays.

Students are graded comprehensively according to reports from companies or institutions to which they were sent, their reports or presentations, and other results. Those given a passing grade can earn 2 credits.

The internship covers overseas training and TA (teaching assistant) programs in basic experiments in science and engineering as well.

**(Note) To participate, you must submit an application form for internship participation to the Center for Science and Engineering in advance. By submitting this application form, you are automatically registered to both the ‘Injury and Accident Compensation Program for Waseda Students (GAKUSHOUHO)’ and the ‘Liability Insurance Program for Waseda Students (GAKUBAIHO)’.**

#### **【Volunteers】**

This course requires students to submit an “activity report” and a report describing achievements for welfare activities, disaster relief activities, or other social activities related to human rights, peace, the environment, or other deep problems of human society in which they were involved for their own motives. The said two reports will be evaluated, and, if deemed passing score, the final grade will be given to you with 1 credit. Students can take this course from 1st year.

**(Note) In order to take this course, students must submit in advance to the Center for Science and Engineering a “volunteer application form” and letter of consent by your guarantor to the Center for Science and Engineering. By submitting the application form to the office, you are automatically registered to both the ‘Injury and Accident Compensation Program for Waseda Students (GAKUSHOUHO)’ and the ‘Liability Insurance Program for Waseda Students (GAKUBAIHO)’.**

## 5 Tuition and Fees

### (1) Payment dates

Tuition and fees must be paid by the following due dates:

Tuition and Fees	Due date for payment
Tuition and Fees for the fall semester	October 1
Tuition and Fees for the spring semester	May 1

### (2) Tuition and Fees

<b>Master</b>					
<b>Graduate School of Fundamental Science and Engineering / Graduate School of Creative Science and Engineering</b>					
	First year		Second year		
	Fall semester	Spring semester	Fall semester	Spring semester	
Admission Fee	200,000	0	0	0	
Tuition	401,000	403,500	403,500	406,500	
Educational Environment Improvement Fee	90,000	90,000	90,000	90,000	
Seminar Fee	Pure and Applied Mathematics	35,000	35,000	35,000	
	Computer Science and Communications Engineering	48,000	48,000	48,000	
	Modern Mechanical Engineering	47,000	47,000	48,000	
	Civil and Environmental Engineering	45,000	45,000	45,000	
	Earth Sciences, Resources and Environmental Engineering	48,000	48,000	48,000	
Membership Fee of Student Health Promotion Mutual Aid	1,500	1,500	1,500	1,500	
Total amount	Pure and Applied Mathematics	727,500	530,000	533,000	
	Computer Science and Communications Engineering	740,500	543,000	546,000	
	Modern Mechanical Engineering	739,500	542,000	543,000	
	Civil and Environmental Engineering	737,500	540,000	543,000	
	Earth Sciences, Resources and Environmental Engineering	740,500	543,000	546,000	
Yearly amount		1,257,500		1,083,000	
	Computer Science and Communications Engineering		1,283,500		1,089,000
	Modern Mechanical Engineering		1,281,500		1,089,000
	Civil and Environmental Engineering		1,277,500		1,083,000
	Earth Sciences, Resources and Environmental Engineering		1,283,500		1,089,000

<b>Graduate School of Advanced Science and Engineering</b>					
	First year		Second year		
	Fall semester	Spring semester	Fall semester	Spring semester	
Admission Fee	200,000	0	0	0	
Tuition	450,000	453,500	453,500	456,500	
Educational Environment Improvement Fee	90,000	90,000	90,000	90,000	
Seminar Fee	Pure and Applied Physics				
	Chemistry and Biochemistry	39,750	39,750	39,750	
	Applied Chemistry			44,750	
	Life Science and Medical Bioscience			45,500	
	Electrical Engineering and Bioscience				
	Integrative Bioscience and Biomedical Engineering	44,750	44,750		
	(Laboratories excluding Mechanical engineering/ Information science)			46,250	
	Integrative Bioscience and Biomedical Engineering				46,250
	(Mechanical engineering/ Information science laboratories)	20,000	20,000	21,500	
	Nanoscience and Nanoengineering (Solid-state Nanoscience / Nanoelectronics)	39,750	39,750	40,500	
Total amount	Nanoscience and Nanoengineering (Nanotechnology)	44,750	44,750	45,500	
	Membership Fee of Student Health Promotion Mutual Aid	1,500	1,500	1,500	
	Pure and Applied Physics	781,250	584,750	584,750	
	Chemistry and Biochemistry			589,750	
	Applied Chemistry			590,500	
	Life Science and Medical Bioscience			591,250	
	Electrical Engineering and Bioscience				
	Integrative Bioscience and Biomedical Engineering	786,250	589,750		
	(Laboratories excluding Mechanical engineering/ Information science)			591,250	
	Integrative Bioscience and Biomedical Engineering				594,250
Yearly amount	(Mechanical engineering/ Information science laboratories)	761,500	565,000	566,500	
	Nanoscience and Nanoengineering (Solid-state Nanoscience / Nanoelectronics)	781,250	584,750	585,500	
	Nanoscience and Nanoengineering (Nanotechnology)	786,250	589,750	590,500	
	Pure and Applied Physics		1,366,000		1,172,500
	Chemistry and Biochemistry				1,182,500
	Applied Chemistry				1,184,000
	Life Science and Medical Bioscience				
	Electrical Engineering and Bioscience		1,376,000		
	Integrative Bioscience and Biomedical Engineering				1,185,500
	(Laboratories excluding Mechanical engineering/ Information science)				
Total amount	Integrative Bioscience and Biomedical Engineering				1,136,000
	(Mechanical engineering/ Information science laboratories)		1,326,500		
	Nanoscience and Nanoengineering (Solid-state Nanoscience / Nanoelectronics)		1,366,000		1,174,000
	Nanoscience and Nanoengineering (Nanotechnology)		1,376,000		1,184,000

Doctor		First year		Second year		Third year	
		Fall semester	Spring semester	Fall semester	Spring semester	Fall semester	Spring semester
Admission Fee		200,000	0	0	0	0	0
Tuition		330,500	333,000	333,000	335,000	335,000	337,500
Educational Environment Improvement Fee		55,000	55,000	55,000	55,000	55,000	55,000
Seminar Fee	Pure and Applied Mathematics	35,000	35,000	35,000	35,000	35,000	35,000
	Applied Mechanics	48,000	48,000	48,000	48,000	48,000	48,000
	Electronic and Physical Systems						
	Computer Science and Communication Engineering						
	Intermedia Art and Science						
	Architecture	48,000	48,000	48,000	48,000	48,000	48,000
	Modern Mechanical Engineering	47,000	47,000	48,000	48,000	48,000	48,000
	Industrial Management and Systems Engineering			47,000	47,000	47,000	47,000
	Civil and Environmental Engineering			45,000	45,000	45,000	45,000
	Earth Sciences,Resources and Environmental Engineering			48,000	48,000	48,000	48,000
	Business Design & Management	60,000	60,000	60,000	60,000	60,000	60,000
	Pure and Applied Physics	47,250	47,250	47,250	47,250	47,250	47,250
	Chemistry and Biochemistry	52,250	52,250	53,000	53,000	53,750	53,750
	Applied Chemistry						
	Life Science and Medical Bioscience						
	Electrical Engineering and Bioscience						
	Integrative Bioscience and Biomedical Engineering						
	Nanoscience and Nanoengineering						
	Cooperative Major in Nuclear Energy	47,250	47,250	47,250	47,250	47,250	47,250
Membership Fee of Student Health Promotion Mutual Aid		1,500	1,500	1,500	1,500	1,500	1,500
Total amount	Pure and Applied Mathematics	622,000	424,500	424,500	426,500	426,500	429,000
	Applied Mechanics	635,000	437,500	437,500	439,500	439,500	442,000
	Electronic and Physical Systems						
	Computer Science and Communication Engineering						
	Intermedia Art and Science						
	Architecture	635,000	437,500	437,500	439,500	439,500	442,000
	Modern Mechanical Engineering	634,000	436,500	437,500	439,500	439,500	442,000
	Industrial Management and Systems Engineering			436,500	438,500	438,500	441,000
	Civil and Environmental Engineering			434,500	436,500	436,500	439,000
	Earth Sciences,Resources and Environmental Engineering			437,500	439,500	439,500	442,000
	Business Design & Management	647,000	449,500	449,500	451,500	451,500	454,000
	Pure and Applied Physics	634,250	436,750	436,750	438,750	438,750	441,250
	Chemistry and Biochemistry	639,250	441,750	442,500	444,500	445,250	447,750
	Applied Chemistry						
	Life Science and Medical Bioscience						
	Electrical Engineering and Bioscience						
	Integrative Bioscience and Biomedical Engineering						
	Nanoscience and Nanoengineering						
	Cooperative Major in Nuclear Energy	634,250	436,750	436,750	438,750	438,750	441,250
Yearly amount	Pure and Applied Mathematics	1,046,500		851,000		855,500	
	Applied Mechanics	1,072,500		877,000		881,500	
	Electronic and Physical Systems						
	Computer Science and Communication Engineering						
	Intermedia Art and Science						
	Architecture	1,072,500		877,000		881,500	
	Modern Mechanical Engineering	1,070,500		877,000		881,500	
	Industrial Management and Systems Engineering			875,000		879,500	
	Civil and Environmental Engineering			871,000		875,500	
	Earth Sciences,Resources and Environmental Engineering			877,000		881,500	
	Business Design & Management	1,096,500		901,000		905,500	
	Pure and Applied Physics	1,071,000		875,500		880,000	
	Chemistry and Biochemistry	1,081,000		887,000		893,000	
	Applied Chemistry						
	Life Science and Medical Bioscience						
	Electrical Engineering and Bioscience						
	Integrative Bioscience and Biomedical Engineering						
	Nanoscience and Nanoengineering						
	Cooperative Major in Nuclear Energy	1,071,000		875,500		880,000	

### (3) Tuition and fees for students enrolled longer than the given terms

Tuition and fees for each semester for students enrolled longer than the given term are as follows:

	Tuition	Educational Environment Improvement Fee	Seminar fee
Students who have only yet to pass a master's or doctoral thesis review	50% of the prescribed fee	50% of the prescribed fee	For a master's program, the prescribed fee for the second year
Students who have passed a master's or doctoral thesis review although the total number of credits required for graduation has not been reached			
Students who have not passed a master's or doctoral thesis review and taken courses and who need to earn 14 credits or less for graduation	70% of the prescribed fee		For a doctoral program, the prescribed fee for the third year
Students who need to pass a master's or doctoral thesis review and take courses and who need to earn 15 credits or more for graduation	Prescribed fee		

\* The "number of credits to be earned for graduation" refers to the number calculated at the end of the previous semester.

\* For details about tuition and fees when you are on a leave of absence or study abroad during the enrollment period, contact the Center for Science and Engineering.

### (4) Payment method

Please pay tuition and fees using the "school expense payment form" or by account transfer through a post office or another financial institution specified in the admission procedure. The account transfer must be made from the account you specified in the admission procedure. When making payment by account transfer, be sure to check the notice of account transfer that will be sent to your school expense payer in advance. In case of any changes in the financial institution or account, inform the Center for Science and Engineering of the changes.

Tuition and fees must be paid by the specified due dates. If some special reason makes it impossible to do that, you may be allowed to postpone payment of tuition and fees. For more details, consult the Center for Science and Engineering.

### (5) Removal from the school register

Those who fail to pay tuition and fees are removed from the school register which means losing student status. They are expelled with retroactive effect to the end of the semester for which they paid tuition and fees. In this case, part of the years at school and grades are cancelled. If you want to withdraw from the university for some special reason before the date when you would be automatically removed from the school register (refer to the table below), consult the Office of the Faculty of Science and Engineering.

Tuition and Fees	Due date for payment	Date of automatic removal from the school register	Date of withdrawal
Tuition and Fees for the fall semester	October 1	March 31 of the following year	September 20
Tuition and Fees for the spring semester	May 1	September 20	March 31

## **6 List of Courses for each Department**

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### **Department of Pure and Applied Mathematics**

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The objective of the Department of Pure and Applied Mathematics is to study problems arising in various fields of mathematical science, including pure and applied mathematics.

In the basic stages of this field, students must deepen their understanding of the basic concepts required. In the next stage, students need to develop their ability to apply the theories and methods they have developed to each problem. At higher stages, students carry out research activities such as exploring unknown territories in mathematical science and working on unsolved problems.

The Department of Pure and Applied Mathematics consists of the following seven research areas: Mathematical Logic, Algebra, Geometry, Analysis, Mathematics on Phenomena, Computational Mathematics, and Statistical Science. Students belong to one of the research areas from which they select courses, mainly from the recommended courses of each research area. However, these research areas are not independent from each other in terms of academic characteristics, but are organically related to each other. Therefore, students are recommended to choose and study courses in a well-balanced manner without being constrained to one specific research area.

In master's programs, apart from lecture courses, seminar courses are provided in a seminar format, and students are required to take the seminar courses provided by their supervisor. These seminars form the basis for the Department of Pure and Applied Mathematics, and students are required to be well-prepared before attending seminars. It is important for attendees to deepen their understanding of the themes through research discussions.

Students in a doctoral program are required to develop their research ability and attitude to lead research activities on their own initiative as expert researchers.

#### **Guidelines for earning a Master's Degree**

1. To be granted a master's degree, you must earn 30 or more credits, receive the required research guidance, and pass a master's thesis review.
2. Among the 30 credits required for the degree, 12 credits must be earned from seminar courses. Each academic year, you must take the seminar courses provided by your supervisor. If more than 12 credits of seminar courses are taken, credits in excess of 12 are not counted toward the number of credits required for the degree.
3. Please consult with your supervisor regarding what other courses should be taken to fulfill the credit requirement toward your degree.

## Summary of Each Research Area

### ◆ Mathematical Logic

Mathematical logic is traditionally classified into set theory, recursive function theory, model theory, and proof theory. Among these, recursive function theory is related to the fundamentals of computer sciences, and as a result, proof theory is partially related to computer-related research areas. On the other hand, set theory has developed as an area of pure mathematics, and its application to other areas of pure mathematics that deals with infinities is observed. This research area provides lectures on set theory and its application and the fundamental theory of information and computer science.

### ◆ Algebra

Algebra contains the following research themes: algebraic number theory, diophantine equation, automorphic function theory, commutative algebra, homological algebra, arithmetical geometry, geometric code theory, and algebraic geometry.

### ◆ Geometry

Geometry consists of the two pillars, “Analysis on Manifolds” and “Topology.”

The first pillar, Analysis on Manifolds, has made remarkable progress under the influence of relativity and quantum field theory, and has developed into a huge field which can be called the core of modern mathematics. The research themes in this area consist of (a) theory of analytic manifolds, (b) geometry of connections, (c) Lie group representation theory, (d) algebraic analysis of infinite degrees of freedom, and (e) nonlinear analysis on manifolds.

The other pillar, Topology, is an active area which currently shows new developments centering on the theory of three-dimensional manifolds and dynamical systems. The research themes in this area are (a) geometry of knots, (b) dynamical systems, and (c) theory of three-dimensional hyperbolic manifolds.

### ◆ Analysis

In the research area of Analysis, studies are conducted mainly on functional analysis, real function theory, and theory of functional equations.

In functional analysis, studies on application of the theory of function algebras to complex analysis, function spaces appearing in probability theory, etc. are conducted. In real function theory, studies on various function spaces such as real Hardy spaces, application of interpolation theory to partial differential equations, etc. are conducted.

In the theory of functional equations, partial differential equations, especially non-linear equations, are the main topic of study, and a wide variety of problems such as nonlinear evolution equations, optimal control problems, hyperbolic equations, parabolic equations, elliptic equations, fluid equation systems, and variational problems are studied. Therefore, students in this field need to select their research theme from a wide range of options with a clear awareness of the issues. A variety of methods including orthodox differential and integral calculus, functional analysis, theory of nonlinear semigroups, variational problems, mapping degree, viscosity solutions, Fourier analysis, bifurcation theory, and computer assisted proof are used as study methods. Accordingly, even among instructors working on similar themes, the research methods and means employed may be different from each other.



#### ◆ Mathematics on Phenomena

This research area aims to examine various phenomena which appear in natural science and engineering such as physics, chemistry, and mathematical ecology in hopes of finding new buds of mathematics from which to grow a new kind of mathematics. Specifically, mathematics of nonlinear systems (reaction-diffusion equations, nonlinear wave equations, etc.), theory of relativity, and topology of area structures of materials such as fractal structures are studied.

#### ◆ Computational Mathematics

In the research area of Computational Mathematics, studies are conducted mainly on methods and theories (from basics to applications) which are effective for analyzing various problems of mathematics and physics with the aid of computers.

#### ◆ Statistical Science

The present age is often called the “age of uncertainty.” The purpose of mathematical statistics is to find a fixed law hidden behind the phenomena that appear to be random at first glance and make reasonable and effective decisions by consciously using it.

In the research area of Statistical Science, the basic characteristics of probability that controls chance and composition, inference, and application of models of stochastic phenomena (stochastic processes) corresponding to various phenomena in society and nature are developed, while taking into account the basics of measure theory. Furthermore, by extracting valid information given statistical data, studies are developed on statistical model selection, estimation and validation of unknown probability distributions, and basics and applications of statistical data analysis for prediction of future matters, while clarifying the mathematical grounds. While the undergraduate school provides education focusing on introductory matters rather than rigorous theories, the graduate school provides education and research guidance to enable students to gain a systematic understanding from the basics. Study themes include financial engineering among other fields and are based on time series analysis, multivariate analysis, asymptotic theory, decision theory, Bayes estimation, modern probability theory, and statistical inference.

## (I) Research guidance (Master's program)

Course Name
Research on Number Theory
Research on Number Theory and Special Functions
Research on Algebraic Geometry
Research on Topology (Prof. Murakami)
Research on Topology (Prof. Watanabe)
Research on Partial Differential Equations (Prof. Shibata)
Research on Partial Differential Equations (Prof. Yamazaki)
Research on Applications of Mathematics to Materials Engineering
Research on Nonlinear Systems (Prof. Yamada)
Research on Nonlinear Systems (Prof. Takahashi)
Research on Numerical Analysis (Prof. Oishi)
Research on Numerical Analysis (Prof. Kashiwagi)
Research on Mathematical Statistics, Time Series, Finance
Research on Stochastic Processes
Research on Applied Statistics
Research on Differential Geometry
Research on Mathematical Logic and Set Theory
Research on Computing Language and Speech
Research on Stochastic and Statistical Analysis and Insurance Mathematics
Research on Harmonic Analysis and Nonlinear Partial Differential Equation
Research on Non-linear Functional Analysis
Research on Real Analysis

## (II) Research guidance (Doctoral program)

Course Name
Research on Number Theory
Research on Number Theory and Special Functions
Research on Algebraic Geometry
Research on Topology (Prof. Murakami)
Research on Topology (Prof. Watanabe)
Research on Partial Differential Equations (Prof. Shibata)
Research on Partial Differential Equations (Prof. Yamazaki)
Research on Applications of Mathematics to Materials Engineering
Research on Nonlinear Systems (Prof. Yamada)
Research on Nonlinear Systems (Prof. Takahashi)
Research on Numerical Analysis (Prof. Oishi)
Research on Numerical Analysis (Prof. Kashiwagi)
Research on Mathematical Statistics, Time Series, Finance
Research on Stochastic Processes
Research on Applied Statistics
Research on Differential Geometry
Research on Mathematical Logic and Set Theory
Research on Computing Language and Speech
Research on Stochastic and Statistical Analysis and Insurance Mathematics
Research on Harmonic Analysis and Nonlinear Partial Differential Equation
Research on Non-linear Functional Analysis
Research on Real Analysis

### (III) Lecture courses

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Advanced Algebra	2	2	
Advanced Geometry	2	2	
Mathematics of Thermodynamics and Statistical Mechanics	2	2	
Statistical Science A	2	2	
Statistical Science B	2	2	
Advanced Partial Differential Equations	2	2	
Advanced Number Theory	2	2(Intensive)	
Advanced Topics in Pure and Applied Mathematics (Data Science) B	2	2	
Advanced Topics in Pure and Applied Mathematics (Data Science) D	2	2	
Cyclotomic Field and Iwasawa Theory	2		2
Number Theory and Geometry	2		2
Advanced Topology	2		2
Mathematical Fluid Dynamics	2		2
Statistical Science C	2		2
Advanced Numerical Analysis	2		2
Advanced Probability and Statistics	2		2
Financial Econometrics	2		2
Advanced Topics in Pure and Applied Mathematics (Data Science) A	2		2
Advanced Topics in Pure and Applied Mathematics (Data Science) C	2		2

### (IV) Seminar courses

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Seminar on Number Theory A	3		3
Seminar on Number Theory B	3	3	
Seminar on Number Theory C	3		3
Seminar on Number Theory D	3	3	
Seminar on Number Theory and Special Functions A	3		3
Seminar on Number Theory and Special Functions B	3	3	
Seminar on Number Theory and Special Functions C	3		3
Seminar on Number Theory and Special Functions D	3	3	
Seminar on Topology A (Prof. Murakami)	3		3
Seminar on Topology B (Prof. Murakami)	3	3	
Seminar on Topology C (Prof. Murakami)	3		3
Seminar on Topology D (Prof. Murakami)	3	3	
Seminar on Topology A (Prof. Watanabe)	3		3
Seminar on Topology B (Prof. Watanabe)	3	3	
Seminar on Topology C (Prof. Watanabe)	3		3
Seminar on Topology D (Prof. Watanabe)	3	3	
Seminar on Nonlinear Partial Differential Equations A (Prof. Shibata)	3		3
Seminar on Nonlinear Partial Differential Equations B (Prof. Shibata)	3	3	
Seminar on Nonlinear Partial Differential Equations C (Prof. Shibata)	3		3
Seminar on Nonlinear Partial Differential Equations D (Prof. Shibata)	3	3	

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Seminar on Nonlinear Partial Differential Equations A (Prof. Yamazaki)	3		3
Seminar on Nonlinear Partial Differential Equations B (Prof. Yamazaki)	3	3	
Seminar on Nonlinear Partial Differential Equations C (Prof. Yamazaki)	3		3
Seminar on Nonlinear Partial Differential Equations D (Prof. Yamazaki)	3	3	
Seminar on Applications of Mathematics to Materials Engineering A	3		3
Seminar on Applications of Mathematics to Materials Engineering B	3	3	
Seminar on Applications of Mathematics to Materials Engineering C	3		3
Seminar on Applications of Mathematics to Materials Engineering D	3	3	
Seminar on Nonlinear Systems A (Prof. Yamada)	3		3
Seminar on Nonlinear Systems B (Prof. Yamada)	3	3	
Seminar on Nonlinear Systems C (Prof. Yamada)	3		3
Seminar on Nonlinear Systems D (Prof. Yamada)	3	3	
Seminar on Nonlinear Systems A (Prof. Takahashi)	3		3
Seminar on Nonlinear Systems B (Prof. Takahashi)	3	3	
Seminar on Nonlinear Systems C (Prof. Takahashi)	3		3
Seminar on Nonlinear Systems D (Prof. Takahashi)	3	3	
Seminar on Numerical Analysis A (Prof. Oishi)	3		3
Seminar on Numerical Analysis B (Prof. Oishi)	3	3	
Seminar on Numerical Analysis C (Prof. Oishi)	3		3
Seminar on Numerical Analysis D (Prof. Oishi)	3	3	
Seminar on Numerical Analysis A (Prof. Kashiwagi)	3		3
Seminar on Numerical Analysis B (Prof. Kashiwagi)	3	3	
Seminar on Numerical Analysis C (Prof. Kashiwagi)	3		3
Seminar on Numerical Analysis D (Prof. Kashiwagi)	3	3	
Seminar on Mathematical Statistics, Time Series, Finance A	3		3
Seminar on Mathematical Statistics, Time Series, Finance B	3	3	
Seminar on Mathematical Statistics, Time Series, Finance C	3		3
Seminar on Mathematical Statistics, Time Series, Finance D	3	3	
Seminar on Algebraic Geometry A	3		3
Seminar on Algebraic Geometry B	3	3	
Seminar on Algebraic Geometry C	3		3
Seminar on Algebraic Geometry D	3	3	
Seminar on Stochastic Processes A	3		3
Seminar on Stochastic Processes B	3	3	
Seminar on Stochastic Processes C	3		3
Seminar on Stochastic Processes D	3	3	
Seminar on Applied Statistics A	3		3
Seminar on Applied Statistics B	3	3	
Seminar on Applied Statistics C	3		3
Seminar on Applied Statistics D	3	3	
Seminar on Differential Geometry A	3		3
Seminar on Differential Geometry B	3	3	
Seminar on Differential Geometry C	3		3
Seminar on Differential Geometry D	3	3	

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Seminar on Mathematical Logic and Set Theory A	3		3
Seminar on Mathematical Logic and Set Theory B	3	3	
Seminar on Mathematical Logic and Set Theory C	3		3
Seminar on Mathematical Logic and Set Theory D	3	3	
Seminar on Stochastic and Statistical Analysis and Insurance Mathematics A	3		3
Seminar on Stochastic and Statistical Analysis and Insurance Mathematics B	3	3	
Seminar on Stochastic and Statistical Analysis and Insurance Mathematics C	3		3
Seminar on Stochastic and Statistical Analysis and Insurance Mathematics D	3	3	
Seminar on Exercise on Computing Language and Speech A	3		3
Seminar on Exercise on Computing Language and Speech B	3	3	
Seminar on Exercise on Computing Language and Speech C	3		3
Seminar on Exercise on Computing Language and Speech D	3	3	
Seminar on Real Analysis A	3		3
Seminar on Real Analysis B	3	3	
Seminar on Real Analysis C	3		3
Seminar on Real Analysis D	3	3	
Seminar on Non-linear Functional Analysis A	3		3
Seminar on Non-linear Functional Analysis B	3	3	
Seminar on Non-linear Functional Analysis C	3		3
Seminar on Non-linear Functional Analysis D	3	3	
Seminar on Harmonic Analysis and Nonlinear Partial Differential Equation A	3		3
Seminar on Harmonic Analysis and Nonlinear Partial Differential Equation B	3	3	
Seminar on Harmonic Analysis and Nonlinear Partial Differential Equation C	3		3
Seminar on Harmonic Analysis and Nonlinear Partial Differential Equation D	3	3	

## **Department of Applied Mechanics**

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The Department of Applied Mechanics is designed for education and research on mechanical systems for thermodynamics, mechanics, systems, and materials and design based on physics and mathematics, with natural science and mechanical engineering at its core forming the field of application. The mission of this department is to provide training to students in scientific thinking and to nurture their aptitude for engineering as well as to enhance "research" that can contribute to the relevant academic and industrial world. The department not only aims to substantiate highly credible fundamental fields in the conventional academic and industrial worlds but also intends to further research in the field of aeronautics, while venturing into new fields that pave the way for the untouched domains of the 21st century.

### **Summary of Each Research Area**

#### **◆ Thermofluid Science Division**

There are numerous opportunities for handling unsteady flow phenomena involving thermal changes in the mechanical and aeronautical fields. This division promotes basic research on high-speed and unsteady flow dynamics as well as on combustion and reaction flow based on hydraulic engineering and thermodynamics, while experimentally and mathematically explaining thermofluid behavior inside aviation engine elements and various turbo machines as application examples in the mechanical and aeronautical fields.

#### **◆ Applied Mathematics Division**

The division explores research in the use of numerical methods on various dynamic phenomena as well as on prediction and evaluation of nonlinear behaviors that manifest in engineering systems to establish methods for their application in analytical designs of engineering methods. More specifically, the division explores research in methods of experimentation and measurement, theoretical analysis, numerical calculation, and optimization in non-holonomic systems of flexible space structures, space robots, and vehicles, which are examples of dynamic systems; It also is involved in the study of dirac structures and Lagrangian systems that appear in multibody systems as well as of fluid transient phenomena, fluid related vibrations, and ultrahigh-speed liquid jets as examples of fluid systems.

#### **◆ Systems and Environmental Energy Division**

Educational research in this division aims to contribute to resolving environmental issues by explaining the dynamic behaviors of systems, targeting various systems such as energy power systems. The knowledge gained from research in this department is to establish methodologies for optimized design of systems and make optimization controls possible, besides implementing efficient energy use in practical energy systems. Characteristic evaluations of the components of practical systems as well as experimental research on improving the efficiency of systems are carried out along with various kinds of research on measurement and control engineering.

#### **◆ Material Design and Processing Division**

This division conducts fundamental and applied research on optimized material design, processing methods, evaluation technologies, and numerical simulations for aircraft, railway rolling stocks, automobiles, industrial machinery, and precision equipment. The research aims to increase strength, reduce weight, achieve anti-corrosion and durability, as well as reliability and safety, in the context of learning about the strength of materials, mechanics of elasticity and plasticity, fracture mechanics, metal physics, and mechanical material science.

◆ Functional Design and Micro-Engineering Division

Mechanical design, tribology, precision engineering, electromagnetic dynamics, and the like are researched on by engineers and researchers with superior analytical and design capabilities to achieve highly functional new mechanical systems. Such research, furthermore, is aimed at developing fine, accurate, and high-speed precision information and medical equipment.

**(I) Research guidance (Doctoral program)**

Course Name
Research on Tribology
Research on Micro and Nano Mechanics
Research on Control Engineering
Research on Dynamics and Control of Power and Energy Systems
Research on Applied Mathematics (Prof. Yoshimura)
Research on Applied Mathematics (Assoc. Prof. Yanao)
Research on Materials Process Engineering
Research on Dynamics and Control of Mechanical Systems
Research on Fluid Engineering (Prof. Ohta)
Research on Fluid Engineering (Prof. Miyagawa)
Research on Thermofluid Science
Research on Aerodynamics Research
Research on Precision Engineering
Research on Aerospace Structural Engineering
Research on High Speed Aerospace Propulsion
Research on Engineering of Composite Materials

## Department of Electronic and Physical Systems

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The Department of Electronic and Physical Systems ventures into a new academic field that involves systemization by functional discoveries and functional integrations, with electrons and photons as intermediaries, for the purpose of understanding self-integration of atoms and molecules as basic materials and formation of higher-order structures, as well as for the creation of functional systems ranging in dimensions from nanometers to micrometers by using ultrafine processing technologies. Furthermore, students acquire logical configuration capabilities and gain a sense of craftsmanship and systematic thinking from experience; they are also trained through such education and research to have multifaceted views, flexible cognitive capabilities, and a progressive spirit of inquiry.

This department was established to meet the strong social demand requiring revitalizing the economy by using sophisticated technologies of electrons and photons. Electronics and photonics are considered the nuclei of industry in the 21st century and many industrial fields aim to extend these technologies to their maximum potential. Furthermore, electronics and photonics are expected to make significant contributions toward a more abundant society as they are systematized and elevated to network technologies based on the study of hardware. Students of electronic and physical systems are trained to become world-class engineers and researchers to meet these demands.

Development of materials and devices intended for electrons and photons, as well as their system applications, is being advanced by focusing on enhancing sophisticated technologies brought about by many businesses involved in key industries that recognize the potential of electronics and photonics. The scope of system-on-a-chip, an extension from the development of large-scale integrated circuits, is also becoming broader. Sharing networks providing such functions has become essential for building a sophisticated information society. Students of master's program and doctoral program equipped with disciplinary knowledge grounded in electronic and physical systems are expected to play an active role in a diverse range of fields, such as electrical, electronics, communication, material, automotive, aerospace, and the like, for companies, government agencies, educational institutions and research organizations.

### Summary of Each Research Area

#### ◆ Fundamental Condensed-Matter Science Division

The division aims at conducting fundamental research related to the physical properties of condensed matters. The faculty in the division specializes in quantum physics, solid state physics, thermodynamics, statistical mechanics, and the like, and they advance physics research on multiple scales ranging from atoms, electrons, and photons to continuous media. Specific topics of research conducted in this division are described below:

- Focus on phase transitions and changes by symmetry breaking and examining the details by transmission electron microscopes using diffraction crystallography. In particular, new conditions characterized in nanometer scale are explored.
- Quantum field theory, fundamentals of quantum mechanics, and elementary particle physics. Recent topics include quantum field theory under thermal situations and theoretical research on Bose-Einstein condensation of alkali atoms.



- Fundamental research on various kinds of physical properties of solids using quantum theory. Studies particularly in relation focus on the effects of defects and dopants at the atomic levels in solids.
- Research on physical chemistry of substances at high temperatures, particularly measurements of thermodynamic data, reaction diffusion phenomena, and behavior of mixed phase fluids.

#### ◆ Electronics Division

This division conducts research on improvement of elemental performance, manifestation of new functions, as well as the application of these functions in different fields based on the operating principles of electronic elements and their manufacturing process. Performance of electronic elements is achieved by reducing the dimensions of elements that constitute the foundation of a sophisticated information society. Electronic elements are shrinking to nanoscale in present times, almost approaching the limit of miniaturization. This has given rise to demands for using technologies in different fields such as chemistry, biology, environment, machinery, and the like, not only by further improvement of performance by miniaturization but also by using physical phenomena that become more prominent under conditions of nanoscale dimensions, as well as by developing new processes that can also integrate carbon and soft materials. More specifically, research guidance is provided in the field of molecular nano-engineering, nanodevices, microsystems, and nano-materials informatics.

#### ◆ Photonics Division

Research conducted here contributes to applications that enhance a sophisticated information society by creating new optical functions. The principles of light emission are studied using semiconductor lasers or light emitting diodes or by observing the interaction of light with media such as photodetection waves and light modulations. In addition, optical waveguiding as optical fiber communication or optical space communication, together with transmission through optical space or optical transmission systems, and optical applications, such as optical sensors, optical measurements, and optical disks to cover photonics, are understood from perspectives that range from wave motions to photons. Such efforts combine nanophotonics technology, optical material technology, optical device technology, optical circuit technology, optical signal transmission, and optical signal processing technologies, as well as optical networks, with academic disciplines such as optics, quantum mechanics, semiconductor engineering, quantum electronics, transmission theories, and wireless communications, which form the foundation for these advanced technologies. More specifically, research guidance is provided for functional photonics and optical wireless communication systems.

#### ◆ Information Systems Division

Research is based on the development of a wide range of application systems that ranges from Large-scale Integrated Circuits (LSIs) and System-on-a-Chip (SoC), which are components of information systems, to multimedia and sophisticated information communications. The theoretical and practical standpoints of design methods and Computer-Aided Design (CAD) methodologies are studied. Theoretical aspects include fundamental academic fields such as algorithms and data structures, programming constructs, computational complexity theory, graph theory, combinatorics, digital signal processing, and computer architecture. Practical aspects include video image processing (compression, recognition, and the like), security (encryption, decryption, and the like), information communication network (ad hoc networks,

sensor networks, and the like), CAD methodologies (hardware/software co-design and high-level verification and the like), low power consumption technologies, and the like. More specifically, research guidance is offered for design and analysis systems, integrated system design, high-level verification technologies, and wireless communication circuit technologies.

### **(I) Research guidance (Doctoral program)**

Course Name
Research on Nano-device
Research on Nano Materials Informatics
Research on Nano and Microsystem
Research on Multi Media System
Research on Radio and Optical Converged Systems
Research on Advanced Theoretical Physics for Condensed Matter
Research on Molecular Nano-engineering
Research on Physics and Engineering of Semiconductor Nano Devices
Research on Solid State Physics
Research on Functional Photonics
Research on Wireless Communication Circuit Technologies
Research on Design and Analysis Systems
Research on Quantum Solid-state Science
Research on Integrated System Design
Research on High-level Verification Technologies
Research on High Temperature Physical Chemistry

## **Department of Computer Science and Communications Engineering**

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The Department of Computer Science and Communications Engineering aims to produce students with advanced technical knowledge gained through study and education in the academic field of Information and Communications Technology (ICT) which merges information and communications technologies, positioned as a key technology to promote social activities and science and technology. The Department of Computer Science and Communications Engineering has three key fields: information communications, information science, and information engineering.

In information communications, the development of large-scale communications and broadcasting networks comprising the infrastructure of social life and the realization of systems to respond to increasingly diverse requests from society are being strongly promoted. The academic field of information communications which serves as a basis for the establishment of communications and broadcasting networks has rapidly expanded as demanded by society and its level of study has remarkably improved. It is our primary purpose to respond to these demands. In addition, taking into consideration influences exerted by ICT on social life, we also have the objective of clarifying the orientation of the research field backed by information communications ethics.

In information science, knowledge information processing, software engineering, computer architecture, etc. are the driving forces for the development and use of computers. These technologies are entering into times of qualitative innovation in addition to quantitative expansion of the fields of application. In other words, we are facing fundamental problems which cannot be solved simply by an increase in the speed and capacity of hardware and the sophistication of software technologies. For example, the development of the new field of study called “knowledge processing,” as represented by artificial intelligence, is expected. However, in order to develop this field of research, studies on information processing based on new ideas and theories that go beyond the conventional framework of computer science have become indispensable.

Information engineering is a field that provides education and research in technological fields of information science and information communications, and it mainly deals with basic studies on the systematization of theories and their application to engineering. In addition to our objective of promoting advanced studies, we aim to develop human resources who put emphasis on manufacturing with broad and deep knowledge, and doing so requires intensive efforts toward research and education on theories and applications by expert groups.

As mentioned above, information communications, information science, and information engineering have advanced rapidly, and without cooperation between these closely related fields, it is extremely difficult to maintain the environment for advanced research and education. Furthermore, it has been recognized that circulative development in which a result in a field serves as a basis for development in another field is indispensable. This Department has two main fields: Computer Science and Engineering, and Computer Communications and Engineering. Computer Science and Engineering has five research areas: Human-Computer Interaction, Networking, Advanced Computing Mechanisms, Advanced Software, and Information Systems Architecture. Computer Communications and Engineering has three research areas: Information Systems, Network Communications and Media Contents. These areas aim to integrate and fuse information communications, information science, and information engineering through organic links among these areas.

Graduates of the doctoral program are expected to play an active role in educational institutions including universities, as well as electronic manufacturers, research centers of telecommunications carriers, etc., and state-run research institutes. Graduates of the master's program are, in addition to the above research institutes, also expected to engage in the development of new software at software development companies, etc. and play an active role in a variety of fields including consulting firms.

### **Guidelines for earning a Master's Degree**

1. To be granted a master's degree, you must earn 30 or more credits, receive the required research guidance, and pass a master's thesis review.
2. Among the 30 credits required for the degree, 12 credits must be earned from seminar courses. Each academic year, you must take the seminar courses provided by your supervisor. If more than 12 credits of seminar courses are taken, credits in excess of 12 are not counted toward the number of credits required for the degree.
3. Please consult with your supervisor regarding what other courses should be taken to fulfill the credit requirement toward your degree.
4. Students must have earned credits from Special Laboratory A and B in Computer Science and Engineering at the eligible year.

### **Summary of Each Research Area**

#### ◆ Computer Science and Engineering

#### ◇ Human-Computer Interaction

In this research area, research and education are focused on the application of information processing systems centering on computers to the fields of hardware, software, and ICT.

Specifically, the content of the research guidance is as follows:

1. Multimedia/hypermedia systems  
To make computers easier to use and more familiar to people, computers using multiple media such as images, characters, and sounds are being studied. At present, studies are being conducted on Computer Aided Instruction (CAI), Computer Aided Learning (CAL), and database systems in this multimedia/hypermedia environment.
2. Computer application  
Computers are currently used in all industries and there are countless applications in the ICT field. As representative themes in this study, VLSI CAD (Computer Aided Design), power system analysis, identification and recognition of character strings with an image in the background, discrete system simulation, aerohydrodynamic analysis, finite element method, robots, etc. can be listed.
3. Computer vision  
Researches on computer vision and related pattern analysis, in both theory and application. Research subjects include basic techniques such as optimization and machine learning; vision technology such as 3D vision, video analysis, and object recognition; and their application in such areas as medical imaging, digital appliances, and computer graphics.

### ◇ Information Networks

Along with the studies on structures and functions of nodes and links, multimedia information processing and encoding, system architectures including network security and personal communications, and protocols, we conduct studies on network control methods and terminal functions of broadband digital integrated networks with the fusion of communication and broadcasting in mind.

### ◇ Advanced Computing Mechanisms

The role of computers is to amplify the intellectual ability of people. Thus far, computers have mainly helped people by performing routine operations at a high speed. However, with the rapid increase in the amount of information created and distributed in society, computers are required to perform more advanced and intellectual operations to ease the burden on people. From this point of view, in the field of Advanced Computing Mechanisms, research is being conducted from a variety of angles on methods to drastically enhance the functions of computers, aiming to discover and present what the information processing environment should be like in the future.

Specifically, the content of the research guidance is as follows:

#### 1. Knowledge information processing

The framework to express, acquire, and manipulate advanced information beginning with knowledge is studied as a basis for knowledge information processing. Research on the theoretical foundations of the programming languages used to describe them, programming techniques, and execution methods is also performed. On the practical side, studies on various applications such as architecture, design, diagnosis, and control of large-scale knowledge processing systems are conducted. Furthermore, to create an advanced information processing environment, it is extremely important to examine not only information processing within a computer but the exchanges of information between multiple entities (people or computers), in other words, communication, from a software point of view. On a fundamental level, studies are conducted in this research on theoretical formulations, security problems, etc. of communication between multiple entities.

#### 2. Learning information processing system

Learning here means that computers develop more advanced information processing by accumulating knowledge. Such learning is feasible when an information processing system is ill-posed and uncertain, which leads to flexible information processing observed in living organisms which have senses. Specifically, learning algorithms, neuron computing (connectionism), and advanced computer-human interface techniques resulting from their application can be listed.

### ◇ Advanced Software

In the current information society, the need for software to control computers has become enormous and production has not been able to keep up with the demand for a long time. The purpose of this research area is to conduct research and education on theoretical and practical methods to produce highly reliable and sophisticated software in response to the demands of society.

Specifically, the content of the research guidance is as follows:

1. Theory of program design

This is a field which has achieved results that are theoretically the most beautiful and practically the most useful in computer science. In modern society where computers have spread into every corner of human life, programs which are essential to control computers have increasingly grown in importance. From a practical point of view, research and education are carried out on the design and analysis theories for the programs based on a sequential, parallel, deterministic, or probabilistic algorithm.

2. Software development engineering

To efficiently develop and maintain good software, various methodologies and a group of software tools to support it are essential. For the purpose of realizing these things, research themes are focused on design and implementation of software with a variety of new concepts and establishment of their theoretical basis. Studies are also conducted on the development of hardware architectures, support for their designs, and various systems to implement such software.

3. Distributed intelligent agents software

Studies are conducted from basics to applications of autonomous agents and multi-agent systems. Multiple programs often work in a cooperative manner to achieve their own goals or the shared goals that are difficult to achieve alone. For example, services on the Internet are provided by a number of programs that may be developed in different groups, and multiple robots often have to coordinate each other for their individual actions. These programs are called intelligent agents in the field of artificial intelligence and they autonomously decide their course of actions for their goals. Research and educations are carried out the theoretical foundation including game theoretic and machine learning approaches, social learning and network analysis in a multi-agent context, and applications to multi-agent social simulations and network systems.

4. Reliable software engineering

Studies are conducted on software engineering technologies and knowledge systems which are essential to efficiently develop and maintain various kinds of highly functional and high-quality software. Specifically, we deal with highly efficient development technologies such as modeling, design, reuse, and auto-generation to fill the gap between requirements and programs, and high-quality development technologies such as review, test, measurement, and formal verification. We try to establish practically useful methodologies and tools backed by theory and experience and develop empirically derived knowledge. Furthermore, security problems, incorporation, processes, management, etc. can be listed as studies on applications.

◇ Information Systems Architecture

In this research area, we conduct a wide range of studies, from basics to applications, on information processing covering networks and their nodes which are computers, hardware, and software. In the field of information processing technologies develop very rapidly, so that even if research results are temporarily achieved, they soon become obsolete. A feature of this research area, however, is that it aims to discover leading-edge themes without being constrained to the existing framework of research.

Specifically, the content of the research guidance is as follows:

1. Information architecture design and analysis

Studies are conducted from a theoretical and practical point of view regarding design methodologies and CAD (computer-aided design) methods for a wide range of systems covering computers, entire information communication network systems, and VLSIs (very-large-scale integrated circuits) which are indispensable system components. From a theoretical perspective, basic fields of study such as algorithms and data structures, computer programming techniques, computational complexity theory, computational geometry, graph theory, and combination theory are covered. From a practical perspective, design (architecture, functional synthesis, logical synthesis, layout, and test) and analysis (modeling, simulation, operation verification, reliability, operation speed, and power consumption) of large-scale networks, print circuits, packaging, multi-tip modules, LSIs for image and communication processing, general and special-purpose processors, analog functional elements, etc. are covered.

2. Parallel processing hardware/software

Studies are conducted on the architecture, software (automatic parallelizing compiler, parallel OS, scheduling, etc.), and application of parallel processing technology, which is today's basic architectural technology for all computers—from microprocessors to supercomputers.

3. Infrastructure software and advanced application

Studies are conducted on infrastructure software such as operating systems, distributed middleware, and network software, and advanced applications realized by using them. Infrastructure software studies include those on resource management and abstraction, infrastructure software development methods, security, large-scale information management, high reliability, real-time processing, etc. Studies on advanced applications include those on advanced multi-media applications including image analysis and phonetic analysis, very large-scale data management applications such as web search, ubiquitous computing applications that integrate real world and cyber spaces, etc.

4. Information access

The amount and diversity of information available in the digital and physical worlds keep growing exponentially. In this research area, we pursue theory and practice for helping the users access required information and satisfy their needs effectively and efficiently. Information access technologies include information retrieval, databases, natural language processing, and human interfaces.

◆ Communications and Computer Engineering

◇ Information Systems

Studies are conducted from a theoretical and practical point of view regarding design methodologies and CAD (computer-aided design) methods for a wide range of systems covering computers, entire information communication network systems, and VLSIs (very-large-scale integrated circuits) which are indispensable system components. From a theoretical perspective, basic fields of study such as algorithms and data structures, computer programming techniques, computational complexity theory, computational geometry, graph theory, and combination theory are covered. From a practical perspective, design (architecture, functional synthesis, logical synthesis, layout, and test) and analysis (modeling, simulation, operation verification, reliability, operation speed, and power consumption) of large-scale networks, print circuits, packaging, multi-tip modules, LSIs for image and



communication processing, general and special-purpose processors, analog functional elements, etc. are covered.

#### ◇ Communication Network

Research and education on information network systems, media systems, etc. are conducted to respond to the societal demands for research and education in line with the rapid progress in information and communications technology. In addition, being in the age of the fusion of communications, broadcasting, and computers, and based on the fact that the establishment of fundamental technologies of advanced information processing and efficient information transmission is essential, research and education are mainly focused on image information and radio communication.

Specifically, the content of the research guidance is as follows:

##### 1. Internet computing

We research Future Internet which will be able to solve crucial technological problems in the current Internet. Especially, research and development of the innovative network architecture is a main target.

##### 2. Telecommunication network

Key terms of present telecommunication network are the integration of telephone network and computer network, the integration of wireless network and wired network, and the integration of telecommunication and broadcasting. NGN (Next Generation Network) and NwGN (New Generation Network) will promote this trend. In the integrated network, the service will be diverse, and the teletraffic will be diverse. Therefore, new technologies and new methods are demanded. First, in order to make an infrastructure of the network, more advanced wireless network technologies and more advanced optical network technologies must be developed. Secondly, various QoS (Quality of Service) will be provided in the network. Each QoS class corresponds to each price. This means that teletraffic theory must consider the price as an element. Thirdly, the network must be managed. For this purpose, network measurement and anomaly detection are important research issues. We will study network design, routing, switching system, teletraffic theory, QoS, pricing, network measurement, IP traffic analysis, mobile ad hoc network, new telecommunication services, etc.

##### 3. Wireless communications

Studies are conducted on fundamental technologies such as radio wave propagation, network architecture, and digital transmission for wireless communications such as cellular phone services, wireless LANs, and digital broadcasting. All of the studies on these wireless communications are for the ultimate purpose of the efficient use of radio frequency bands. As specific examples of study items, solutions and measures for signal degradation by fading and radio wave interference, network architecture technologies including line allocation methods based on a multiple access scheme, transmission technologies on highly efficient modulation/demodulation and error correction based on digital signal processing, etc. can be listed.

##### 4. Wireless access scheme

We study on wireless access schemes for various kinds of telecommunications, such as, wireless communication, body area communication, ultrasonic communication, optical mobile communication, airborne communication, stratospheric communication, small satellite communication, UAV network system, so on.



5. Wireless signal processing  
Research on signal processing in lower layers related mostly to physical layer for wireless communications systems. Especially focusing on modulation and demodulation, error control coding, and multiplexing for improving system performance of wireless communications.
6. Ubiquitous communication network system  
This research forces on ICT and networking technologies of wireless communication network, IP network or sensor network applying cellular phone, power electric system, smart grid, robotics, ITS transfer system, medical network, agriculture, stock firming or finance circulation of money financing industries.
7. Distributed computing systems  
The followings are the areas covered by this research: 1. distributed system which includes P2P-Grid, system performance and configuration free in particular, and 2. communication quality control which includes network performance issue required in Grid computing, quality of service control for video delivery and internet broadcast, and overlay networks. Studies are conducted on theories of image and speech information processing, encoding, recognition, etc. and their application to systems for the purpose of application to human interfaces, and mobile multimedia systems.
8. Networked systems  
The target of this research is large-scale networked systems such as the Internet. We aim to solve the fundamental problems of the systems. In order to establish the goal, we use the various approaches; monitoring, statistical analysis and modeling, controlling, and forecasting. Our research interests include but not limited to the following topics: deep understanding of the Internet through the statistical approaches, developing fast and scalable network monitoring algorithms, network security, modeling of temporal-spatial behavior of mobile devices.

#### ◇ Media Contents

Studies are conducted on human interfaces and multimedia contents deployed over advanced information networking systems.

Specifically, the content of the research guidance is as follows:

1. Perceptual information processing  
To realize a more human-friendly computer, it is important to develop a system which enables sharing of an experience space with people by installing a perceptual information processing mechanism on a computer. In order to develop such a system, this research area conducts studies on speech recognition and comprehension, image comprehension, etc.
2. Image information  
Research guidance is provided to help students fully understand elemental technologies including generation, transformation, processing, encoding, transmission, storage, display, and recording of images and videos, and to allow them to choose the latest themes they are interested in from among the above topics. In addition to the above knowledge, by integrating knowledge on information network technologies and image/visual databases, research guidance is provided on methods for constructing multimedia communications systems.

### 3. Audio-visual information processing

We focus on the user-centric audio-visual representation within the research area of audio-visual information processing. Our research goal is to provide user-friendly visual representation and coding format including visual object recognition and audio-visual distribution.

### 4. Multimedia information distribution systems

In general, multimedia information is exchanged, purchased and consumed among creators, providers and consumers. However, there are lots of open issues to make an efficient value chain among these three players. Some innovative approach is required, which enables the information circulation beyond transmission media, distribution protocols, communication systems and terminal architectures. Besides, an intelligent interactive environment is essentially needed to make consumers get positively involved in the information distribution. In such an environment, several key technologies are very essential, such as portal sites, intelligent information retrieval systems based on intelligent metadata and its processing, digital rights management systems, and global content distribution platforms. With such technologies, an ideal media-agnostic information service can be realized. A variety of technical subjects related with above-mentioned are to be investigated in this research project, in order to realize ultimate multimedia systems, aiming at providing more advanced services beyond the current systems, focused on technologies and systems of smooth and seamless multimedia information exchange and distribution from various aspects.

## (I) Research guidance (Master's program)

Course Name
Research on Computer Vision and Pattern Analysis
Research on Information Systems
Research on Digital Imaging
Research on Parallel Knowledge Information Processing
Research on Computational Intelligence
Research on Software Development Engineering
Research on Intelligent Software
Research on Reliable Software Engineering
Research on Distributed Systems
Research on Advanced Computing Systems
Research on Parallel and Distributed Architecture
Research on Advanced Processor Architecture
Research on Ubiquitous Communication System
Research on Wireless Access
Research on Multimedia Information Distribution Systems
Research on Telecommunication Network
Research on Audiovisual Information Processing
Research on Distributed Computing System
Research on Perceptual Computing
Research on Image Information
Research on Wireless Communications
Research on Design and Analysis Systems
Research on Information System Design
Research on Wireless Signal Processing
Research on Networked Systems
Research on Information Access
Research on Bioinformatics
Research on Media Intelligence
Research on Computational Biology

## (II) Research guidance (Doctoral program)

Course Name
Research on Computer Vision and Pattern Analysis
Research on Information Systems
Research on Digital Imaging
Research on Parallel Knowledge Information Processing
Research on Computational Intelligence
Research on Software Development Engineering
Research on Intelligent Software
Research on Reliable Software Engineering
Research on Distributed Systems
Research on Advanced Computing Systems
Research on Parallel and Distributed Architecture
Research on Advanced Processor Architecture
Research on Ubiquitous Communication System
Research on Wireless Access
Research on Multimedia Information Distribution Systems
Research on Telecommunication Network
Research on Audiovisual Information Processing
Research on Distributed Computing System
Research on Perceptual Computing
Research on Image Information
Research on Wireless Communications
Research on Design and Analysis Systems
Research on Information System Design
Research on Wireless Signal Processing
Research on Networked Systems
Research on Information Access
Research on Bioinformatics
Research on Media Intelligence
Research on Computational Biology

### (III) Lecture courses

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Advanced Information Networks	2	2	
Digital Imaging	2	2	
Information Retrieval	2	2	
Advanced Intelligent Software	2	2	
Multimedia and Standards	2	2	
Cloud Systems	2	2	
Advanced Wireless Access	2	2	
Perceptual Computing	2	2	
Wireless Communications Network	2	2	
Analysis of Networked Systems	2	2	
System LSI design and CAD	2	2	
Info-Telecommunication and the Standardization	2	2	
Algorithms in Computational Biology	2	2	
Digital System Design	2	2(second half)	
Reliable Software	2		2
Information Integration of Symbols and Patterns	2		2
Distributed Embedded and Real-Time Processing	2		2
Advanced Computer Architecture	2		2
Advanced Processor Architecture	2		2
Software Quality Assurance	2		2
Computer Vision and Pattern Analysis	2		2
Ubiquitous Communication Network	2		2
Network Theory	2		2
Multimedia Representation and Content Distribution Systems	2		2
Advanced Image Information	2		2
Wireless Signal Processing	2		2
Foundations for Information Access Evaluation	2		2
Pattern Recognition and Machine Learning	2		2
Business and Global Standardization	2		2

#### (IV) Seminar courses

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Seminar on Computer Vision and Pattern Analysis A	3		3
Seminar on Computer Vision and Pattern Analysis B	3	3	
Seminar on Computer Vision and Pattern Analysis C	3		3
Seminar on Computer Vision and Pattern Analysis D	3	3	
Seminar on Information Networks A	3		3
Seminar on Information Networks B	3	3	
Seminar on Information Networks C	3		3
Seminar on Information Networks D	3	3	
Seminar on Digital Imaging A	3		3
Seminar on Digital Imaging B	3	3	
Seminar on Digital Imaging C	3		3
Seminar on Digital Imaging D	3	3	
Seminar on Parallel Information Processing A	3		3
Seminar on Parallel Information Processing B	3	3	
Seminar on Parallel Information Processing C	3		3
Seminar on Parallel Information Processing D	3	3	
Seminar on Software Development Engineering A	3		3
Seminar on Software Development Engineering B	3	3	
Seminar on Software Development Engineering C	3		3
Seminar on Software Development Engineering D	3	3	
Seminar on Intelligent Software A	3		3
Seminar on Intelligent Software B	3	3	
Seminar on Intelligent Software C	3		3
Seminar on Intelligent Software D	3	3	
Seminar on Reliable Software Engineering A	3		3
Seminar on Reliable Software Engineering B	3	3	
Seminar on Reliable Software Engineering C	3		3
Seminar on Reliable Software Engineering D	3	3	
Seminar on Distributed Systems A	3		3
Seminar on Distributed Systems B	3	3	
Seminar on Distributed Systems C	3		3
Seminar on Distributed Systems D	3	3	
Seminar on Advanced Computing Systems A	3		3
Seminar on Advanced Computing Systems B	3	3	
Seminar on Advanced Computing Systems C	3		3
Seminar on Advanced Computing Systems D	3	3	
Seminar on Parallel and Distributed Architecture A	3		3
Seminar on Parallel and Distributed Architecture B	3	3	
Seminar on Parallel and Distributed Architecture C	3		3
Seminar on Parallel and Distributed Architecture D	3	3	
Seminar on Advanced Processor Architecture A	3		3
Seminar on Advanced Processor Architecture B	3	3	
Seminar on Advanced Processor Architecture C	3		3
Seminar on Advanced Processor Architecture D	3	3	

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Seminar on Ubiquitous Communication System A	3		3
Seminar on Ubiquitous Communication System B	3	3	
Seminar on Ubiquitous Communication System C	3		3
Seminar on Ubiquitous Communication System D	3	3	
Seminar on Wireless Access A	3		3
Seminar on Wireless Access B	3	3	
Seminar on Wireless Access C	3		3
Seminar on Wireless Access D	3	3	
Seminar on Multimedia Information Distribution Systems A	3		3
Seminar on Multimedia Information Distribution Systems B	3	3	
Seminar on Multimedia Information Distribution Systems C	3		3
Seminar on Multimedia Information Distribution Systems D	3	3	
Seminar on Telecommunication Network A	3		3
Seminar on Telecommunication Network B	3	3	
Seminar on Telecommunication Network C	3		3
Seminar on Telecommunication Network D	3	3	
Seminar on Audiovisual Information Processing A	3		3
Seminar on Audiovisual Information Processing B	3	3	
Seminar on Audiovisual Information Processing C	3		3
Seminar on Audiovisual Information Processing D	3	3	
Seminar on Distributed Computing System A	3		3
Seminar on Distributed Computing System B	3	3	
Seminar on Distributed Computing System C	3		3
Seminar on Distributed Computing System D	3	3	
Seminar on Perceptual Computing A	3		3
Seminar on Perceptual Computing B	3	3	
Seminar on Perceptual Computing C	3		3
Seminar on Perceptual Computing D	3	3	
Seminar on Image Information A	3		3
Seminar on Image Information B	3	3	
Seminar on Image Information C	3		3
Seminar on Image Information D	3	3	
Seminar on Wireless Communications A	3		3
Seminar on Wireless Communications B	3	3	
Seminar on Wireless Communications C	3		3
Seminar on Wireless Communications D	3	3	
Seminar on Design and Analysis Systems A	3		3
Seminar on Design and Analysis Systems B	3	3	
Seminar on Design and Analysis Systems C	3		3
Seminar on Design and Analysis Systems D	3	3	
Seminar on Information System Design A	3		3
Seminar on Information System Design B	3	3	
Seminar on Information System Design C	3		3
Seminar on Information System Design D	3	3	
Seminar on Wireless Signal Processing A	3		3
Seminar on Wireless Signal Processing B	3	3	

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Seminar on Wireless Signal Processing C	3		3
Seminar on Wireless Signal Processing D	3	3	
Seminar on Networked Systems A	3		3
Seminar on Networked Systems B	3	3	
Seminar on Networked Systems C	3		3
Seminar on Networked Systems D	3	3	
Seminar on Information Access A	3		3
Seminar on Information Access B	3	3	
Seminar on Information Access C	3		3
Seminar on Information Access D	3	3	
Seminar on Bioinformatics A	3		3
Seminar on Bioinformatics B	3	3	
Seminar on Bioinformatics C	3		3
Seminar on Bioinformatics D	3	3	
Seminar on Media Intelligence A	3		3
Seminar on Media Intelligence B	3	3	
Seminar on Media Intelligence C	3		3
Seminar on Media Intelligence D	3	3	
Seminar on Hands-on Course on Computational Biology A	3		3
Seminar on Hands-on Course on Computational Biology B	3	3	
Seminar on Hands-on Course on Computational Biology C	3		3
Seminar on Hands-on Course on Computational Biology D	3	3	

#### (V) Laboratory courses

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Special Laboratory A in Computer Science and Communications Engineering	1		2
Special Laboratory B in Computer Science and Communications Engineering	1	2	



## **Department of Intermedia Studies**

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The progress in media technologies in recent years has increased expectations about the creation of new cultures and industries. However, associated problems such as qualitative and quantitative insufficiency of content, as well as incompatibility with living organisms, have become more prominent. Understanding and representing characteristics, sensibilities, and communication of living organisms as well as expressions for communication are needed, while activities intended to determine how to pursue study of scientific technologies that support such efforts are also required to resolve such problems and to support lifestyles and social systems that use next-generation media. The principle of the Department of Intermedia Studies is about taking up challenging activities in response to new social needs and creating new values through the fusion of science and technology with artistic expressions based on such awareness.

Sophisticated and highly specialized education and research activities are promoted in this department aiming at developing "Intermedia," a concept of transversing and fusing science and technology with artistic expressions. More specifically, two divisions, the Intermedia Engineering Division and the Intermedia Arts Division, are established for the master's programs to offer lecture classes that reflect specialties of each department as well as research guidance intended to bring about fusion between the divisions. This transversing and fusing is done to achieve further levels of sophisticated research performance. Research guidance for master's theses and doctoral dissertations are provided to achieve a level of performance that is equivalent to winning an award from a competition of international standards for research topics with the subject content productions.

### **Summary of Each Research Area**

The following two divisions have been established for the Department of Intermedia Studies. Students are recommended to complete lecture classes provided by the departments that correspond to individual specialisms and to proactively take initiatives to set research topics that transverse and fuse divisions.

#### **◆ Intermedia Engineering Division**

This division encompasses fields such as visual and acoustic engineering, ergonomics, sensing engineering, virtual reality, artificial intelligence, robotics, and cognitive science. Research guidance is provided for research on acoustic communication science, dynamic expression systems, advanced media and ergonomics, as well as cognitive information systems.

#### **◆ Intermedia Arts Division**

This division encompasses fields of design, music, art, semantics, and narratology. Research guidance is provided for research on musical information science, life expression, digital media expression, and media design.

**(I) Research guidance (Doctoral program)**

Course Name
Research on Digital Image Expression
Research on Human Media Technology
Research on Media Design Study
Research on Ergonomics in Advanced Media
Research on Intelligence Dynamics and Representation Systems
Research on Biological Expression
Research on Perceptual Computing
Research on Cognitive Science
Research on Communication Acoustics
Research on Intermedia Music Study

## Department of Architecture

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A curriculum of study has evolved with new educational contents since FY2007 that meets the certification standards for the master's program under the Japan Accreditation Board for Engineering Education (JABEE). The Department of Architecture comprises the architectural art field, offering research guidance on architectural history, architectural planning, and urban planning, and the architectural engineering field, offering research guidance on environmental engineering, structural mechanics, and building production. The purpose of education for the doctoral program is to provide students the ability to conduct research independently in each expertise. The purpose of education for the master's program varies depending on research fields or research guidance.

The architectural art field comprises architectural history that considers the change in architecture and the theory of creation from a historical perspective and from the standpoint of architectural design and planning with the mission of creating modern architecture as well as urban planning focusing on cities as an agglomeration of architecture. Each segment is treated as having individual characteristics with their respective missions and research methods. The master's program's uniqueness is that it does not inhibit students from having a broad perspective and superior insights as planners of architecture. This is reflected in the selection of design systems, which is generally required to connect the master's dissertation topic with the master's design.

Each element in the field of architectural engineering is unique. Environmental engineering deals with (1) planning methods for a comfortable and healthy thermally monitored environment in architectural facility systems in cities, (2) theorization and development of disaster prevention plans and technologies for architectural disaster management of fires and floods, (3) development of energy-conserving technologies for a low-carbon society; and (4) development and developmental theory of software technologies for environmental impact evaluation and consensus building technologies. Structural mechanics covers a broad range of technology spanning from fundamentals in mechanics to advanced structural design, such as structural materials, earthquake resistant design, elastoplastic dynamics, shell structures, soil and foundation engineering, vibration engineering, structural controls, aseismic (damped) structures, seismic isolation, and the like. Building production involves dealing with issues directly linked to practical work, such as development of new materials, diagnosis of deterioration, natural materials and industrial waste, development of building construction methods corresponding to the various purposes of buildings or their components, and development of construction engineering and construction management technologies.

The aim of the architectural education for the master's degree program of the architectural art field is described below, which reflects the UNESCO/UIA Charter for Architectural Education (set up in 1996) and is required for students to fulfil for the accreditation of JABEE.

## **The aim of the architectural education in Waseda University:**

### **The aim of the education (MA)**

The aim of the education (BA) for undergraduate at the Department of Architecture precedes the aim of the education (MA). The accreditation of JABEE for the architecture art filed entails realizing the aim of education (MA) as well as the aim of education (BA).

- (I) Study in the "Waseda Architecture" tradition, and develop the ability to fulfill what modern society expects of architecture and the built environment
- (J) Have both a global perspective and a point-of-view that appreciates region-specific history and culture, and develop the ability to contribute internationally
- (K) Have the opportunity be involved in the practice of architecture and urban design, and understand the professional skills of architects and their mission in society
- (L) Obtain the ability to make creative proposals based on a deep knowledge of design and aesthetics of architecture
- (M) Develop the ability to absorb proactively advanced knowledge in architecture, urban design, and related fields-of-study
- (N) Develop the ability to identify, investigate, and analyze broad-ranged issues enrooted in human activity and the region, based on existing base of knowledge in architecture, urban design, and related fields-of-study
- (O) Develop the ability to solve problems of architectural design and planning pragmatically through collaborative work with faculty and other students
- (P) Develop the ability to exert leadership in collaboration with experts of different fields-of-study and the general public to propagate one's idea broadly to society

### **Summary of Each Research Guidance**

#### **◆ Architectural History (architectural art field)**

Architecture is utilized for convenience, safety, amenities, and creativity of the human being. This means that diverse fields mutually interact with each other, ranging from engineering technologies to fine art, or from natural sciences to humanities. As the architecture is a field where regardless of the kind of unrefined fragment taken out from it, its comprehensive nature remains unaltered. The highly advanced theoretical and practical inquisitions at the graduate school level are based on architectural history, diversity, and comprehensiveness, which form the essence of architecture. Efforts are made for preserving and restoring the cultural assets of Japan and Asia, for understanding the Western architecture from ancient times to the near-modern and modern era, as well as for conducting research on architectural cities and settlement theories.

#### **◆ Architectural Planning (architectural art field)**

Principles and methods of planning are learnt from the perspective of architectural designers while developing theories about domestic and foreign architects. Methods for providing feedback to designers are examined by investigating how a facility is being used. More specifically, one's own individual concept of architecture is created by conducting investigative research and by actual design production work, with guidance in technique and creativity from the instructing professor as well as practical training off campus (internship). Students' abilities to respond to issues discovered in society with creative proposals are given importance during the course of the program.

#### ◆ Urban Planning (architectural art field)

Urban planning at Waseda was established in 1966 by architects and urban planners, Motoo Take and Takamasa Yoshizaka, who attempted at offering radical proposals for urbanization. This task has since then been passed onto Koichi Tonuma, who, in working toward raising human standards of habitation, pursues a future image of settlements and cities as places for a global standard of living and continues to present proposals to society.

The reach of these investigations, research, and plans extends beyond Japan to the Asian region, but in all cases, in general, the research and practical training are conducted locally. Foreign students from over ten countries, numbering more than 300, are among those who undertook this program and many among them were conferred doctoral degrees. The three laboratories currently established are engaged in activities conducted in mutual coordination, including research on principal topics of theory and history of urban design and planning, cityscape design, residential and living environmental design, urban regeneration of built environment, citizens-initiative community planning, regional promotion and revitalization planning and the like.

#### ◆ Environmental Engineering (architectural engineering field)

Environmental engineering pertains to technologies, planning methods, and systems that make the space of architecture and the city work as a site for human life and activities. At Waseda, it started with the acoustic design for the Okuma Auditorium, which has incorporated into its design air conditioning, the fundamental theory of architectural facilities, the urban environment, and the like. Issues that this discipline handles today are diverse ranging from controlling the thermal environment to make it suitable and healthy and building energy infrastructure based on environmental regulation to securing the safety of buildings and cities that are ever-expanding, to preventing vicious cycles that lead to desolate cities and unhealthy global environments due to the energy- and construction-resources consumption practices followed, to developing habitats. Research in this field aims to establish architectural and urban planning theory based on measurement and prediction targeting of environmental phenomena (thermal environment of the architecture and the city, fires and floods, human behavior), surveys on actual conditions of cities and architecture, and development of sophisticated architectural facility systems. It is also aimed at improving energy conservation, reusable resources and energy utilization systems, and low carbon technologies, as well as disaster prevention technologies. This kind of research paves the way for discovering the new potential of architecture or the software aspects of it, such as consensus building technologies, as well as its environmental aspects.

#### ◆ Structural Mechanics (architectural engineering field)

Structural mechanics is a technology associated with issues for achieving safe and comfortable architecture from a variety of perspectives. Structural mechanics in architecture has diversified in recent years as an academic field. Research topics have close relations with the field of civil engineering and mechanical engineering, or even with the field of electrical engineering. To deal with the diversity, research guidance ranges from earthquake engineering, high-performance structural material, earthquake resistant design, vibration engineering, elastoplastic mechanics, shell structures, soil and foundation engineering to structural reliability, structural control, aseismic controlled structure, and seismic isolation.

◆ Building production (architectural engineering field)

Building production involves education and research on building material science, building construction methods, and building construction management. Furthermore, efforts are also on to pursue ideal building production through investigation and research into these respective fields as well as to develop new technologies. Research in building material science is performed to understand the properties of materials, their applications, and the required caution when dealing with materials at the stage of design, construction, operation, and maintenance. Building construction methods study starts from understanding various structures and proceeds to pursue the structural principles of building components, to develop hardware and software technologies responding to the phenomena in changing buildings over time. Efforts are made in building construction methods by pursuing advanced technologies relating to construction engineering and systemization of respective technologies relating to construction management, which are being promoted primarily for large-scale construction projects. Innovative movements in mechanisms and functions of building production are being explored, while research of construction industry and management methods necessary for such efforts are being conducted citing rationalization and modernization of building production.

**(I) Research guidance (Doctoral program)**

Course Name
Research on Earthquake Engineering
Research on Regenerative Design of the Built Environment
Research on Architectural Design and Information
Research on Architectural Design Concepts
Research on Building Materials
Research on Building Construction
Research on Structural Design for Buildings
Research on Architectural Environments
Research on Building Construction Engineering and Management
Research on Architecture and Sociological Concepts
Research on Architecture and Space Concepts
Research on Safety Planning in Built Environments
Research on Structural Response Control
Research on Landscape and Regional Design
Research on History of Architectural Construction and Expression
Research on Comparative Architectural History
Research on Environment Media
Research on Continuum Mechanics
Research on Urban and Environmental Design

## **Department of Modern Mechanical Engineering**

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The Department of Modern Mechanical Engineering aims to develop distinctive social practices from a new point of view while working to integrate and restructure the mechanical engineering system, and also aims to develop a new path for mechanical engineering to take by mastering the essence of engineering that contributes to society by making use of scientific investigations and knowledge.

In education and research, by building an education and research system which allocates heuristic science focusing on the future and realization-oriented engineering which contributes to society as soon as practicably possible in a well-balanced manner to allow students to participate in a series of processes consisting of research, development, experiment, demonstration, and practical application, we develop human resources with sufficient ability to investigate and utilize knowledge while keeping a hands-on approach. Through such education and research activities, we develop high-level professionals with specialized knowledge and expertise and workers and researchers who can contribute to society.

This Department conducts research in three main areas: Advanced Design and Co-creation Division, Robotics and Medical/Welfare Service Division, and Environment and Energy Division. Related Departments include the Department of Integrative Bioscience and Biomedical Engineering of the Graduate School of Advanced Science and Engineering and the Graduate School of Environment and Energy Engineering as an independent graduate school.

### **Guidelines for earning a Master's Degree**

1. To be granted a master's degree, you must earn 30 or more credits, receive the required research guidance, and pass a master's thesis review.
2. Among the 30 credits required for the degree, 12 credits must be earned from seminar courses. Each academic year, you must take the seminar courses provided by your supervisor. If more than 12 credits of seminar courses are taken, credits in excess of 12 are not counted toward the number of credits required for the degree.
3. Please consult with your supervisor regarding what other courses should be taken to fulfill the credit requirement toward your degree.
4. To start writing a master's thesis, students must have earned credits from Seminar A and B, completed 12 or more credits from lecture courses, and submitted a research plan for their master's thesis at the end of the first year.

### **Summary of Each Research Area**

#### **◆ Advanced Design and Co-creation Division**

There is a human act called design that is the core of mechanical engineering based on technology. In this research area, we develop education and studies in line with the places of life (behaviors) of diverse people with different values and backgrounds. In other words, based on the basic education and studies of mechanical design making full use of computers, we develop a new academic field to aim for the development of coexistence (co-creation) technologies and design technologies in the places where humans live. To be specific, we aim to develop various machinery designs with this new perspective, designs of aerospace structures which will rapidly develop in the future, designs of communication systems, and communication designs in a broad sense as well.

#### ◆ Robotics and Medical/Welfare Service Division

Health has become a top concern for people in developed countries facing a super-aging society, including Japan. In this research area, we perform research and development of systems that guarantee a high quality of life by exploring advanced bio-mechatronics technologies including human support robots, welfare equipment, operation support systems, and artificial organs, through interdisciplinary approaches including not only mechanical engineering, but also medical science, computer science, physiology, and psychology. Specifically, we proceed with the development of humanoid robots and systems such as a rehabilitation support system, a minimally-invasive operation support system, and artificial hearts, and the solution of human movement, control, and cognitive characteristics, human bio-functions, etc. which serve as their basis.

#### ◆ Environment and Energy Division

In the design, research, and development of various machines and equipment, there is an increasing requirement to use resources and energies effectively, taking into consideration the conservation of the global environment and human living environments. This is the reason why the 21st century is called the “Century of the Environment.” In this research area, by particularly focusing on basic phenomena relating to thermal energy and its conversion and the mechanical equipment to which they are applied, we aim to develop advanced engineers and researchers who deal with engineering problems related to the environment and energy through education and studies. In particular, taking into account the expansion of the scope of studies of the energy field, we cooperate with independent graduate schools, the Project Research Institute, the Environmental Research Institute, and other graduate schools related to the environment that position not only the Okubo Campus, but also the Honjo Waseda Area as their social experiment stations. We develop human resources who can make full use of scientific and engineering methods by providing students with opportunities to learn how to clarify and solve challenging problems by participating in these projects.



### (I) Research guidance (Master's program)

Course Name
Research on Design of Mechanical Systems
Research on Design Optimization
Research on Intelligent Machines
Research on Environment and New Energy
Research on Thermal Energy Reaction Engineering
Research on Neuro Robotics
Research on Communication and Cocreation Technology
Research on Transporters & Energy Plants Materials Science and Engineering
Research on Medical Applications of Mechanical Engineering
Research on Biorobotics
Research on Environmental Mobility
Research on Exergy Engineering
Research on Co-creative Interface Design
Research on Image Engineering
Research on Applied Mechanics of Fluid-Structure Interaction

### (II) Research guidance (Doctoral program)

Course Name
Research on Design of Mechanical Systems
Research on Design Optimization
Research on Intelligent Machines
Research on Environment and New Energy
Research on Thermal Energy Reaction Engineering
Research on Neuro Robotics
Research on Communication and Cocreation Technology
Research on Transporters & Energy Plants Materials Science and Engineering
Research on Medical Applications of Mechanical Engineering
Research on Biorobotics
Research on Environmental Mobility
Research on Exergy Engineering
Research on Co-creative Interface Design
Research on Image Engineering
Research on Applied Mechanics of Fluid-Structure Interaction

### (III) Lecture courses

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Advanced Topics in Environment and Energy Conversion Engineering	2	2	
Advanced Topics in New Energy	2	2	
Image Engineering Advanced	2	2	
Advanced Topics in Robots and Systems B	2	2	
Advanced Topics in Applied Mechanics of Fluid-Structure Interactions	2	2	
Advanced Topics in Architectural Design and Engineering B	2	2	
Advanced Topics in Intellectual Property Rights, Technology, and Legal Affairs	2	2	
Seminar on Sensing in Embodiment Informatics B	4	4	
Advanced Topics in Robots and Systems A	2		2
Advanced Topics in Environmental Management	2		2
Advanced Topics in Environmental Policy and Science	2		2
Advanced Topics in Computational Fluid Dynamics with Chemical Reactions	2		2
Materials Science and Engineering for Space Craft	2		2
Advanced Topics in Architectural Design and Engineering A	2		2
Seminar on Sensing in Embodiment Informatics A	4		4
Analysis and Discussion of Papers on Advanced Robotics	4	2	2

#### (IV) Seminar courses

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Seminar on Structural Design A	3		3
Seminar on Structural Design B	3	3	
Seminar on Structural Design C	3		3
Seminar on Structural Design D	3	3	
Seminar on Structural Dynamics A	3		3
Seminar on Structural Dynamics B	3	3	
Seminar on Structural Dynamics C	3		3
Seminar on Structural Dynamics D	3	3	
Seminar on Intelligent Biomechatronic Systems A	3		3
Seminar on Intelligent Biomechatronic Systems B	3	3	
Seminar on Intelligent Biomechatronic Systems C	3		3
Seminar on Intelligent Biomechatronic Systems D	3	3	
Seminar on Environment and Advanced New Energy A	3		3
Seminar on Environment and Advanced New Energy B	3	3	
Advanced Seminar on Environment and Energy Engineering A	3		3
Advanced Seminar on Environment and Energy Engineering B	3	3	
Seminar on Thermal Energy Reaction Engineering A	3		3
Seminar on Thermal Energy Reaction Engineering B	3	3	
Seminar on Neuro Robotics A	3		3
Seminar on Neuro Robotics B	3	3	
Seminar on Neuro Robotics C	3		3
Seminar on Neuro Robotics D	3	3	
Seminar on Environment and Mobility A	3		3
Seminar on Environment and Mobility B	3	3	
Seminar on Transporters & Energy Plants Materials A	3		3
Seminar on Transporters & Energy Plants Materials B	3	3	
Seminar on Transporters & Energy Plants Materials C	3		3
Seminar on Transporters & Energy Plants Materials D	3	3	
Seminar on Communication Design A	3		3
Seminar on Communication Design B	3	3	
Seminar on Communication Design C	3		3
Seminar on Communication Design D	3	3	
Seminar on Biorobotics A	3		3
Seminar on Biorobotics B	3	3	
Seminar on Biorobotics C	3		3
Seminar on Biorobotics D	3	3	
Seminar on Mechanical Engineering for Medical Application A	3		3
Seminar on Mechanical Engineering for Medical Application B	3	3	
Seminar on Mechanical Engineering for Medical Application C	3		3
Seminar on Mechanical Engineering for Medical Application D	3	3	
Seminar on Exergy Engineering A	3		3
Seminar on Exergy Engineering B	3	3	
Seminar on Human-being Design A	3		3
Seminar on Human-being Design B	3	3	
Seminar on Human-being Design C	3		3
Seminar on Human-being Design D	3	3	
Seminar on Image Engineering A	3		3
Seminar on Image Engineering B	3	3	

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Seminar on Image Engineering C	3		3
Seminar on Image Engineering D	3	3	
Seminars on Applied Mechanics of Fluid-Structure Interactions A	3		3
Seminars on Applied Mechanics of Fluid-Structure Interactions B	3	3	
Seminars on Applied Mechanics of Fluid-Structure Interactions C	3		3
Seminars on Applied Mechanics of Fluid-Structure Interactions D	3	3	

# Department of Industrial and Management Systems Engineering

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The Department of Industrial and Management Systems Engineering involves research and education on an academic discipline in which the engineering approach is applied to management systems, i.e. various mechanism relating to management of organizations include business corporations, to provide practical and effective solutions for managerial problems with planner and manager of administrative actions. This academic discipline includes effective utilization of management resources such as humans, materials, facilities, money and information as its core. The discipline also includes topics relating to discovery and structuring of problems, theorization and systemization of problems, as well as problem analysis and solving methods utilizing mathematical science and information technologies. This department provides courses that impart the latest specialized knowledge, develop practical skills and support researches on the fields.

Research and education in this department is organized as a mesh structure; application areas as one axis and engineering methods as the other axis. Application areas cover a broad range of planning and management fields in business management, including planning, development, manufacturing, quality assurance, facility, sales, finance, personnel, and information, while engineering methods include operations research (OR), statistical analysis, knowledge engineering, information sciences, system engineering, software engineering, investment science, method engineering, ergonomics, and the like.

## Summary of Each Research Area

### ◆ Software Engineering

- Software design ○ Software architecture ○ Software validation and verification
- Software requirements engineering ○ Software management

### ◆ Production Management

- Lean and agile production ○ Production strategy research ○ International production and logistic systems ○ Productivity Improvement Scheme TPM

### ◆ Ergonomics and Human Life Engineering

- Human factors ○ Cognitive behavior model ○ Usability ○ Safety management

### ◆ Applied Stochastic Process

- Queuing theory ○ Methodology for statistical simulations ○ Financial engineering

### ◆ Systems Theory and Systems Science

- Mathematical systems theory ○ Applied system thinking ○ Agent-based social simulation
- Research policy evaluation ○ Soft systems approach

### ◆ Statistical Science

- Statistical multiple comparison ○ Multivariate analysis method ○ Design of experiments
- Statistical decision theory ○ Application to process control

### ◆ Information Mathematics Application

- Information statistics ○ Management information system design and evaluation ○ Text data analysis ○ Data mining
- Information search ○ Application to marketing analysis

◆ Information Theory and Application

- Information source encryption and communication path encryption
- Uncertain expression and estimation of knowledge
- Statistical application (model selection and data analysis)
- Academic theory

◆ Operations Research

- Mathematical programming
- Integer programming and combinatorial optimization
- Optimization under uncertainty
- Applications of optimization method
- Quantitative analysis of logistics
- Simulation

◆ Knowledge Information Processing and Artificial Intelligence

- Artificial intelligence and knowledge processing
- Intellectual agent and multi-agent systems
- Human-computer interaction (HCI)
- Web intelligence

**(I) Research guidance (Doctoral program)**

Course Name
Research on Operations Research
Research on Systems Theory
Research on Software Engineering
Research on Human Life Engineering
Research on Applied Information Science
Research on Operations and Production Management
Research on Knowledge Information Processing
Research on Statistical Science
Research on Mathematical Decision Making

## Department of Business Design & Management

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This program involves developing new businesses based on advanced technologies and their management thereof, along with developing innovative capacity for aligning existing businesses to changes in the management environment. Research is also aimed at the ability to improve operations, which is required evermore than before, in the future of business management. This educational program is aimed at nurturing business management leaders in the value-creating industries represented by the root source for competitive advantage in Japan, namely "Monozukuri" or craftsmanship, featuring characteristics intended to equip students with practical management capabilities, as described below:

- Curriculum focused on business creation and business innovation.
- Exercises and case studies to enhance problem-finding and -solving skills by simulating business experiences.
- A research guidance framework comprising teaching staff from the academia and from the industry or the corporate world offers guidance in both theory and practice.

Furthermore, this department is available as a General Program intended for general students, to be completed in two years, as well as a Special Program for working adults, to be completed in 1.5 years. These are provided to implement self-development education that involves general students and working adult students collaborating in their efforts to complement each other with the merits of each group supplementing for the demerits of the other.

The academic degrees awarded in this department are the "Master of Management Engineering" and "Doctor of Management Engineering," which makes this the first department in Japan that awards academic degrees in "Management Engineering."



**(I) Research guidance (Doctoral program)**

Course Name
Research on Operations Engineering
Research on Human Factors Management
Research on Profit Engineering
Research on Life Cycle Engineering
Research on Logistics Engineering
Research on Quality Management
Research on Manufacturing Systems Engineering
Research on Manufacturing Management
Research on Manufacturing, Retail and Distribution Process Innovation
Research on Management Information

## Department of Civil and Environmental Engineering

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Civil and Environmental Engineering is an academic field with a mission to establish facilities to serve as a basis for human life directly or indirectly and maintain and improve them. Since engineers in this field are required to have a high-level and wide range of engineering judgment in particular, harmonization of advanced technologies and humanity is expected. In this Department, education and studies are conducted aiming to develop appropriate human resources for that purpose. This department can be roughly divided into the research areas of Infrastructure Engineering, Environment and Disaster Prevention, and Planning and Management. As one of the characteristics of the Department of Civil and Environmental Engineering, each research area has content quite different from the others. Therefore, students need to consider their desire and aptitude well, and carefully decide which research area and which study to select.

### Guidelines for earning a Master's Degree

1. To be granted a master's degree, you must earn 30 or more credits, receive the required research guidance, and pass a master's thesis review.
2. Among the 30 credits required for the degree, 12 credits must be earned from seminar courses. Each academic year, you must take the seminar courses provided by your supervisor. If more than 12 credits of seminar courses are taken, credits in excess of 12 are not counted toward the number of credits required for the degree.
3. Please consult with your supervisor regarding what other courses should be taken to fulfill the credit requirement toward your degree.
4. To start writing a master's thesis, students must have earned credits from Seminar A and B, completed 12 or more credits from lecture courses, and submitted a research plan for their master's thesis at the end of the first year.

### Summary of Each Research Area

#### ◆ Infrastructure Engineering

In Infrastructure Engineering, we perform theoretical and experimental studies on problems related to various structures covered by the Department of Civil and Environmental Engineering.

In Structural Design, studies are conducted on problems related to designs and constructions of various civil engineering structures such as aboveground structures, underground structures, and marine structures.

In Structural Mechanics, studies are conducted on problems such as nonlinearity, buckling, load bearing capacity, shock and elasto-plasticity of mechanical behaviors of structures, dynamics of composite structures and composite materials, etc. In Concrete Engineering, studies regarding concrete structures are conducted on mechanical behaviors and design methods of concrete members, basic physical properties, durabilities of concrete, etc.

Since the above research areas are related to each other, we sometimes proceed with our studies in cooperation with other areas.

#### ◆ Environment and Disaster Prevention

Environment and Disaster Prevention conducts theoretical and experimental studies on problems related to the environment and disaster prevention in the hydrosphere and geosphere.

In Coastal Engineering, studies are conducted on hydraulics and coastal engineering, in particular, the numerical analysis, field surveys and hydraulic experiments of tsunami and storm surges, wave mechanics, sediment transport and beach erosion, water quality, etc. In Water and Environmental Engineering, studies are conducted on the restoration of water environments with resource recycling processes, advanced water and wastewater treatment processes, conservation of water environments using bio-barriers, simulation of water quality, etc. In River Engineering, based on river hydraulics and hydrology, we perform numerical analysis and experimental studies on multinatural river creation making use of the mechanism of natural river migration and problems related to environment and disaster prevention of drainage basins.

In Soil and Foundation Engineering and Soil Mechanics, the static and dynamic characterization of soil and studies on modeling for analysis of the ground and foundation structure under various conditions are carried out. Research and development on soil liquefaction phenomena that occur during an earthquake, damage to structures arising from liquefaction, and countermeasures against soil liquefaction, especially focusing on sandy ground are performed. In addition to the basic studies on a soil constitutive equation representing the stress-strain relationship, experimental and analytical studies on behavior and security of the ground in underground construction work such as earthwork and filling and environmental problems of the ground are carried out.

#### ◆ Planning and Management

In various changes in the social and economic environment surrounding the urban areas in recent years, the role of studies on city planning has become increasingly important.

The field of city planning is extremely wide. However, in this research area, our study includes multiple courses concerning planning design technologies covering everything from investigation, analysis, planning, design, to management and operation, centering on (1) arrangement of urban and regional areas, space design, and urban development, (2) urban transportation and urban infrastructure facilities, (3) urban disaster prevention, and (4) landscape planning and design. The areas are not limited to Japan and overseas city planning is also positioned as an important course of study. Our study approaches are based not only on theoretical and methodological basic studies, but also on active and practical application studies including policy experiments on real urban areas.

### (I) Research guidance (Master's program)

Course Name
Research on Transportation Studies and Planning
Research on City and Regional Planning
Research on Landscape and Aesthetics of infrastructure
Research on Structural Mechanics
Research on Structural Engineering
Research on Structural Design
Research on Geotechnical Engineering
Research on Soil Mechanics
Research on Coastal Engineering and Management
Research on River Engineering
Research on Water and Environmental Engineering
Research on Concrete Structure
Research on Tunnel Engineering

### (II) Research guidance (Doctoral program)

Course Name
Research on Transportation Studies and Planning
Research on City and Regional Planning
Research on Landscape and Aesthetics of infrastructure
Research on Structural Mechanics
Research on Structural Engineering
Research on Structural Design
Research on Geotechnical Engineering
Research on Soil Mechanics
Research on Coastal Engineering and Management
Research on River Engineering
Research on Water and Environmental Engineering
Research on Concrete Structure
Research on Tunnel Engineering

### (III) Lecture courses

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Practical City Planning and Design B	3	6	
Urban Studies and Planning A	2	2	
Advanced Structures and Materials	2	2	
Infrastructure Management	2	2	
Advanced Topics in Water and Environmental Engineering	2	2	
Advanced Soil Mechanics B	2	2	
Steel Material and Structure	2	2	
Advanced Topics in Intellectual Property Rights, Technology, and Legal Affairs	2	2	
Advanced Topics in Architectural Design and Engineering B	2	2	
Advanced Topics in Civil Engineering A	2	2 (intensive)	
Advanced Topics in Civil Engineering C	1	2 (intensive)	
Advanced Topics in Civil Engineering E	1	2 (intensive)	
Practical City Planning and Design A	3		6
Advanced Soil Mechanics A	2		2
Coastal Disaster Prevention	2		2
Advanced River Engineering	2		2
Advanced Coastal Engineering	2		2
Coastal Environment	2		2
International Development and Planning	2		2
Advanced Topics in Architectural Design and Engineering A	2		2
Advanced Topics in Civil Engineering B	2		2 (intensive)
Advanced Topics in Civil Engineering D	1		2 (intensive)

#### (IV) Seminar courses

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Seminar on Transportation Studies and Planning A	3		3
Seminar on Transportation Studies and Planning B	3	3	
Seminar on Transportation Studies and Planning C	3		3
Seminar on Transportation Studies and Planning D	3	3	
Seminar on City and Regional Planning A	3		3
Seminar on City and Regional Planning B	3	3	
Seminar on City and Regional Planning C	3		3
Seminar on City and Regional Planning D	3	3	
Seminar on Landscape and Aesthetics of Infrastructure A	3		3
Seminar on Landscape and Aesthetics of Infrastructure B	3	3	
Seminar on Landscape and Aesthetics of Infrastructure C	3		3
Seminar on Landscape and Aesthetics of Infrastructure D	3	3	
Seminar on Structural Mechanics A	3		3
Seminar on Structural Mechanics B	3	3	
Seminar on Structural Mechanics C	3		3
Seminar on Structural Mechanics D	3	3	
Seminar on Structural Engineering A	3		3
Seminar on Structural Engineering B	3	3	
Seminar on Structural Engineering C	3		3
Seminar on Structural Engineering D	3	3	
Seminar on Structural Design A	3		3
Seminar on Structural Design B	3	3	
Seminar on Structural Design C	3		3
Seminar on Structural Design D	3	3	
Seminar on Geotechnical Engineering A	3		3
Seminar on Geotechnical Engineering B	3	3	
Seminar on Geotechnical Engineering C	3		3
Seminar on Geotechnical Engineering D	3	3	
Seminar on Soil Mechanics A	3		3
Seminar on Soil Mechanics B	3	3	
Seminar on Soil Mechanics C	3		3
Seminar on Soil Mechanics D	3	3	
Seminar on Coastal Engineering and Management A	3		3
Seminar on Coastal Engineering and Management B	3	3	
Seminar on Coastal Engineering and Management C	3		3
Seminar on Coastal Engineering and Management D	3	3	
Seminar on River Engineering A	3		3
Seminar on River Engineering B	3	3	
Seminar on River Engineering C	3		3
Seminar on River Engineering D	3	3	
Seminar on Water Quality Engineering A	3		3
Seminar on Water Quality Engineering B	3	3	
Seminar on Water Quality Engineering C	3		3
Seminar on Water Quality Engineering D	3	3	
Seminar on Concrete Structure A	3		3
Seminar on Concrete Structure B	3	3	
Seminar on Concrete Structure C	3		3
Seminar on Concrete Structure D	3	3	

## **Department of Earth Sciences, Resources and Environmental Engineering**

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Department of Earth Sciences, Resources, and Environmental Engineering involves research and education associated mainly with environmental issues, resource issues, and earth sciences. Our studies encompass a wide range of environmental issues associated with the atmosphere, aquatic environments, soil, environmentally-friendly recycling, the proper disposal and management of waste, development of new materials, development of natural resources, the use of underground spaces including the ocean and geothermal environments, resource development operations, and conservation of the natural environment.

We aim to develop human resources capable of gaining extensive knowledge from the expertise of scientists and of managing environmental and resource issues using a global perspective.

Five research areas in the international program under Department of Earth Sciences, Resources and Environmental Engineering include the following: Geoexploration Engineering Division, Development and Environmental Engineering Division, Resources Processing and Recycling Division, Materials Processing Engineering Division, and Environmental Protection Engineering Division.

### **Guidelines for earning a Master's Degree**

1. To be granted a master's degree, you must earn 30 or more credits, receive the required research guidance, and pass a master's thesis review.
2. Among the 30 credits required for the degree, 12 credits must be earned from seminar courses. Each academic year, you must take the seminar courses provided by your supervisor. If more than 12 credits of seminar courses are taken, credits in excess of 12 are not counted toward the number of credits required for the degree.
3. Please consult with your supervisor regarding what other courses should be taken to fulfill the credit requirement toward your degree.

### **Summary of Each Research Area**

#### **◆ Geoexploration Engineering Division**

Understanding the existing conditions of the geosphere and conducting continuous monitoring are necessary for the efficient use of natural resources and the protection of the geosphere. This division conducts research on environmental issues related to the geosphere, starting with the discovery and development of natural resources, and moving to courses such as crustal movement, ground and earthquake disaster prevention for the civil engineering and construction divisions, the geological disposal of waste and sequestration of carbon dioxide, and groundwater and soil pollution.

◆ Development and Environmental Engineering Division

It is essential to utilize clean energy to minimize environmental damage. This division conducts studies on the development of oil and natural gas resources that deliver lower carbon dioxide emissions, in addition to studies on sources such as renewable geothermal energy and methane hydrate. Furthermore, the sequestration of carbon dioxide generated from fossil fuels, and underground treatment methods for radioactive materials generated by atomic disintegration are also studied.

◆ Recourses Processing and Recycling Division

High-efficiency processes, such as the separation of useful components from waste (hazardous) components, is essential in the effective utilization of natural resources and waste resources.

With the upgrading of processing technology, such as the ability to separate base products, the goal of this division is to optimize the flow of resources as a whole, and to minimize the environmental load during resource usage in terms of enabling environmentally-friendly resource recycling and cleaning up the environment.

◆ Materials Processing Engineering Division

In various manufacturing processes of functional materials, such as metallic materials, studies are being conducted in relation to the physico-chemical analysis of processes involved using various academic methods such as “thermodynamics”, “electrochemistry”, and “quantum chemistry”. In addition, computer simulations are also being conducted. To be specific, this division concerns the following: the development of a new manufacturing process for titanium, the production of a compound semiconductor using an electrochemical method, the measurement of properties of non-ferrous metal smelting, the elucidation of environmental substances using quantum chemistry, and an analysis of reaction mechanisms.

◆ Environmental Protection Engineering Division

There are two laboratories in this research division: the laboratory of Environmental and Safety Engineering, and the Laboratory of Atmospheric and Aquatic Environmental Chemistry. The Department of Environmental and Safety Engineering conducts measurements and evaluations of harmful factors associated with atmospheric, work, and indoor environment that include chemical materials such as dust, asbestos, and benzene, and then researches appropriate countermeasures. The Laboratory of Atmospheric and Aquatic Environmental Chemistry conducts fieldwork related to the atmosphere, aquatic environments, and forests, using investigative processes associated with the academic disciplines of atmospheric chemistry, water chemistry, analytical chemistry, geochemistry, meteorology, forest ecology, and soil science.



### **(I) Research guidance (Master's program)**

Course Name
Research on Geo-Environmental Science
Research on Petroleum Engineering
Research on Resources Recycling Engineering
Research on Environmental Purification and Resources Processing
Research on Atmospheric and Aquatic Chemistry
Research on Rock Mechanics and Production Engineering
Research on Geophysical Engineering
Research on Environment and Safety Engineering

### **(II) Research guidance (Doctoral program)**

Course Name
Research on Geo-Environmental Science
Research on Petroleum Engineering
Research on Resources Recycling Engineering
Research on Environmental Purification and Resources Processing
Research on Atmospheric and Aquatic Chemistry
Research on Rock Mechanics and Production Engineering
Research on Geophysical Engineering
Research on Environment and Safety Engineering

### (III) Lecture courses

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Advanced Environmental Interface Engineering	2	2	
Advanced Topics in Aquatic Chemistry	2	2	
Fundamentals of Petroleum Engineering	2	2	
Fundamental Well Test Analysis	2	2	
Physical Chemistry of Separation Technology	2	2	
Advanced Topics in Resources Recycling	2	2	
Earth and Environmental Science	2	2	
Advanced Topics in Industrial Hygiene	2	2	
Advanced Topics in Earth and Environmental Science	2		2(intensive)
Resources and Environment	2		2
Material Flow Analysis	2		2
Resources Processing Technology	2		2
Advanced Reservoir Engineering	2		2
Introduction to Geostatistics	2		2
Applied Reservoir Simulation	2		2
Advanced Production Engineering	2		2
Advanced Numerical Rock Mechanics	2		2
Advanced Applied Geophysics	2		2
Advanced Topics in Geo-Environmental Science	2		2
Advanced Topics in Atmospheric Science	2		2

#### (IV) Seminar courses

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Seminar on Geo-Environmental Science A	3		3
Seminar on Geo-Environmental Science B	3	3	
Seminar on Geo-Environmental Science C	3		3
Seminar on Geo-Environmental Science D	3	3	
Seminar on Petroleum Engineering A	3		3
Seminar on Petroleum Engineering B	3	3	
Seminar on Petroleum Engineering C	3		3
Seminar on Petroleum Engineering D	3	3	
Seminar on Resources Recycling Engineering A	3		3
Seminar on Resources Recycling Engineering B	3	3	
Seminar on Resources Recycling Engineering C	3		3
Seminar on Resources Recycling Engineering D	3	3	
Seminar on Environmental Purification and Resources Processing A	3		3
Seminar on Environmental Purification and Resources Processing B	3	3	
Seminar on Environmental Purification and Resources Processing C	3		3
Seminar on Environmental Purification and Resources Processing D	3	3	
Seminar on Atmospheric and Aquatic Chemistry A	3		3
Seminar on Atmospheric and Aquatic Chemistry B	3	3	
Seminar on Atmospheric and Aquatic Chemistry C	3		3
Seminar on Atmospheric and Aquatic Chemistry D	3	3	
Seminar on Rock Mechanics and Production Engineering A	3		3
Seminar on Rock Mechanics and Production Engineering B	3	3	
Seminar on Rock Mechanics and Production Engineering C	3		3
Seminar on Rock Mechanics and Production Engineering D	3	3	
Seminar on Geophysical Exploration A	3		3
Seminar on Geophysical Exploration B	3	3	
Seminar on Geophysical Exploration C	3		3
Seminar on Geophysical Exploration D	3	3	
Seminar on Environment and Safety Engineering A	3		3
Seminar on Environment and Safety Engineering B	3	3	
Seminar on Environment and Safety Engineering C	3		3
Seminar on Environment and Safety Engineering D	3	3	

## Department of Pure and Applied Physics

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Research on important issues of modern physics and their technological applications is conducted in the Department of Pure and Applied Physics. There are a broad range of research fields such as mathematical physics, elementary particle physics, nuclear physics, cosmic-ray physics, astrophysics, nuclear engineering, condensed matter physics, polymer physics, biophysics, applied crystallography, optics, measurement engineering, control engineering, and information engineering. Interdisciplinary research is also being conducted. It is assumed that students studying in this department acquired academic knowledge equivalent to that of graduates of the Department of Physics or the Department of Applied Physics of undergraduate programs.

### Guidelines for earning a Master's Degree

1. To be granted a master's degree, you must earn 30 or more credits, receive the required research guidance, and pass a master's thesis review.
2. Among the 30 credits required for the degree, 12 credits must be earned from seminar courses. Each academic year, you must take the seminar courses provided by your supervisor. If more than 12 credits of seminar courses are taken, credits in excess of 12 are not counted toward the number of credits required for the degree.
3. Please consult with your supervisor regarding what other courses should be taken to fulfill the credit requirement toward your degree. In addition, you should consult "Core Courses / Recommended Courses" of this handbook.

[Note]

Students cannot obtain credits from combined undergraduate school lectures if they have already earned them in undergraduate schools.

### Summary of Each Research Area

#### ◆ Mathematical Physics

Research is conducted on mathematical problems that occur in physics, engineering, biology, etc. mainly by using methods of analysis, geometry, etc. In particular, the basic knowledge of functional analysis, the theory of evolution equation, the theory of nonlinear partial differential equation, the theory of real function and the variational method is important and basic knowledge of physics is also necessary. There are a variety of nonlinear phenomena to be studied. As far as the nonlinear partial differential equations are concerned, there are parabolic equations (Navier-Stokes equation, nonlinear heat equation), hyperbolic equations (nonlinear Klein-Gordon equation, compressible fluid equation), dispersion equations (KdV equation, nonlinear Schroedinger equation), a nonlinear elliptic equation which describes the steady state of the above-mentioned equations, and mixed equations as complex simultaneous equations of the above-mentioned equations (Zakharov equation, Davey-Stewartson equation), etc. The typical research themes of these equations are the existence, nonexistence, uniqueness, multiplicity, regularity, analyticity, specificity, symmetry, periodicity, almost periodicity, asymptotic behavior, stability, etc. of solutions.

#### ◆ Theoretical Nuclear and Particle Physics

In this research area, theoretical studies on nuclei and elementary particles in a broad sense are conducted. In the former, the main course is the theoretical study of nuclear structure and the results are applied to astrophysics, etc. In the study of nuclear structure, emphasis is placed on the study of infinitely-large hypothetical nuclei using the quantum-mechanical

many-body problem techniques. In relation to the above, the studies of the internal structure of neutron stars, etc. are also conducted. In the latter, theoretical research on elementary particle physics is conducted. In relation to this course, phenomenological analyses of the standard model of elementary particles and models beyond the standard model, theoretical studies on unified models of elementary particles including gravity and supersymmetry are incorporated. Studies on quantum mechanics in mesoscopic systems, quantization of stochastic processes and various problems related to the basic theories and measurement problems of quantum mechanics, etc. are also conducted.

#### ◆ Particle and Applied Radiation Physics

##### (1) High Energy Experimental Particle Physics

Interactions between elementary particles are studied at high energy frontier experiments. Based on experimental data taken at large-scale accelerator experiments, researches are widely performed to verify various theoretical models and also to search for new particles/phenomena. In addition, we focus on an understanding of possible connections between cosmology and particle physics through experimental approaches.

##### (2) Applied Radiation Physics

Development of new-generation radiation detectors widely used for radiation physics, high energy astrophysics and nuclear medicine. Performance of the detectors will be tested through various accelerator beam experiments, balloon-borne experiments and future satellite missions. Also studies of high energy phenomena in the Universe will be carried out using observational data from Suzaku and Fermi astronomical satellites.

##### (3) High Quality Beam Science

Fundamental science and application of laser light, electron beam, synchrotron radiation and other quantum beams are main subject. Especially, experimental research in the view point of physical chemistry between above mentioned beams and various kinds of materials will be conducted.

#### ◆ Astrophysics

We aim to understand both theoretically and experimentally various phenomena in the universe from the point of view of physics.

The theoretical groups are studying relativistic and particle cosmology as well as high-energy astrophysics. More specifically, the research topics in cosmology include the creation and evolution of the universe, phase transitions in the early universe, the inflationary scenario, dark matter and dark energy, and large-scale structure formations; in high-energy astrophysics we are interested in supernova explosions, formations of black holes and neutron stars, and emissions of neutrinos and gravitational waves. We take both analytical and numerical approaches. More recently, various theories of gravity are also investigated from the astrophysical viewpoint and the dark energy problem is tackled in this context.

The experimental groups are working mainly in the fields of planetary science, space physics, and high-energy astrophysics. Employing satellite- and balloon-borne instruments and detectors that we develop on our own, we study (1) the formation and evolution of the moon, planets, and asteroids via the observation of MeV gamma-rays and neutrons, (2) high-energy phenomena occurring in space and on extraterrestrial objects through the observation of high-energy gamma-rays and cosmic rays, and (3) dark matter in the universe. In addition, we conduct research and development on new detectors and technologies required for the

observations and experiments mentioned above. Using terrestrial accelerators, we also study particle interactions related to high-energy astronomical phenomena.

#### ◆ Theory of Condensed Matter Physics

In the field of condensed matter physics, we try to clarify and understand the structures and the behaviors of materials and physical systems from microscopic scales to mesoscopic and macroscopic scales, and try to establish their concrete and universal theories by making full use of quantum mechanics, statistical mechanics, etc. The research themes that are currently conducted by the members of this research area include:

- (1) Interdisciplinary studies on pattern formation and collective behavior in physical, chemical, biological, and social systems, from the viewpoints of statistical physics and nonlinear dynamics.
- (2) Theoretical studies on low temperature many-body phenomena, including superconductivity, superfluidity, charge density waves, macroscopic tunneling effects, etc.
- (3) Studies on applied and fundamental physics of nonlinear and chaotic dynamics, quantum and wave chaos, and transport in many-particle systems.
- (4) Theoretical studies on various quantum phenomena occurring in the microscopic and mesoscopic scales, and on the emergent quantum technologies making use of quantum correlations and entanglements.

#### ◆ Condensed Matter Physics

Condensed matter physics is a basis of core-technologies for modern industry. Condensed matter physics area at Waseda provides a variety of lecture courses including solid state physics, soft matter physics, laser physics, surface and interface physics, and strongly correlated electron physics, and also spans a wide range of research on condensed matter. The research theme of each group in condensed matter physics area is as follows:

- (1) Studies on physical and chemical phenomena occurred in a material and on a surface, such as diffusion of atoms/ions and reduction/oxidation processes. Development of conceptually new devices and systems, such as for neuromorphic computing systems, based on the studies is also carried out. In the studies, instruments such as STM, SEM, LEED, Semiconductor Parameter Analyzer, and EB-deposition system are used.
- (2) Spectroscopic studies on correlated electrons in the bulk or at the surface of solids. We aim to find novel quantum states or functionalities due to electronic correlation by means of photoemission or x-ray spectroscopy and contribute to development of new energy materials.
- (3) Attosecond and ultra-fast spectroscopy. We develop intense, ultra-short laser pulses with the wavelength from infrared to soft-Xray to study fast electron dynamics in an atom and molecule. In addition, we develop the new experimental approaches to image fast dynamics of an electron wave function or molecular orbital with attosecond time-resolution.
- (4) Exploring new physics through new materials. We seek to synthesize new materials including transition metal oxides as strongly correlated electron systems, grow new crystals, and find their exotic behaviors, e.g., charge/orbital ordering and large responses to an external field, by measuring their transport, magnetic, and optical properties.
- (5) Study of novel phenomena appearing in the electronic system with strong correlations, using a low temperature scanning tunneling microscope (STM). They include i. various types of high-temperature superconductivity and associating electronic orders, ii. direct

observation and/or discovery of new quantum phenomena appeared in nano structure at low temperatures.

- (6) Experimental studies on soft matter, especially focusing on static and dynamic properties of liquid crystals: We try to understand how the soft molecular interaction should result in the long-range orientational order and how the molecular random motion is transformed from the vastly differing scales ranging from nm to mm and from pico-seconds to micro-seconds. This multi-scale energy transformation is one of the unique properties of soft matter, which will help us to clarify life activities.

#### ◆ Biophysics

All of the biological phenomena are based on the physical properties of the constituent biomolecules, and the hierarchical organization and dynamic interactions among them. Biophysics, including both the physical approach to biology and the biological viewpoint in physics, has been developed, based on physics and chemistry, as one of the most active interdisciplinary research areas of science. There are a wide variety of biophysical subjects to be studied, which is hierarchically ranging from the sub-nanometer levels to study molecular machines consisting of protein, DNA, and RNA, to the micrometer levels to study individual cells, and then to the macroscopic levels to study tissues and organs that consist of cells. There are also a variety of biophysical methods to be used, ranging from analytical approaches such as atomistic molecular dynamics simulation, to experimental approaches including single-molecule and single-cell observations and manipulations, and constructive approach that is complementary to the conventional analytical approaches. For example, we experimentally study various biological motions (muscular contraction, cell movements, cell divisions, etc.) and information transduction inside or between cells, and we theoretically examine the physical mechanisms of biological functions such as energy and signal transduction in proteins and biomolecular complexes. Biophysics has infinite frontiers to explore, and should be attractive to a wide range of students, not only to those who like biology, but also to those who like physics, chemistry or mathematics. Below are the research key words and the three research instructions:

Key words:

proteins / DNA / RNA / molecular machine / structure-function relationship / cooperativity / structural polymorphism / fluctuation and response / atomic and molecular forces / cell motility / biological oscillation / cardiac muscle cells / self-organization / neural-cell network / tumor cell in the blood / molecular population / cellular population / computational science / single molecule physiology / constructive approach / drug discovery / medical diagnosis / bio-chips

Research topics:

- a) Theoretical and computational approaches to understand the molecular dynamics in molecular machine systems composed of proteins and other biomolecules including DNA. Particularly, physical principles of how molecular machines works efficiently using different types of energies (e.g. chemical, mechanical, electrical, thermal, optical, etc.) are studied based on the statistical mechanics and electrostatics.
- b) Experimental approaches to understand the molecular mechanism by which protein filaments and molecular motors work. Emphasis is placed on structural polymorphism of actin filaments, to unveil the principles and properties of protein machines that are distinct from artificial ones.

c) Experimental approaches to understand the meaning and function of epigenetic information in living systems. A system of analyzing epigenetic information has been developed starting from the twin complementary viewpoints of cell regulation as an 'algebraic' system (emphasis on temporal aspects) and as a 'geometric' system (emphasis on spatial aspects). The knowledge acquired from this study may lead to the use of cells that fully control practical applications like cell-based drug screening and the regeneration of organs.

#### ◆ Physics-Based Engineering: Informatics, Photonics and Image Science

This research area consists of the optical field and the measurement control engineering field. The optoelectronic industry made remarkable progress in recent years, and along with the progress of laser, microfabrication, optical materials, and computers, the optical application field has been expanding from image formation and measurement to communication, electronics, medicine, biology, and information processing, and new application methods have also been actively developed. Furthermore, new applications and the pursuit of extremes have promoted new theoretical development and the formation of a framework of basic optics.

Against this backdrop, studies of basic physical phenomena and new application methods related to light are conducted in the optical field regarding quantum optics, statistical optics, coherence theory, Fourier optics, optical information processing, optical measurement, optical design, optical communication, optical computers, laser engineering, optoelectronics, micro optics, nonlinear optics, image science, X-ray optics, medical optics, physiological optics, eye optics, etc. while at the same time reviewing the system of completed classical optics.

Measurement and control have been the main topics of engineering so far. However, the progress of computers has brought a new concept of information to this field and promoted new development by merging measurement control engineering with electronic engineering, system engineering, communication engineering, information engineering, etc. In the field of measurement control engineering, research guidance on the following five studies are provided to develop researchers and engineers who can bear the leading edge of the times and that have a sense for engineering based on a knowledge of physics and mathematics: the “study of information transformation engineering handling photonic integrated circuits and communication, measurement, and processing of multimedia information using them,” the “study of semiconductor device engineering to study a physical solution of an ultrafast phenomenon of semiconductors using ultrashort optical pulse laser and its application to devices,” the “study of system control engineering handling the discrete event system and modeling, analysis, control problems, etc. of the hybrid system,” the “study of information engineering handling robotics, neural networks, image processing, acoustic signal processing, etc.,” and the “study of image information processing handling multimedia information based on generation, processing, and modeling of three-dimensional moving images.”



## Core Courses / Recommended Courses

When core courses and recommended courses are provided by each research area of your department, take courses in accordance with the specified method.

### Mathematical Physics

Core courses

Earn 2 or more credits from the following core courses:

Mathematical Physics A
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There are no recommended courses.

### Theoretical Nuclear and Particle Physics

Core courses

Taking the following core courses is recommended. Taking your supervisor's courses is required.

Advanced Quantum Mechanics A
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Advanced Quantum Mechanics B
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Advanced Elementary Particle Physics A
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Advanced Elementary Particle Physics B
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Nuclear Physics A
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Nuclear Physics B
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Nuclear Astrophysics
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There are no recommended courses.

### Astrophysics

Core courses

Earn 6 or more credits from the following core courses:

General Relativity and Gravitation
------------------------------------

Advanced Cosmology
--------------------

Elementary Processes in Astrophysical Phenomena A
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Elementary Processes in Astrophysical Phenomena B
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Cosmic Radiation Physics A
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Cosmic Radiation Physics B
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High Energy Astrophysics A
----------------------------

High Energy Astrophysics B
----------------------------

Recommended courses

It is recommended that you take about 8 credits from the following recommended courses:

Advanced Quantum Mechanics A
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Advanced Quantum Mechanics B
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Advanced Elementary Particle Physics A
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Advanced Elementary Particle Physics B
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Nuclear Physics A
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Nuclear Physics B
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Nuclear Astrophysics
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Experimental High Energy Particle Physics A
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Experimental High Energy Particle Physics B
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Experimental High Energy Particle Physics C
---

Experimental High Energy Particle Physics D
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Advanced Statistical Physics
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Quantum Physics of Matter A
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Quantum Physics of Matter B
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Physics of Non-Equilibrium Systems A
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Physics of Non-Equilibrium Systems B
--------------------------------------

## Theory of Condensed Matter Physics

### Core courses

Earn 2 or more courses from the following core courses:

Quantum Physics of Matter A
Quantum Physics of Matter B
Advanced Statistical Physics
Physics of Non-Equilibrium Systems A
Physics of Non-Equilibrium Systems B
Soft Condensed Matter Physics (Theory & Simulation)
Advanced Theoretical Quantum Physics A
Advanced Theoretical Quantum Physics B

There are no recommended courses.

## Condensed Matter Physics

### Core courses

Earn 4 or more courses from the following core courses:

Optical Processes in Solids
Soft Condensed Matter Physics (Experiment)
Superconductivity
Intense Laser Physics
Surface and Interface Physics
Strongly Correlated Electron Physics
Semiconductor Quantum Physics
Soft Condensed Matter Physics (Theory & Simulation)
Advanced Statistical Physics
Quantum Physics of Matter A
Quantum Physics of Matter B
Physics of Non-Equilibrium Systems A
Physics of Non-Equilibrium Systems B
Advanced Theoretical Quantum Physics A
Advanced Theoretical Quantum Physics B

There are no recommended courses.

## Particle and Applied Radiation Physics

### Core courses

Earn 4 or more credits from the following core courses. Taking your supervisor's courses is required.

Particle Accelerator Applications
Cosmic Radiation Physics A
Cosmic Radiation Physics B
High Energy Astrophysics A
High Energy Astrophysics B
Soft Condensed Matter Physics (Experiment)
Soft Condensed Matter Physics (Theory & Simulation)
Experimental High Energy Particle Physics A, B, C, D

There are no recommended courses.

## Physics-Based Engineering: Informatics, Photonics and Image Science

Core courses	
Earn 6 or more credits from the following core courses:	
Advanced Applied Optics	There are no recommended courses.
Advanced Quantum Optics	
Measurement and Information Technology	
Integrated and Guided Optics	
Semiconductor Quantum Physics	
Image Processing	

## Biophysics

There are no core courses.	Recommended courses
	Advanced Biological Physics A
	Advanced Biological Physics B
	Soft Condensed Matter Physics (Experiment)
	Soft Condensed Matter Physics (Theory & Simulation)
	Physics of Non-Equilibrium Systems A
	Physics of Non-Equilibrium Systems B
	Advanced Statistical Physics
	Surface and Interface Physics
	Advanced Applied Optics

## (I) Research guidance (Master's program)

Course Name
Research on Mathematical Physics (Prof. Otani)
Research on Mathematical Physics (Prof. Ozawa)
Research on Theoretical Particle Physics
Research on Theoretical Nuclear Physics
Research on Theoretical Foundations of Quantum Mechanics
Research on Theoretical Astrophysics and Cosmology
Research on Theoretical Astrophysics
Research on Observational Astrophysics (Prof. Hasebe)
Research on Observational Astrophysics (Prof. Torii)
Research on Theoretical Low Temperature Physics
Research on Physics of Nonequilibrium Systems
Research on Quantum Physics of Complex Systems
Research on Soft Matter Physics
Research on Experimental Low Temperature Condensed Matter Physics
Research on Experimental Biophysics
Research on Molecular Biophysics
Research on Theoretical Biophysics
Research on Beam Applications
Research on Optical Science and Engineering
Research on Semiconductor Devices
Research on Photonic Devices
Research on Measurement and Information Technology
Research on Image Processing
Research on Applied Radiation Physics
Research on Experimental Particle Physics
Research on Theoretical Quantum Physics
Research on Pie-Electron Materials
Research on Quantum and Laser Physics
Research on Quantum Optics
Research on Nonlinear Physics
Research on Electronic Correlation Physics
Research on Surface and Interface Non-equilibrium Physics

## (II) Research guidance (Doctoral program)

Course Name
Research on Mathematical Physics (Prof. Otani)
Research on Mathematical Physics (Prof. Ozawa)
Research on Theoretical Particle Physics
Research on Theoretical Nuclear Physics
Research on Theoretical Foundations of Quantum Mechanics
Research on Theoretical Astrophysics and Cosmology
Research on Theoretical Astrophysics
Research on Observational Astrophysics (Prof. Hasebe)
Research on Observational Astrophysics (Prof. Torii)
Research on Theoretical Low Temperature Physics
Research on Physics of Nonequilibrium Systems
Research on Quantum Physics of Complex Systems
Research on Soft Matter Physics
Research on Experimental Low Temperature Condensed Matter Physics
Research on Experimental Biophysics
Research on Molecular Biophysics
Research on Theoretical Biophysics
Research on Beam Applications
Research on Optical Science and Engineering
Research on Semiconductor Devices
Research on Photonic Devices
Research on Measurement and Information Technology
Research on Image Processing
Research on Applied Radiation Physics
Research on Experimental Particle Physics
Research on Theoretical Quantum Physics
Research on Pie-Electron Materials
Research on Quantum and Laser Physics
Research on Quantum Optics
Research on Nonlinear Physics
Research on Electronic Correlation Physics
Research on Surface and Interface Non-equilibrium Physics

### (III) Lecture courses

Please note that many lecture courses are only offered in alternate years. Please consult the department for details.

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Advanced Quantum Mechanics B	2	2	
Advanced Elementary Particle Physics B	2	2	
Nuclear Physics B	2	2	
Elementary Processes in Astrophysical Phenomena A	2	2	
Elementary Processes in Astrophysical Phenomena B	2	2	
Experimental High Energy Particle Physics A	2	2	
Cosmic Radiation Physics B	2	2	
High Energy Astrophysics B	2	2	
Advanced Statistical Physics	2	2	
Advanced Biological Physics B	2	2	
Particle Accelerator Applications	2	2	
Integrated and Guided Optics	2	2	
Semiconductor Quantum Physics	2	2	
Intense Laser Physics	2	2	
Physics of Non-Equilibrium Systems B	2	2	
Strongly Correlated Electron Physics	2	2	
Surface and Interface Physics	2	2	
Experimental High Energy Particle Physics B	2	2 (intensive)	
Experimental High Energy Particle Physics D	2	2 (intensive)	
Mathematical Physics A	2		2
Advanced Quantum Mechanics A	2		2
Advanced Elementary Particle Physics A	2		2
Nuclear Physics A	2		2
Nuclear Astrophysics	2		2
Advanced Cosmology	2		2
Experimental High Energy Particle Physics C	2		2
Cosmic Radiation Physics A	2		2
High Energy Astrophysics A	2		2
Quantum Physics of Matter A	2		2
Quantum Physics of Matter B	2		2
Optical Processes in Solids	2		2
Soft Condensed Matter Physics (Experiment)	2		2
Superconductivity	2		2
Soft Condensed Matter Physics (Theory & Simulation)	2		2
Advanced Biological Physics A	2		2
Advanced Applied Optics	2		2
Measurement and Information Technology	2		2
Advanced Quantum Optics	2		2
Advanced Theoretical Quantum Physics A	2		2
Advanced Theoretical Quantum Physics B	2		2
Physics of Non-Equilibrium Systems A	2		2
Image Processing	2		2 (intensive)
General Relativity and Gravitation	2		2 (first half)

#### (IV) Seminar courses

Please note that many seminar courses are only offered in alternate years. Please consult the department for details.

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Seminar on Functional Equations and Applications A	3		3
Seminar on Functional Equations and Applications B	3	3	
Seminar on Functional Equations and Applications C	3		3
Seminar on Functional Equations and Applications D	3	3	
Seminar on Mathematical Physics A	3		3
Seminar on Mathematical Physics B	3	3	
Seminar on Mathematical Physics C	3		3
Seminar on Mathematical Physics D	3	3	
Seminar on Theoretical Particle Physics A	3		3
Seminar on Theoretical Particle Physics B	3	3	
Seminar on Theoretical Particle Physics C	3		3
Seminar on Theoretical Particle Physics D	3	3	
Seminar on Theoretical Nuclear Physics A	3		3
Seminar on Theoretical Nuclear Physics B	3	3	
Seminar on Theoretical Nuclear Physics C	3		3
Seminar on Theoretical Nuclear Physics D	3	3	
Seminar on Theoretical Foundations of Quantum Mechanics A	3		3
Seminar on Theoretical Foundations of Quantum Mechanics B	3	3	
Seminar on Theoretical Foundations of Quantum Mechanics C	3		3
Seminar on Theoretical Foundations of Quantum Mechanics D	3	3	
Seminar on Theoretical Astrophysics and Cosmology A	3		3
Seminar on Theoretical Astrophysics and Cosmology B	3	3	
Seminar on Theoretical Astrophysics and Cosmology C	3		3
Seminar on Theoretical Astrophysics and Cosmology D	3	3	
Seminar on High Energy Astrophysics A	3		3
Seminar on High Energy Astrophysics B	3	3	
Seminar on Gravitational Physics A	3		3
Seminar on Gravitational Physics B	3	3	
Seminar on Cosmic Radiation Physics A	3		3
Seminar on Cosmic Radiation Physics B	3	3	
Seminar on Cosmic Radiation Physics C	3		3
Seminar on Cosmic Radiation Physics D	3	3	
Seminar on Observational Astrophysics A	3		3
Seminar on Observational Astrophysics B	3	3	
Seminar on Observational Astrophysics C	3		3
Seminar on Observational Astrophysics D	3	3	
Seminar on Low Temperature Physics A	3		3
Seminar on Low Temperature Physics B	3	3	
Seminar on Low Temperature Physics C	3		3
Seminar on Low Temperature Physics D	3	3	
Seminar on Mathematics of Pattern Formation A	3		3
Seminar on Mathematics of Pattern Formation B	3	3	

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Seminar on Physics of Pattern Formation A	3		3
Seminar on Physics of Pattern Formation B	3	3	
Seminar on Quantum Physics of Complex Systems A	3		3
Seminar on Quantum Physics of Complex Systems B	3	3	
Seminar on Quantum Physics of Complex Systems C	3		3
Seminar on Quantum Physics of Complex Systems D	3	3	
Seminar on Soft Matter Physics A	3		3
Seminar on Soft Matter Physics B	3	3	
Seminar on Soft Matter Physics C	3		3
Seminar on Soft Matter Physics D	3	3	
Seminar on Experimental Low Temperature Condensed Matter Physics A	3		3
Seminar on Experimental Low Temperature Condensed Matter Physics B	3	3	
Seminar on Experimental Low Temperature Condensed Matter Physics C	3		3
Seminar on Experimental Low Temperature Condensed Matter Physics D	3	3	
Seminar on Experimental Biophysics A	3		3
Seminar on Experimental Biophysics B	3	3	
Seminar on Experimental Biophysics C	3		3
Seminar on Experimental Biophysics D	3	3	
Seminar on Molecular Biophysics A	3		3
Seminar on Molecular Biophysics B	3	3	
Seminar on Molecular Biophysics C	3		3
Seminar on Molecular Biophysics D	3	3	
Seminar on Theoretical Biophysics A	3		3
Seminar on Theoretical Biophysics B	3	3	
Seminar on Simulations in Biophysics A	3		3
Seminar on Simulations in Biophysics B	3	3	
Seminar on Accelerator Applications A	3		3
Seminar on Accelerator Applications B	3	3	
Seminar on Accelerator Applications C	3		3
Seminar on Accelerator Applications D	3	3	
Seminar on Information Optics A	3		3
Seminar on Information Optics B	3	3	
Seminar on Optical Engineering A	3		3
Seminar on Optical Engineering B	3	3	
Seminar on Semiconductor Devices A	3		3
Seminar on Semiconductor Devices B	3	3	
Seminar on Semiconductor Devices C	3		3
Seminar on Semiconductor Devices D	3	3	
Seminar on Photonic Devices A	3		3
Seminar on Photonic Devices B	3	3	
Seminar on Photonic Devices C	3		3
Seminar on Photonic Devices D	3	3	
Seminar on Measurement and Information Technology A	3		3
Seminar on Measurement and Information Technology B	3	3	
Seminar on Measurement and Information Technology C	3		3
Seminar on Measurement and Information Technology D	3	3	



Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Seminar on Image Processing A	3		3
Seminar on Image Processing B	3	3	
Seminar on Image Processing C	3		3
Seminar on Image Processing D	3	3	
Seminar on Applied Radiation Physics A	3		3
Seminar on Applied Radiation Physics B	3	3	
Seminar on Applied Radiation Physics C	3		3
Seminar on Applied Radiation Physics D	3	3	
Seminar on Experimental Particle Physics A	3		3
Seminar on Experimental Particle Physics B	3	3	
Seminar on Experimental Particle Physics C	3		3
Seminar on Experimental Particle Physics D	3	3	
Seminar on Theoretical Quantum Physics A	3		3
Seminar on Theoretical Quantum Physics B	3	3	
Seminar on Theoretical Quantum Physics C	3		3
Seminar on Theoretical Quantum Physics D	3	3	
Seminar on Pie-electron materials A	3		3
Seminar on Pie-electron materials B	3	3	
Seminar on Pie-electron materials C	3		3
Seminar on Pie-electron materials D	3	3	
Seminar on Atomic, Molecular and Optical Physics A	3		3
Seminar on Atomic, Molecular and Optical Physics B	3	3	
Seminar on Atomic, Molecular and Optical Physics C	3		3
Seminar on Atomic, Molecular and Optical Physics D	3	3	
Seminar on Quantum Optics A	3		3
Seminar on Quantum Optics B	3	3	
Seminar on Quantum Optics C	3		3
Seminar on Quantum Optics D	3	3	
Seminar on Nonlinear Physics A	3		3
Seminar on Nonlinear Physics B	3	3	
Seminar on Nonlinear Physics C	3		3
Seminar on Nonlinear Physics D	3	3	
Seminar on Electronic Correlation Physics A	3		3
Seminar on Electronic Correlation Physics B	3	3	
Seminar on Electronic Correlation Physics C	3		3
Seminar on Electronic Correlation Physics D	3	3	
Seminar on Surface and Interface Non-equilibrium Physics A	3		3
Seminar on Surface and Interface Non-equilibrium Physics B	3	3	
Seminar on Surface and Interface Non-equilibrium Physics C	3		3
Seminar on Surface and Interface Non-equilibrium Physics D	3	3	

## Department of Chemistry and Biochemistry

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In the Department of Chemistry and Biochemistry, we aim to develop human resources with flexible thinking and creativity backed by a basic ability in chemistry through explaining reactions and properties of materials from the perspective of atoms and molecules, development of a quantum chemical calculation method and various spectroscopies required for the explanation, development of new organic compounds and metal complex synthesis methods, analysis of the reaction mechanism, synthesis of compounds with useful functions and reactions, life science based on chemistry, etc.

The Department of Chemistry and Biochemistry has the four research areas of physical chemistry, organic chemistry, inorganic and analytical chemistry, and biochemistry.

### Guidelines for earning a Master's Degree

1. To be granted a master's degree, you must earn 30 or more credits, receive the required research guidance, and pass a master's thesis review.
2. Among the 30 credits required for the degree, 12 credits must be earned from seminar courses. Each academic year, you must take the seminar courses provided by your supervisor. If more than 12 credits of seminar courses are taken, credits in excess of 12 are not counted toward the number of credits required for the degree.
3. Please consult with your supervisor regarding what other courses should be taken to fulfill the credit requirement toward your degree. Students should take the core courses without fail and some of the recommended courses.

### Summary of Each Research Area

#### ◆ Physical Chemistry

In this research area, studies and education on the structure of molecules and molecular assembly, electronic state, vibrational state, properties, and chemical reaction mechanisms are conducted. Using experimental methods such as infrared/Raman spectroscopy, ultraviolet/visible/near-infrared absorption spectroscopy, emission spectroscopy, and nonlinear spectroscopy, as well as a scanning probe microscope, the electronic state and vibrational state of molecules and solids are observed. Electrical and optical properties are also measured. In addition, physical properties of molecules are theoretically predicted by quantum chemical calculations using the molecular orbital method, the density functional theory, etc. We also aim to solve the chemical reaction mechanism by using the molecular dynamics method. The materials to be studied are organic and inorganic materials, electroconductive polymers, biological polymers, functional materials, etc. Based on these study results, we aim to discover new phenomena and properties, construct basic theories, and develop high-performance organic electronic devices (light-emitting diode, transistor, solar battery).

#### ◆ Organic Chemistry

In this research area, studies and education on organic synthetic chemistry, functional organic chemistry, and reaction organic chemistry are conducted.

We aim to understand organic chemical reactions and the structure and characteristics of organic compounds and do research on new reactions, studies of synthesis and properties of new compounds, creation of functional substances, etc. mainly from the standpoint of pure chemistry. In organic synthetic chemistry, the main topics are the total synthesis of bioactive

natural products and studies of new reactions and new synthesis methodologies directed at total synthesis, the study of the catalytic asymmetric synthesis method, and the study of bioorganic chemistry based on total synthesis. In functional organic chemistry, the main topics are the study of synthesis and reactions of new functionalized molecules with structural properties, the development of organic molecular catalysis, and the design and reaction system construction of analogs of biomolecules. In reaction organic chemistry, the main topics are creating new and efficient carbon-carbon bond formation reactions by taking advantage of the characteristics of organometallic complexes and the development of catalytic asymmetric reactions, among other things.

#### ◆ Inorganic and Analytical Chemistry

In this research area, studies and education on inorganic reaction mechanisms and coordination chemistry are conducted. Through studying kinetics and equilibrium of inorganic reactions in solution such as ligand substitution reactions and oxidation-reduction reactions, we aim to solve the mechanisms of the reactions. Studies of the synthesis, structure and properties of metal complexes with metal-metal bonds, nano-scale metal complexes, and functional complexes are also conducted. In particular, the focus is placed on studies of electrochemical and photochemical properties.

In performing the studies, we use various spectroscopic methods such as X-ray crystal structure analysis, ESR, NMR, high pressure NMR, stopped-flow spectrophotometry, and high-pressure stopped-flow spectrophotometry, cyclic voltammetry, spectroelectrochemistry etc.

#### ◆ Biochemistry

In this research area, life science is studied from the viewpoint of chemistry by taking a life form as an assembly of chemical substances and life phenomena as chemical reactions. Studies are conducted on life phenomena by applying marine natural compounds as bioprobes in Chemical Biology, collagen in Biomolecular Chemistry, and solution of the mechanism of cell division and its control in Molecular Biology.

## Core Courses / Recommended Courses

When core courses and recommended courses are provided by each research area of your department, take courses in accordance with the specified method.

It is preferable to take core courses without fail. It is also preferable to take some courses from the recommended courses.

### Organic Chemistry

Core courses	Recommended courses
Advanced Functional Organic Chemistry	Advanced Structural Chemistry
Advanced Synthetic Chemistry	Advanced Photo Physical Chemistry
Advanced Reaction Organic Chemistry	Advanced Inorganic Reaction Chemistry
	Advanced Coordination Chemistry

### Physical Chemistry

Core courses	Recommended courses
Advanced Electronic State Theory	Advanced Condensed Matter Physics C
Advanced Structural Chemistry	
Advanced Photo Physical Chemistry	

### Inorganic and Analytical Chemistry

Core courses	
Advanced Inorganic Reaction Chemistry	There are no recommended courses.
Advanced Coordination Chemistry	

### Biochemistry

Core courses	
Advanced Chemical Biology	There are no recommended courses.
Advanced Biomolecular Chemistry	
Advanced Molecular Biology	

**(I) Research guidance (Master's program)**

Course Name
Research on Structural Chemistry
Research on Electronic State Theory
Research on Chemical Synthesis Methods
Research on Functional Organic Chemistry
Research on Reaction Organic Chemistry
Research on Inorganic Reaction Chemistry
Research on Coordination Chemistry
Research on Biomolecular Chemistry
Research on Chemical Biology
Research on Molecular Biology
Research on Photo Physical Chemistry

**(II) Research guidance (Doctoral program)**

Course Name
Research on Structural Chemistry
Research on Electronic State Theory
Research on Chemical Synthesis Methods
Research on Functional Organic Chemistry
Research on Reaction Organic Chemistry
Research on Inorganic Reaction Chemistry
Research on Coordination Chemistry
Research on Biomolecular Chemistry
Research on Chemical Biology
Research on Molecular Biology
Research on Photo Physical Chemistry

**(III) Lecture courses**

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Advanced Electronic State Theory	2	2	
Advanced Synthetic Chemistry	2	2	
Advanced Functional Organic Chemistry	2	2	
Advanced Inorganic Reaction Chemistry	2	2	
Advanced Coordination Chemistry	2	2	
Advanced Biomolecular Chemistry	2	2	
Advanced Structural Chemistry	2		2
Advanced Reaction Organic Chemistry	2		2
Advanced Chemical Biology	2		2
Advanced Molecular Biology	2		2
Advanced Photo Physical Chemistry	2		2
Experiments in Chemistry and Biochemistry	2	3	3

#### (IV) Seminar courses

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Seminar on Structural Chemistry A	3		3
Seminar on Structural Chemistry B	3	3	
Seminar on Structural Chemistry C	3		3
Seminar on Structural Chemistry D	3	3	
Seminar on Electronic State Theory A	3		3
Seminar on Electronic State Theory B	3	3	
Seminar on Electronic State Theory C	3		3
Seminar on Electronic State Theory D	3	3	
Seminar on Chemical Synthesis Methods A	3		3
Seminar on Chemical Synthesis Methods B	3	3	
Seminar on Chemical Synthesis Methods C	3		3
Seminar on Chemical Synthesis Methods D	3	3	
Seminar on Functional Organic Chemistry A	3		3
Seminar on Functional Organic Chemistry B	3	3	
Seminar on Functional Organic Chemistry C	3		3
Seminar on Functional Organic Chemistry D	3	3	
Seminar on Reaction Organic Chemistry A	3		3
Seminar on Reaction Organic Chemistry B	3	3	
Seminar on Reaction Organic Chemistry C	3		3
Seminar on Reaction Organic Chemistry D	3	3	
Seminar on Inorganic Reaction Chemistry A	3		3
Seminar on Inorganic Reaction Chemistry B	3	3	
Seminar on Inorganic Reaction Chemistry C	3		3
Seminar on Inorganic Reaction Chemistry D	3	3	
Seminar on Coordination Chemistry A	3		3
Seminar on Coordination Chemistry B	3	3	
Seminar on Coordination Chemistry C	3		3
Seminar on Coordination Chemistry D	3	3	
Seminar on Biomolecular Chemistry A	3		3
Seminar on Biomolecular Chemistry B	3	3	
Seminar on Biomolecular Chemistry C	3		3
Seminar on Biomolecular Chemistry D	3	3	
Seminar on Chemical Biology A	3		3
Seminar on Chemical Biology B	3	3	
Seminar on Chemical Biology C	3		3
Seminar on Chemical Biology D	3	3	
Seminar on Molecular Biology A	3		3
Seminar on Molecular Biology B	3	3	
Seminar on Molecular Biology C	3		3
Seminar on Molecular Biology D	3	3	
Seminar on Photo Physical Chemistry A	3		3
Seminar on Photo Physical Chemistry B	3	3	
Seminar on Photo Physical Chemistry C	3		3
Seminar on Photo Physical Chemistry D	3	3	

## Department of Applied Chemistry

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In the Department of Applied Chemistry, we aim for “practical applications of theories” which is one of our foundational spirits by developing practical chemistry to realize environment-friendly energy and material transformation while integrating interdisciplinary fields based on chemistry. In the master’s program, based on the broad, practical basics cultivated by our undergraduate education program, and through education and studies in research and development of the advanced chemical field in response to deepened and refined specialized fields, we educate students with research abilities (planning, implementation, evaluation) putting emphasis on practical sciences and engineering. Students are supposed to develop the abilities to work on their study courses actively in preparing their master’s thesis and develop broad knowledge and practical skills by taking courses which strengthen their basic scholastic ability, courses and seminar courses which deal with profound fields of study, and courses which enable students to acquire high-level literacy including technologist ethics. On the other hand, in the doctoral program, on the basis of high achievements in the past, through the world-class study activities, we develop human resources who have the ability to plan original and creative research projects, possess leadership qualities, and can develop practical chemistry taking the lead in social transformation.

### Guidelines for earning a Master’s Degree

1. To be granted a master’s degree, you must earn 30 or more credits, receive the required research guidance, and pass a master’s thesis review.
2. Among the 30 credits required for the degree, 12 credits must be earned from seminar courses. Each academic year, you must take the seminar courses provided by your supervisor. If more than 12 credits of seminar courses are taken, credits in excess of 12 are not counted toward the number of credits required for the degree.
3. Please consult with your supervisor regarding what other courses should be taken to fulfill the credit requirement toward your degree. When selecting lecture courses, you should give priority to core courses in your area of research.

### Summary of Each Research Area

#### ◆ Inorganic Synthetic Chemistry

Inorganic chemistry is a field of study that attempts to clarify the structure and characteristics of simple bodies, and compounds of an extremely wide variety of elements and natural and artificial minerals, etc. are studied as inorganic solid-state chemistry. Due to the importance of the development of new materials in the current innovation of science and technology, practical applications and development of various inorganic materials based on inorganic chemistry are conducted. In particular, the importance of material synthesis by chemical routes has been widely recognized in recent years, and studies are conducted on the development of synthesis techniques by making use of the knowledge of inorganic chemistry and suggestions for new materials in the field of applied chemistry.

In Inorganic Synthetic Chemistry, based on inorganic solid-state chemistry, inorganic synthesis chemistry, students comprehensively learn the synthesis, structure, and properties of inorganic compounds and understand recent study trends through the latest literature by seminar courses. Furthermore, by taking up state-of-the-art inorganic materials, we consistently carry out establishment of synthesis methods, analysis of the structure, and evaluation of the properties to develop each person’s ability to promote research.

### ◆ Polymer Chemistry

Polymers are an important substance group supporting social life and advanced technologies along with ceramics. Since polymers are macromolecules (e.g., for genomic DNAs, 10<sup>9</sup> dalton), it is possible to discover various new functions related to electronics, biotechnology, etc. depending on the chemical structure and order of units, combination methods and the degree of polymerization, and the assembly and arrangement of molecules. Polymer Chemistry serves as a basis for understanding and creation of these high molecular materials.

In Polymer Chemistry, students systematically learn about the synthesis and properties of polymers, biopolymers, and high polymer materials and master science and engineering of high molecular materials developed through practice from the standpoint of functional design in a new field. In addition, through experimental studies selected from advanced courses such as the electron transport system, molecular assembly, oxygen carriers, molecular magnetism, and super engineering plastics synthesis, students learn correlations of structures, properties, and functions of polymers to develop their ability to pursue original and creative studies while flexibly responding to the demands of society.

### ◆ Catalytic Chemistry

Catalysts are important in the production process of almost all the chemical industries including oil and petrochemistry or in all the fields in which a chemical reaction is involved such as environmental, resources saving, and energy technology. Catalysts are one of the courses most studied in the field of applied chemistry and chemical engineering. Most practical catalysts are solid catalysts and the surface is involved in chemical reactions; therefore, the catalysis is complicated and includes a wide range of issues from the structures of the solid, surface, and the reaction mechanism to the analysis and design of reactors.

In Catalytic Chemistry, students systematically learn the basic theories about catalysts and catalyses and aim to comprehensively and thoroughly master the science and engineering of catalyses for representative industrial catalyst processes through seminar courses. Furthermore, by selecting a particular and advanced catalyst system and a reaction process, students develop their ability to pursue original and creative studies in the underlying catalyst science, in particular, relations between preparation and the structure of catalysts, relations between the surface and solid structures and the properties and functions, the reaction mechanism, etc.

### ◆ Applied Biochemistry

Biotechnology is a technology enabling reactions at normal temperatures and pressures and enables the development of an energy-saving, safe, and secure substance production process. In Applied Biochemistry, studies are conducted for establishing production methods of useful substances and developing new substance synthesis processes using microorganisms and microbial enzymes. We also advance studies on molecular breeding technologies of useful microorganisms (cell fusion and genetic engineering). The present study themes are classified into the following six items. However, the studies on each item are closely related to each other and there are many studies being advanced in boundary areas: (1) production of organic acids (mainly citric acids) and amino acids and solution of related metabolic systems, (2) molecular breeding and functional development of useful filamentous bacteria (fungi), (3) search of microbial enzymes for the synthesis of a useful carbohydrate and glycoside and solution of their properties, (4) alteration of enzyme functions and metabolism using genetic engineering, (5) applied development of green biotechnologies, and (6) search and functional development of microorganisms available for biomass conversion and environmental cleanup.



#### ◆ Chemical Engineering

With the sophistication of the chemical industry and its related industries, process compositions have become extremely complicated and composition equipment and operating conditions have increased in variety. From an engineering point of view, which is different from the conventional and laboratory ways of thinking, methods of basic studies and R&Ds, the theory of process composition, and design methods of equipment and operations aiming at industrialization have become indispensable. In Chemical Engineering, we aim to develop and establish plans for processes consisting of the basic theory of the above-mentioned equipment and operation design and groups of equipment, new production processes based on the design theory, and process systems.

This research area is composed of the following three study fields: (1) studies on separation process engineering based on crystallization, (2) studies on materials process engineering, especially on carbon and silicon nanomaterials and their application to electronic and energy-related devices, and (3) studies on medical chemical engineering related to the human body system including biomaterial and biomineralization.

#### ◆ Synthetic Organic Chemistry

Creation of useful materials is the basis for the development of science and technology. For the creation of organic compounds with specific functions including biologically active substances and functional substances, it has become an important challenge to develop efficient organic synthesis methods as well as rational designs of these substances. Aiming at the creation of new functional substances and their efficient synthesis, in Synthetic Organic Chemistry, we search for an organic synthesis route, establish new synthesis reaction systems, develop reagents, and perform total synthesis and molecular design of biologically active substances. Through the synthesis of biologically active substances including saccharides, steroid hormones, antibiotics, and enzyme inhibitors, the development of organometallic reagents, and studies and seminars on asymmetric synthesis reactions, etc., students can gain knowledge as a researcher of organic synthetic chemistry while acquiring the latest technologies and theories of organic synthetic chemistry.

#### ◆ Applied Physical Chemistry

Physical chemistry includes the basic areas in chemistry such as thermochemistry, chemical equilibrium, reaction kinetics, quantum chemistry, and electrochemistry, and is an essential field for students in the Department of chemistry. In this research area, in particular, we develop studies focusing on electrochemistry and surface chemistry in physical chemistry as the backbones. Under the basic principle of “creating new processes and technology areas,” the study theme of this research area is to create new materials and, while evaluating their functions, further create advanced functional materials. For that, students systematically learn the basic theories of physical chemistry, putting emphasis on the electrochemical process, and develop their ability to do research and development. In particular, in consideration of applications to the electronics field which requires a lot of advanced thin-film materials, by developing studies to cover the creation of thin films, analysis of functional characteristics, creation of various devices using these thin films, and evaluation of their characteristics, we develop researchers and engineers who can play an active role in the broad field of functional materials.

## Core Courses / Recommended Courses

When core courses and recommended courses are provided by each research area of your department, take courses in accordance with the specified method.

Common to all categories for the Applied Chemistry major

There are no core courses.	Recommended courses (common)
	Advanced Inorganic Chemistry
	Advanced Organic Chemistry A
	Advanced Organic Chemistry B
	Advanced Physical Chemistry A
	Advanced Physical Chemistry B
	Advanced Chemical Engineering A
	Advanced Chemical Engineering B
	Advanced Biochemistry

### Inorganic Synthetic Chemistry

Core courses	There are no recommended courses.
Advanced Inorganic Chemistry	

### Polymer Chemistry

Core courses	There are no recommended courses.
Advanced Organic Chemistry A,B	

### Catalytic Chemistry

Core courses	There are no recommended courses.
Advanced Physical Chemistry A,B	

### Applied Biochemistry

Core courses	There are no recommended courses.
Advanced Biochemistry	

### Chemical Engineering

Core courses	There are no recommended courses.
Advanced Chemical Engineering A	
Advanced Chemical Engineering B	

### Synthetic Organic Chemistry

Core courses	There are no recommended courses.
Advanced Organic Chemistry A	

## Applied Physical Chemistry

Core courses

Advanced Physical Chemistry A

Advanced Physical Chemistry B

There are no recommended courses.

## (I) Research guidance (Master's program)

Course Name
Research on Inorganic Synthetic Chemistry (Prof. Kuroda, Assoc. Prof. Shimojima)
Research on Inorganic Synthetic Chemistry (Prof. Sugawara)
Research on Polymer Chemistry (Prof. Nishide)
Research on Polymer Chemistry (Prof. Oyaizu)
Research on Catalytic Chemistry (Prof. Matsukata)
Research on Catalytic Chemistry (Prof. Sekine)
Research on Applied Biochemistry (Prof. Kino)
Research on Applied Biochemistry (Prof. Kirimura)
Research on Applied Electrochemistry
Research on Chemical Engineering
Research on Bioactive Substances
Research on Interface Electrochemistry
Research on Chemical Engineering
Research on Synthetic Organic Chemistry

## (II) Research guidance (Doctoral program)

Course Name
Research on Inorganic Synthetic Chemistry (Prof. Kuroda, Assoc. Prof. Shimojima)
Research on Inorganic Synthetic Chemistry (Prof. Sugawara)
Research on Polymer Chemistry (Prof. Nishide)
Research on Polymer Chemistry (Prof. Oyaizu)
Research on Catalytic Chemistry (Prof. Matsukata)
Research on Catalytic Chemistry (Prof. Sekine)
Research on Applied Biochemistry (Prof. Kino)
Research on Applied Biochemistry (Prof. Kirimura)
Research on Applied Electrochemistry
Research on Chemical Engineering
Research on Bioactive Substances
Research on Interface Electrochemistry
Research on Chemical Engineering
Research on Synthetic Organic Chemistry

### (III) Lecture courses

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Advanced Inorganic Chemistry	2		2
Advanced Physical Chemistry A	2		2
Advanced Physical Chemistry B	2		2
Advanced Organic Chemistry A	2		2
Advanced Organic Chemistry B	2		2
Advanced Chemical Engineering A	2		2
Advanced Chemical Engineering B	2		2
Advanced Biochemistry	2		2

### (IV) Seminar courses

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Seminar on Inorganic Reaction Mechanisms A	3		3
Seminar on Inorganic Reaction Mechanisms B	3	3	
Seminar on Inorganic Solid State Chemistry A	3		3
Seminar on Inorganic Solid State Chemistry B	3	3	
Seminar on Inorganic Materials Chemistry A	3		3
Seminar on Inorganic Materials Chemistry B	3	3	
Seminar on Hybrid Materials Chemistry A	3		3
Seminar on Hybrid Materials Chemistry B	3	3	
Seminar on Physical Chemistry of Polymers A	3		3
Seminar on Physical Chemistry of Polymers B	3	3	
Seminar on Polymer Materials A	3		3
Seminar on Polymer Materials B	3	3	
Seminar on Polymer Synthesis A	3		3
Seminar on Polymer Synthesis B	3	3	
Seminar on Biopolymers A	3		3
Seminar on Biopolymers B	3	3	
Seminar on Catalytic Processes A	3		3
Seminar on Catalytic Processes B	3	3	
Seminar on Energy and Fuel A	3		3
Seminar on Energy and Fuel B	3	3	
Seminar on Catalytic Chemistry A	3		3
Seminar on Catalytic Chemistry B	3	3	
Seminar on Organic Catalytic Reactions A	3		3
Seminar on Organic Catalytic Reactions B	3	3	
Seminar on Biochemical Mechanics A	3		3
Seminar on Biochemical Mechanics B	3	3	
Seminar on Applied Biochemistry A	3		3
Seminar on Applied Biochemistry B	3	3	
Seminar on Applied Bioscience A	3		3
Seminar on Applied Bioscience B	3	3	
Seminar on Genetic Engineering A	3		3
Seminar on Genetic Engineering B	3	3	
Seminar on Reaction Engineering A	3		3
Seminar on Reaction Engineering B	3	3	

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Seminar on Chemical Process Engineering A	3		3
Seminar on Chemical Process Engineering B	3	3	
Seminar on Separation Engineering A	3		3
Seminar on Separation Engineering B	3	3	
Seminar on Synthetic Organic Chemistry A	3		3
Seminar on Synthetic Organic Chemistry B	3	3	
Seminar on Bioactive Substances Science A	3		3
Seminar on Bioactive Substances Science B	3	3	
Seminar on Advanced Molecular Design A	3		3
Seminar on Advanced Molecular Design B	3	3	
Seminar on Advanced Molecular Synthesis A	3		3
Seminar on Advanced Molecular Synthesis B	3	3	
Seminar on Electronic Materials Chemistry A	3		3
Seminar on Electronic Materials Chemistry B	3	3	
Seminar on Applied Physical Chemistry A	3		3
Seminar on Applied Physical Chemistry B	3	3	
Seminar on Physical Electrochemistry A	3		3
Seminar on Physical Electrochemistry B	3	3	
Seminar on Functional Surface Chemistry A	3		3
Seminar on Functional Surface Chemistry B	3	3	
Seminar on Material Process Engineering A	3		3
Seminar on Material Process Engineering B	3	3	

## Department of Life Science and Medical Bioscience

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It is said that the 21st century is the era of life science. Understanding of life science at the cellular and molecular levels has been dramatically advanced and medical health care, preventive medicine, tailor-made genomic drug discovery, drug delivery system, regeneration medicine, etc. are expected as near future medical services. Firm knowledge and experiment techniques gained in the academic field of science and technology are the building blocks for the body of knowledge to realize these treatments. The integration of knowledge of science and technology is necessary for the development of new fields of life science; therefore, it is also necessary to develop human resources who can expand studies on life science at the molecular level with their knowledge of science and technology.

In the Department of Life Science and Medical Bioscience, based on the knowledge and research technologies of science and engineering, we study “life” from a foundational and application viewpoint, and develop new education by feeding back the latest knowledge gained from advanced studies. We also provide culture and scientific abilities related to the advanced fields of biomedical science through practical scientific studies and develop human resources with solid basic skills in science and engineering who can play active roles in the fields of life science, medical science, and medical engineering.

### Guidelines for earning a Master’s Degree

1. To be granted a master’s degree, you must earn 30 or more credits, receive the required research guidance, and pass a master’s thesis review.
2. Among the 30 credits required for the degree, each academic year, you must take the seminar courses provided by your supervisor
3. Please consult with your supervisor regarding what other courses should be taken to fulfill the credit requirement toward your degree.

### Summary of Each Research Guidance

#### ◆ Solid State Bioscience

Students learn the basics of physical and chemical properties of bio-related materials, and based on that understanding, elucidate their solid state science. Their non-linear optical and chiroptical properties are investigated from an interdisciplinary scientific viewpoint.

#### ◆ Neurophysiology

Physiological studies of neural systems. We are working on various aspects of the nervous system from functional imaging of the brain to signal transduction mechanisms in neurons using living animals, brain tissue, and cell preparations by means of imaging and molecular biological techniques.

#### ◆ Molecular Brain Science

We aim to understand the molecular mechanisms of neuronal differentiation, brain formation and development, formation of neural networks, and brain functions. We conduct molecular genomics of mice and zebrafish to understand the molecular and cellular bases of higher brain functions such as emotions, and neuropsychiatric disorders. We also attempt to develop new therapeutic method for regeneration of the nervous system.

#### ◆ Molecular Medicine and Biochemistry

Analysis of molecular mechanism of how organisms respond to their surroundings and elucidation of its pathological significance in human diseases. We investigate the molecular mechanisms in the regulation of energy metabolism in organisms by hypoxia-responsive systems. We also aim to elucidate pathophysiological significance of hypoxia responses in the development of human metabolic disease including diabetes, obesity, and fatty liver, and to develop new molecular-targeted drugs against the diseases.

#### ◆ Molecular Oncology

We study cancer-associated genes which are involved in aberrant growth, invasion, metastasis characteristic of cancer cells, and figure out the molecular mechanisms of tumorigenesis using *in vitro* and *in vivo* experimental systems. For this purpose, we also develop original screening and evaluation systems.

#### ◆ Biomolecular Assembling Science

Construction of molecular assemblies and supramolecular structures from biomacromolecules such as proteins, nucleic acids, and polysaccharides and their derivatives with phospholipids, etc., and application studies as functional molecular devices. Development of artificial platelets, drug carriers, gene carriers, nanosheets, and probes for molecule imaging.

#### ◆ Biomaterials Science and Engineering

We create the novel and intelligent cell-culture substrate and scaffold of the polymer-based biomaterials to control cellular behaviors including adhesion/detachment, migration, proliferation, polarization and differentiation. We also develop the Micro/Nano fluidic devices for manipulating and assembling cells. Using these technologies, we fabricate the three-dimensional engineered tissues and organs from cells for regenerative medicine.

#### ◆ Biomolecular Science and Engineering

We have analyzed environmental gene/bio resources for industrial and biomedical applications and for elucidation of ecosystem as an aspect of environment conservation. Especially new challenging technologies for single cell genomics and transcriptomics have been developed using microfluidics and so on. These technologies has widely applied to all kinds of organisms, such as microbes, plant, mammalian cells. These challenges open the new science with novel findings.

#### ◆ Environmental Biotechnology

Molecular ecological studies and simulation of ecological structure of environmental microorganisms, search of new compounds by using unknown genes from uncultured bacteria, foundational and applied study of biofilm formation and suppression, development of simple, rapid, and high-throughput gene analysis method.

#### ◆ Cytoskeletal Logistics

How do cells divide without errors? This has been a big question since the finding of mitosis in 1880's. Now we know chromosomes are segregated by spindle microtubules, but it remains enigmatic how the events are coordinated. We aim to understand the molecular systems to ensure proper chromosome segregation in mitosis and meiosis. Since failures in mitosis and meiosis may cause cancer, cell death, sterility and the Down syndrome, our research is expected to extend from current studies on fission yeast to that on higher eukaryotes.



### (I) Research guidance (Master's program)

Course Name
Research on Environmental Biotechnology
Research on Biomolecular Assembly
Research on Solid State Bioscience
Research on Neurophysiology
Research on Molecular Brain Science
Research on Molecular Medicine and Biochemistry
Research on Molecular Oncology
Research on Biomaterials Science and Engineering
Research on Biomolecular Science and Engineering
Research on Cytoskeletal Logistics

### (II) Research guidance (Doctoral program)

Course Name
Research on Environmental Biotechnology
Research on Biomolecular Assembly
Research on Solid State Bioscience
Research on Neurophysiology
Research on Molecular Brain Science
Research on Molecular Medicine and Biochemistry
Research on Molecular Oncology
Research on Biomaterials Science and Engineering
Research on Biomolecular Science and Engineering
Research on Cytoskeletal Logistics

### (III) Lecture courses

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Advanced Topics on Biomolecular Assembly	2	2	
Advanced Bioengineering	2	2	
Brain Science Lecture A	2	4	
Cytoskeletal Regulation	2	2	
Advanced Biomolecular Science and Engineering	2	2 (intensive)	
Advanced Molecular Biology and Bioscience	2	2 (first half)	
Advanced Topics in Life Science and Medical Bioscience	2	2 (intensive)	
Advanced Neuroscience	2		2
Advanced Solid State Bioscience	2		2
Advanced Biomaterials Science and Engineering	2		2
Brain Science Lecture B	2		4
Advanced Molecular Oncology B	2		2 (intensive)
Advanced Medical Biochemistry	2		2 (intensive)
Advanced Smart and Bioinspired Materials	2		2 (intensive)

#### (IV) Seminar courses

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Seminar on Environmental Biotechnology A	3		3
Seminar on Environmental Biotechnology B	3	3	
Seminar on Environmental Biotechnology C	3		3
Seminar on Environmental Biotechnology D	3	3	
Seminar on Biomolecular Assembly A	3		3
Seminar on Biomolecular Assembly B	3	3	
Seminar on Biomolecular Assembly C	3		3
Seminar on Biomolecular Assembly D	3	3	
Seminar on Solid State Bioscience A	3		3
Seminar on Solid State Bioscience B	3	3	
Seminar on Solid State Bioscience C	3		3
Seminar on Solid State Bioscience D	3	3	
Seminar on Neurophysiology A	3		3
Seminar on Neurophysiology B	3	3	
Seminar on Neurophysiology C	3		3
Seminar on Neurophysiology D	3	3	
Seminar on Molecular Brain Science A	3		3
Seminar on Molecular Brain Science B	3	3	
Seminar on Molecular Brain Science C	3		3
Seminar on Molecular Brain Science D	3	3	
Seminar on Molecular Medicine and Biochemistry A	3		3
Seminar on Molecular Medicine and Biochemistry B	3	3	
Seminar on Molecular Medicine and Biochemistry C	3		3
Seminar on Molecular Medicine and Biochemistry D	3	3	
Seminar on Molecular Oncology A	3		3
Seminar on Molecular Oncology B	3	3	
Seminar on Molecular Oncology C	3		3
Seminar on Molecular Oncology D	3	3	
Seminar on Biomaterials Science and Engineering A	3		3
Seminar on Biomaterials Science and Engineering B	3	3	
Seminar on Biomaterials Science and Engineering C	3		3
Seminar on Biomaterials Science and Engineering D	3	3	
Seminar on Biomolecular Science and Engineering A	3		3
Seminar on Biomolecular Science and Engineering B	3	3	
Seminar on Biomolecular Science and Engineering C	3		3
Seminar on Biomolecular Science and Engineering D	3	3	
Seminar on Cytoskeletal Logistics A	3		3
Seminar on Cytoskeletal Logistics B	3	3	
Seminar on Cytoskeletal Logistics C	3		3
Seminar on Cytoskeletal Logistics D	3	3	

## Department of Electrical Engineering and Bioscience

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In this department, we educate students on cutting-edge research on electrical systems, electronic systems, information systems, life systems, and their boundary areas so that students can gain knowledge from basic to specialized levels.

The electrical and electronic information-communication systems field has begun to interact with other fields of science and engineering as well as with life-related science and technology due to its innovative progress. The relationship between electricity and life has been playing a more important role in leading an affluent social life. Every aspect from the basics to the applications of vital life function equipment, DNA chips, neurochips, development research of biologically-relevant electrical and electronic equipment for understanding the intracellular information transfer mechanism and brain functions, the development of information communication equipment, and the construction of networks for advanced medical treatment are all examples of this. As is clearly seen from the above, the social need for human resources in interdisciplinary areas including electrical and electronic information-communication systems and life science has been increasing more and more.

On the other hand, now that genome projects have finished investigating the DNA sequences of many species including human beings, studies in the field of life science have greatly shifted to solve the structures and functions of proteins and the workings of cells as systems of their interactions. As mentioned above, working with the electrical and electronic information-communication systems with specialties in the control theory, the circuit theory, computer science, simulation technologies, etc. is indispensable for developing studies on element assemblies from genes to systems. It is also necessary to develop measurement techniques such as nanotechnology and molecule measurement technologies for the research development of life science.

This Department has been established to respond to the demand of the times on the above electrical and electronic information-communication systems and life systems for the purpose of establishing an “intellectual cooperation body.”

### **Guidelines for earning a Master's Degree**

1. To be granted a master's degree, you must earn 30 or more credits, receive the required research guidance, and pass a master's thesis review.
2. Among the 30 credits required for the degree, 12 credits must be earned from seminar courses. Each academic year, you must take the seminar courses provided by your supervisor. If more than 14 credits of seminar courses are taken, credits in excess of 14 are not counted toward the number of credits required for the degree.
3. Please note that “Advanced Seminars A and B” are required courses.
4. Please consult with your supervisor regarding what other courses should be taken to fulfill the credit requirement toward your degree.

## (I) Research guidance (Master's program)

Course Name
Research on Applications of Superconductivity
Research on Computer-Aided Electromagnetics
Research on Advance Control
Research on Information-based Learning Systems
Research on Pharmacology
Research on Structural Biology and Biochemistry
Research on Optical Properties of Condensed Matter
Research on Dynamics of Biological Systems
Research on Molecular Networks in Cells
Research on Molecular and Cellular Biosciences
Research on Probabilistic Information Processing
Research on Electronic and Photonic Materials
Research on Quantum Materials Science
Research on Semiconductor Engineering
Research on Next-generation Electrical Energy Systems
Research on Dielectric Materials Research
Research on Molecular Sensors and Devices
Research on Bioinformatics

## (II) Research guidance (Doctoral program)

Course Name
Research on Applications of Superconductivity
Research on Computer-Aided Electromagnetics
Research on Advance Control
Research on Information-based Learning Systems
Research on Pharmacology
Research on Structural Biology and Biochemistry
Research on Optical Properties of Condensed Matter
Research on Dynamics of Biological Systems
Research on Molecular Networks in Cells
Research on Molecular and Cellular Biosciences
Research on Probabilistic Information Processing
Research on Electronic and Photonic Materials
Research on Quantum Materials Science
Research on Semiconductor Engineering
Research on Next-generation Electrical Energy Systems
Research on Dielectric Materials Research
Research on Molecular Sensors and Devices
Research on Bioinformatics

### (III) Lecture courses

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Molecular Cell Biology	2	2	
Electronic and Photonic Materials	2	2	
Electronic Properties of Dielectrics	2	2	
Topics on Probabilistic Information Processing	2	2	
Advanced Electric Power Devices and Machines	2	2	
Smart Grid and Frontiers in Electric Energy Systems	2	2	
Power System and Nuclear Power Generation Theory	2	2	
Power Systems Theory	2		2
Quantum Materials Science	2		2
System Control	2		2
On-line Security Assessment and Control for Power Systems	2		2
Frontiers of Device Engineering	2		2 (intensive)

### (IV) Seminar courses

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Advanced Seminar A	1		◎
Advanced Seminar B	1	◎	
Seminar on Applications of Superconductivity A	3		3
Seminar on Applications of Superconductivity B	3	3	
Seminar on Applications of Superconductivity C	3		3
Seminar on Applications of Superconductivity D	3	3	
Seminar on Dielectric Materials A	3		3
Seminar on Dielectric Materials B	3	3	
Seminar on Dielectric Materials C	3		3
Seminar on Dielectric Materials D	3	3	
Seminar on Computer-Aided Electromagnetics A	3		3
Seminar on Computer-Aided Electromagnetics B	3	3	
Seminar on Computer-Aided Electromagnetics C	3		3
Seminar on Computer-Aided Electromagnetics D	3	3	
Seminar on Advance Control A	3		3
Seminar on Advance Control B	3	3	
Seminar on Advance Control C	3		3
Seminar on Advance Control D	3	3	
Seminar on Intelligent Control A	3		3
Seminar on Intelligent Control B	3	3	
Seminar on Intelligent Control C	3		3
Seminar on Intelligent Control D	3	3	
Seminar on Information-Based Learning Systems A	3		3
Seminar on Information-Based Learning Systems B	3	3	
Seminar on Information-Based Learning Systems C	3		3
Seminar on Information-Based Learning Systems D	3	3	
Seminar on Pharmacology A	3		3
Seminar on Pharmacology B	3	3	
Seminar on Pharmacology C	3		3
Seminar on Pharmacology D	3	3	

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Seminar on Structural Biology and Biochemistry A	3		3
Seminar on Structural Biology and Biochemistry B	3	3	
Seminar on Structural Biology and Biochemistry C	3		3
Seminar on Structural Biology and Biochemistry D	3	3	
Seminar on Optical Properties of Condensed Matter A	3		3
Seminar on Optical Properties of Condensed Matter B	3	3	
Seminar on Optical Properties of Condensed Matter C	3		3
Seminar on Optical Properties of Condensed Matter D	3	3	
Seminar on Dynamics of Biological Systems A	3		3
Seminar on Dynamics of Biological Systems B	3	3	
Seminar on Dynamics of Biological Systems C	3		3
Seminar on Dynamics of Biological Systems D	3	3	
Seminar on Molecular Networks in Cells A	3		3
Seminar on Molecular Networks in Cells B	3	3	
Seminar on Molecular Networks in Cells C	3		3
Seminar on Molecular Networks in Cells D	3	3	
Seminar on Molecular and Cellular Biosciences A	3		3
Seminar on Molecular and Cellular Biosciences B	3	3	
Seminar on Molecular and Cellular Biosciences C	3		3
Seminar on Molecular and Cellular Biosciences D	3	3	
Seminar on Probabilistic Information Processing A	3		3
Seminar on Probabilistic Information Processing B	3	3	
Seminar on Probabilistic Information Processing C	3		3
Seminar on Probabilistic Information Processing D	3	3	
Seminar on Electronic and Photonic Materials A	3		3
Seminar on Electronic and Photonic Materials B	3	3	
Seminar on Electronic and Photonic Materials C	3		3
Seminar on Electronic and Photonic Materials D	3	3	
Seminar on Quantum Materials Science A	3		3
Seminar on Quantum Materials Science B	3	3	
Seminar on Quantum Materials Science C	3		3
Seminar on Quantum Materials Science D	3	3	
Seminar on Semiconductor Engineering A	3		3
Seminar on Semiconductor Engineering B	3	3	
Seminar on Semiconductor Engineering C	3		3
Seminar on Semiconductor Engineering D	3	3	
Seminar on Next-generation Electrical Energy Systems A	3		3
Seminar on Next-generation Electrical Energy Systems B	3	3	
Seminar on Next-generation Electrical Energy Systems C	3		3
Seminar on Next-generation Electrical Energy Systems D	3	3	
Seminar on Bioinformatics A	3		3
Seminar on Bioinformatics B	3	3	
Seminar on Bioinformatics C	3		3
Seminar on Bioinformatics D	3	3	
Seminar on Molecular Sensors and Devices A	3		3
Seminar on Molecular Sensors and Devices B	3	3	
Seminar on Molecular Sensors and Devices C	3		3
Seminar on Molecular Sensors and Devices D	3	3	

## Department of Integrative Bioscience and Biomedical Engineering

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Along with the improvement in efficiency and labor saving of the industrial sector, industrial technologies such as systems and mass production have reached a period of maturity, and development has gradually shifted from uniformity to diversification, from macro to micro, and from structure to function, and eventually extended into fields aimed at “life” as well. Studies covering these fields are life science and medical engineering, and it is a department characteristic of the Department of Integrative Bioscience and Biomedical Engineering that it has organized a new interdisciplinary field that fuses these sciences and engineering. In addition, based on academic cooperation with Tokyo Women’s Medical University, we are proceeding with the development of an original educational and research environment by adding medicine to science and engineering. Many of the studies are carried out at the Center for Advanced Biomedical Sciences (TWIns).

Students who received a solid undergraduate training education can smoothly enter into this department which has “life” as a key word to study in a unique curriculum including courses of Bioethics and Integrative Bioscience and Biomedical Engineering (both are required courses). Furthermore, students can carry out original and creative studies in the environment where the faculty of the life-related fields in the Department of Modern Mechanical Engineering, Department of Electrical Engineering and Bioscience, Department of Electronic and Physical Systems, Department of Physics, Department of Chemistry and Biochemistry, and Department of Applied Chemistry in the Faculty of Science and Engineering, the faculty of the Graduate School of Human Sciences, and the faculty belonging to Biology of the School of Education are gathered. We believe that the mission of this Department is to strive to develop young human resources such as engineers and basic scientists who can take on the challenge of developing new bio-industries that meet social needs.

### Guidelines for earning a Master’s Degree

1. To be granted a master’s degree, you must earn 30 or more credits, receive the required research guidance, and pass a master’s thesis review.
2. Among the 30 credits required for the degree, 12 credits must be earned from seminar courses. Each academic year, you must take the seminar courses provided by your supervisor. If more than 12 credits of seminar courses are taken, credits in excess of 12 are not counted toward the number of credits required for the degree.
3. Please note that Bioethics and Integrative Bioscience and Biomedical Engineering are core (required) courses.
4. Please consult with your supervisor regarding what other courses should be taken to fulfill the credit requirement toward your degree.

[Note]

Students cannot obtain credits from combined undergraduate school lectures if they have already earned them in undergraduate schools.

### Summary of Studies of the Department of Integrative Bioscience and Biomedical Engineering

To make the most of its characteristics as an interdisciplinary field, this Department is not subdivided into research areas by study content. However, the fields of Biological System and Biomolecular Function are available depending on the way study is approached.

#### ◆ Biological System

We mainly study biological systems such as intercellular, interorgan, cells and organs, individuals and species, and life and environment systems. The studies mainly focus on the development of artificial organs, the development of humanoid robots and robots for medical care, the measurement of medical electronics, the molecular evolution of gonadotropic hormones, the cloning and function analysis of neuropeptides, the molecular structure involved in sex determination, the molecular structure of molecular memories in occurrence, and plant ecology.

#### ◆ Biomolecular Function

Studies of molecular mechanisms of life and cell functions are conducted. The studies mainly focus on the asymmetric synthesis of chiral molecules, total synthesis of natural biologically active substances, spectroscopy diagnosis and development of laser surgery methods of diseases, single-molecule microscopic analysis of biomolecular motors, single-molecule imaging of intracellular signal-transducing mechanisms, movements, total synthesis and structure-activity correlations of antineoplastic compounds, search of cell death inducing and suppressive substances, hematopoietic regulation, development, and regeneration, etc.



## Core Courses / Recommended Courses

When core courses and recommended courses are provided by each research area of your department, take courses in accordance with the specified method.

Core courses	There are no recommended courses.
Bioethics	
Integrative Bioscience and Biomedical Engineering	

### (I) Research guidance (Master's program)

Course Name
Research on Medical Applications of Mechanical Engineering
Research on Biorobotics
Research on Biomolecular Engineering
Research on Experimental Biophysics
Research on Molecular Biophysics
Research on Regulation Biology

### (II) Research guidance (Doctoral program)

Course Name
Research on Medical Applications of Mechanical Engineering
Research on Biorobotics
Research on Biomolecular Engineering
Research on Experimental Biophysics
Research on Molecular Biophysics
Research on Regulation Biology

### (III) Lecture courses

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Internal Organ Engineering	2	2	
Integrative Bioscience and Biomedical Engineering B	2	2	
Science Communication II - Communication Theory of Team Work	2	2	
Science Communication IV - Introduction to Team Work and Presentation Skills	2	2	
Integrative Bioscience and Biomedical Engineering A	2		2
Science Communication I - Introduction to Communication Theory	2		2
Science Communication III - Introduction to Team Work and Presentation Skills	2		2
Practical Medical Engineering	2		2

#### (IV) Seminar courses

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Seminar on Biorobotics A	3		3
Seminar on Biorobotics B	3	3	
Seminar on Biorobotics C	3		3
Seminar on Biorobotics D	3	3	
Seminar on Medical Applications of Mechanical Engineering A	3		3
Seminar on Medical Applications of Mechanical Engineering B	3	3	
Seminar on Medical Applications of Mechanical Engineering C	3		3
Seminar on Medical Applications of Mechanical Engineering D	3	3	
Seminar on Cell Biology A	3		3
Seminar on Cell Biology B	3	3	
Seminar on Cell Biology C	3		3
Seminar on Cell Biology D	3	3	

## Department of Nanoscience and Nanoengineering

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Materials science which supported industrial society in the 20th century and electronics which served as the driving force for the advent of the information society are making new progress while including sprouts of new phenomena, materials, process methods, new functional devices, etc. as symbolized in keywords such as cooperative phenomenon, bio-materials, electrochemistry, and nanostructural properties. Great expectations have been placed on the integration of these sciences that can create innovative technologies like nanotechnology which cannot be achieved by a single field and that leads to the creation of new industries in the 21st century. With the faculty of this department as the core members, programs such as the Center of Excellence (COE), 21st Century COE program, Global COE program, and “Nanotechnology Platform Japan” program were promoted and the environment is ready to powerfully advance this distinctly interdisciplinary field of nanoscience and nanoengineering.

This field is an interdisciplinary area. Students who received basic education at each department can smoothly enter into this department, and receive education and engage in studies in a completely new environment to acquire the ability to contribute to the creation of new industries by applying nanotechnology. At the same time, students can nurture their potential to develop a completely new academic field. This department has three fields: Nanoelectronics, Nanochemistry, and Solid-state Nanoscience. Common lectures are set up in the department and research guidance, seminar, and lecture courses are set up in each field. Students belong to one of the research fields and take courses mainly in the field, following the guidance of their supervisor in charge of research guidance.

### Guidelines for earning a Master's Degree

1. To be granted a master's degree, you must earn 30 or more credits, receive the required research guidance, and pass a master's thesis review.
2. Among the 30 credits required for the degree, 12 credits must be earned from seminar courses. Each academic year, you must take the seminar courses provided by your supervisor. If more than 12 credits of seminar courses are taken, credits in excess of 12 are not counted toward the number of credits required for the degree.
3. Please consult with your supervisor regarding what other courses should be taken to fulfill the credit requirement toward your degree.

### Summary of Each Research Area

#### ◆ Nanoelectronics

This field aims at the development of devices that utilize the smallest information carriers such as electrons and photons not only in the field of IT technology, but in biotechnology and environmental science. Electrical engineering is used as the basic scientific discipline for conducting nano-scale physical, chemical, and biological phenomenon analysis and research of engineering applications.

#### ◆ Nanochemistry

In this field, chemical approaches such as precision synthesis and reaction control are used to create nano-material with controlled structures and functions at the atomic/molecular levels and to develop new reaction processes for the purpose of this creation. We also conduct research on various device systems utilizing nano-material functions.

◆ Solid-state Nanoscience

Nano-scale refers to a field at which remarkable quantum effects are observed. It also manifests the extreme limit of possible artificial manipulation. The purpose of this field is to explicate the structure, characteristics, and related phenomena of nano-scale material at the quantum mechanical level. The field also aims at doing studies on artificial manipulation of the structure and related phenomena. This field develops researchers and engineers who can stand on the leading edge of the times with a well developed sense for physics.

**(I) Research guidance (Master's program)**

Course Name
Research on Nanodevices
Research on Microsystems
Research on Molecular Nanoengineering
Research on Nanomaterials Informatics
Research on Surface Chemistry of Nanostructured Materials
Research on Electrochemical Nano-Systems
Research on Nano-Functional Molecules Chemistry
Research on Nanobiomaterials
Research on Electrochemical Computing
Research on Nano-Chiral Science

**(II) Research guidance (Doctoral program)**

Course Name
Research on Nanodevices
Research on Microsystems
Research on Molecular Nanoengineering
Research on Nanomaterials Informatics
Research on Surface Chemistry of Nanostructured Materials
Research on Electrochemical Nano-Systems
Research on Nano-Functional Molecules Chemistry
Research on Nanobiomaterials
Research on Electrochemical Computing
Research on Nano-Chiral Science

**(III) Lecture courses**

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Experiments in Nanoscience and Nanoengineering	2	2	
Nanochemical Systems	1	2(first half)	
Nanobiotechnology Fusion Systems	2	2	
Molecular Nanoengineering	2	2	
Computational Experiments	2	2	
Nanomaterials	2	2	
Materials Nanoarchitectonics	2	2	
Nanodevice Engineering	2		2
Nanobiomaterials Sciences	2		2

### (III) Seminar courses

Course Name	credits	Class hours per week	
		Fall Semester	Spring Semester
Seminar on Nanoelectronics A	3		3
Seminar on Nanoelectronics B	3	3	
Seminar on Nanoelectronics C	3		3
Seminar on Nanoelectronics D	3	3	
Seminar on Microsystem Engineering A	3		3
Seminar on Microsystem Engineering B	3	3	
Seminar on Microsystem Engineering C	3		3
Seminar on Microsystem Engineering D	3	3	
Seminar on Molecular Nanoengineering A	3		3
Seminar on Molecular Nanoengineering B	3	3	
Seminar on Molecular Nanoengineering C	3		3
Seminar on Molecular Nanoengineering D	3	3	
Seminar on Nanomaterials for Informatics A	3		3
Seminar on Nanomaterials for Informatics B	3	3	
Seminar on Nanomaterials for Informatics C	3		3
Seminar on Nanomaterials for Informatics D	3	3	
Seminar on Nanofunctional Surface Chemistry A	3		3
Seminar on Nanofunctional Surface Chemistry B	3	3	
Seminar on Nanofunctional Surface Chemistry C	3		3
Seminar on Nanofunctional Surface Chemistry D	3	3	
Seminar on Nano-Chiral Science A	3		3
Seminar on Nano-Chiral Science B	3	3	
Seminar on Nano-Chiral Science C	3		3
Seminar on Nano-Chiral Science D	3	3	
Seminar on Nano-Functional Molecules Chemistry A	3		3
Seminar on Nano-Functional Molecules Chemistry B	3	3	
Seminar on Nano-Functional Molecules Chemistry C	3		3
Seminar on Nano-Functional Molecules Chemistry D	3	3	
Seminar on Nanobiomaterials Sciences A	3		3
Seminar on Nanobiomaterials Sciences B	3	3	
Seminar on Nanobiomaterials Sciences C	3		3
Seminar on Nanobiomaterials Sciences D	3	3	
Seminar on Electrochemical Computing A	3		3
Seminar on Electrochemical Computing B	3	3	
Seminar on Electrochemical Computing C	3		3
Seminar on Electrochemical Computing D	3	3	

## Cooperative Major in Nuclear Energy

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A congregation of teaching staff in charge of a broad range of fields comes together for this program, including fields such as nuclear physics, mechanical engineering, electrical engineering, and material science. The program is intended to facilitate comprehensive learning to acquire highly specialized knowledge in nuclear engineering and in the related fields, with emphasis on recent advancements as well as acquisition of general understanding in science and engineering for wide applications. The members from Waseda University and Tokyo City University form the core team for this program. Furthermore, technical training and internships are provided at various reactor facilities, accelerator facilities and industries to incorporate practical training to nurture students who can adapt and be ready to meet the needs of the society. Education is also provided from the perspective of engineering ethics and ergonomics to establish safe and secure atomic energy technology.

Two educational and research domains (atomic energy and radiation application) and eight research fields (nuclear energy engineering, atomic energy systems, nuclear reactor physics, thermal-hydraulics of nuclear reactors, radiation measurement, radiation application, accelerator applied science and engineering, and nuclear safety engineering) have been established for this major to achieve its mission.

### Summary of Each Research Area

#### ◆ Atomic Energy Domain

Research and education program are focused primarily on atomic energy. Specialized teaching courses related to atomic energy, such as theory of reactor physics, reactor kinetics, operational control, and reactor thermal-hydraulics, are provided to students by the experienced lecturers from the academy and industries. The program is intended to nurture specialists in the atomic energy industries, governmental organizations and research institutions with high ethics and leaderships. Furthermore, the program aims to nurture professional engineers and scientists in the fields of research and development of new types of nuclear reactors and advanced light water reactors, maintenance and seismic technologies for nuclear power plant facilities, nuclear fuel cycles, and decommissioning technology for nuclear reactors.

#### ◆ Radiation Application Domain

This program offers research and education relating to accelerator and radiation applications, including hardware for the latest accelerators, as well as measurement of beams and applications of radiation. Research guidance is provided on beam physics, measurement and implementation circuits, interaction between radiation and materials, and creation, improvement, and processing of materials used for interactions, described from various perspectives such as physics, electrical engineering, and material science. Students are trained to become professional engineers and personnel engaged in research and development with exceptional levels of knowledge about preparation of materials and devices using future advanced accelerator designs and radiation measurements. They also are trained to develop knowledge about accelerators and radiation, depletion mechanisms of materials used in nuclear reactors, and treatment of radioactive waste materials.

#### ◆ Atomic Energy Safety Field

This is a field intended for conducting research and education with a focus on safety, which is one of the most important aspects of atomic energy. It is founded across the domains of both atomic energy and radiation application, with a perspective that is different from that of the individual domains. Safety as referred to in this field is not limited to engineering safety systems defined in the narrow sense as "controlling the power, cooling the fuel and confining radioactive material". The safety covers science and engineering, including safety of various systems which may lead to abnormality in the power plant, such as seismic systems and seismic isolation systems. Furthermore, the safety extends over wide aspects covering mathematical sociology, legal aspects involved in the safety regulation, and risk management of light water reactors. The program is intended to nurture professional scientists and engineers who will be ready to make contributions for the safety regulatory and industries as well as researchers upon completion of the program.

### **(I) Research guidance (Doctoral program)**

Course Name
Research on Accelerator Application Science and Engineering A
Research on Accelerator Application Science and Engineering B
Research on Nuclear System Engineering Lab., II
Research on Nuclear Safety Engineering Lab., II
Research on Reactor Thermal-Hydraulics
Research on Reactor Theory
Research on Applied Radiation Engineering Lab., II
Research on Radiation Detection and Measurement Engineering Lab., II



## 7 How to Obtain a Teacher's License

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Students who want to obtain a teacher's license for teaching at junior high and high schools in Japan **should read the Guide to Teacher Training Program issued by the Teacher Training Program of the School of Education of Waseda University thoroughly, and take required courses conducted in Japanese in a well-planned manner from the first year.** For details on how to obtain a teacher's license, please contact the Center for Science and Engineering.

## 8 Class Time Slots

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The class time slots of Waseda University are as follows:

Period	1	2	3	4	5	6	7
Time	9:00–10:30	10:40–12:10	13:00–14:30	14:45–16:15	16:30–18:00	18:15–19:45	19:55–21:25

## 9 Notes on Preparing Reports or Theses

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Using all or part of text written by others or materials from a book, a website, or other publications in a report, thesis, etc. without mentioning the source constitutes fraudulent use or plagiarism, and is a punishable offence.

The general rule in quoting or referring to others' sentences or materials when offering your opinions is to specify the quoted part with quotation marks (""") or in other ways and to give the source (specify the author's name, title, page number, publisher, and year of publication, or the website address and the date of access) correctly. However, quotations should be minimized because quoting a large part of a book or website requires approval of the author for quotation or reprint.

## 10 Posting of Grades

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Grades are announced through the MyWaseda system by a date specified each semester. Please check the date of grade announcement at the websites or bulletin board of the Center for Science and Engineering.

Grades of lecture courses, seminar courses, and the master's thesis are indicated by A<sup>+</sup>, A, B, C, and F. The grades A<sup>+</sup> to C are passing grades, but F is a failing grade. Research guidance grades are indicated by P and Q. P is a passing grade and Q is a failing grade. In addition to these grades, the symbols H and \* are used in a grade report.

H... Means that the grade for the course is on hold. Assignments, etc. may be announced by the instructor in charge. Check the bulletin board or check with the instructor. If you do not follow the instructor's instructions, an F is automatically given at the end of the year.

\*.... Means that you have registered for the course, but the instructor in charge has not given grades for the course.

Grade	A <sup>+</sup>	A	B	C	F	H
Score	100–90	89–80	79–70	69–60	59–	
Transcript	A <sup>+</sup>	A	B	C	No indication	
Judgment	Pass				Fail	

## Grade Point Average (GPA) Calculation

### 1. Calculation Formula

Waseda University uses an evaluation system with a set of conversion rates called Grade Points (4 points for A+, 3 points for A, 2 points for B, 1 point for C, and zero point for Failing Grades).

A Grade Point Average (GPA) is a score calculated by multiplying “number of credits” and “corresponding grade point (4 for A+, 3 for A etc.)”, then totaling the obtained figures for the all grades and dividing the result by “total number of registered credits”.

The total number of registered credits includes credits for failing grades.

This is calculated using the following formula:

<Calculation Formula>

$$\frac{\{( \text{No. of A+ credits} \times 4) + ( \text{No. of A credits} \times 3) + ( \text{No. of B credits} \times 2) + ( \text{No. of C credits} \times 1) + ( \text{No. of Failing Grades} \times 0) \}}{\text{Total number of registered credits}} \\ = \text{GPA}$$

\*The GPA will be rounded to the second decimal place.

### 2. Courses used in the GPA calculation

The GPA calculation considers only registered courses that count as credit toward graduation. The following grades, however, will not be included in the GPA calculation even if credit from the course is counted toward the minimum number of credits required for graduation.

- P,Q

- N

- H (※Once the H grade is changed to an A+, A, B, C, or F, then it is included in the GPA calculation)

### 3. GPA on the Grade Report and Transcript of Academic Record

Please note that the GPA will appear on the grade report, but not on the transcript of academic record. We can issue a “transcript of academic record / GPA” indicating the GPA and the grades used in the GPA calculation.

## 11 Research Students

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Research students are either sponsored research students (those who are sponsored by government ministries and agencies, foreign governments, schools, research institutions, private organizations, and the like) or general research students. Research students should enroll themselves at the beginning of a semester. Sponsored research students, however, may enroll themselves during an ongoing semester, depending on the circumstances. The enrollment period of general research students is half a year or one year. If a student wishes to continue his/her enrollment as a research student, he/she must again file an application for enrollment. However, students who are granted resident status of "Student" are not permitted to extend the enrollment period of one year as a general research student.

### (1) Taking courses and credits

Sponsored research students and general research students may take courses and receive research guidance on specific subjects only to the extent that such activities do not interfere with the study of regular students.

The limit on the number of credits for courses are as described below:

1. 14 credits per semester
2. 28 credits for one year

Students who enroll as regular students in a master's program may transfer up to 10 credits earned as a research student toward the master's program.

International students who qualify for the residential status of a "Student" must pay attention as they need to register for courses that take up at least ten hours (equivalent to seven courses) per week.

### (2) Tuition

【Research Student】(For students entering in September 2016 for reference)

School Expenses	Tuition(per 1 credit)	Graduate School of Fundamental & Creative Science and Engineering	54,100 yen
		Graduate School of Advanced Science and Engineering	59,000 yen
	Research Instruction Fee (Master's Program)	Graduate School of Fundamental & Creative Science and Engineering	270,500 yen
		Graduate School of Advanced Science and Engineering	295,000 yen
	Research Instruction Fee (Doctor's Program)	209,400 yen	
	Seminar Fee	Required only if the student will be conducting experiments	

\*Research students receiving research guidance or taking seminar courses will be charged a seminar fee.

\* Screening fee (25,000 yen) is waived for the following students:

- A. Regular Students at the graduate school of this university, who have applied for and been permitted to continue enrollment as research students.
- B. Research students who, according to the stipulations provided by the preceding section, have applied for and been permitted to continue enrollment as research students in the subsequent years.
- C. Research students not stipulated by provisions of Paragraph A, who have applied for and have been permitted to continue enrollment as research students in the subsequent years, shall be granted a screening fee waiver for a period of only two years.

# IV

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## Student Life

1	International Student Handbook
2	Faculty of Science and Engineering Website
3	Student Number
4	Student Consultation
5	Employment
6	Student Identification Card
7	Issuance of Various Certificates
8	Changes in the School Register
9	Scholarships
10	Rules on Use of Bulletin Boards
11	Use of Classrooms and Common Seminar Rooms
12	Extracurricular Activities
13	Safety Management
14	Study Abroad
15	Nonsmoking Campus
16	Ban on Commuting by Bicycle, Motorcycle or Car
17	Library
18	Computer Rooms
19	Experimental Facilities
20	Health Support Center
21	Transportation Strikes and Classes
22	Contingency Measures Due to Severe Weather
23	Class Cancellation in the Event of a Severe Earthquake
24	Class Cancellation in the Event of a Large-Scale Power Outage
25	Granting of Special Consideration to Students on Bereavement Leave

## 1 International Student Handbook

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The International Student Handbook lists the services and programs available at Waseda University for international students. It also contains important information on daily life in Japan such as immigration procedures. The handbook is distributed for free at the International Students' Orientation held by the Center for International Education. It is also available on at: <http://www.waseda.jp/cie/handbook/index.html>

## 2 Faculty of Science and Engineering Website

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The website of the Faculty of Science and Engineering provides various information regarding admission procedures, academic matters, and student affairs. The address of the website is: <http://www.waseda.jp/fsci/en/>

## 3 Student Number

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A specific student number is assigned to every student when he/she is enrolled. It is an 8-digit number. The first 2 digits represent the school code and the next 2 digits represent the year of enrollment (the last 2 digits of the year). The letter "G" in the next position indicates that the student is an IPSE student.

The 6<sup>th</sup> digit represents the department code (refer to "Department codes") and the last 2 digits represent the student number.

A check digit (CD) is added after each student number, which is used when it is entered into a computer. A CD is added to prevent errors during number entry into a computer.

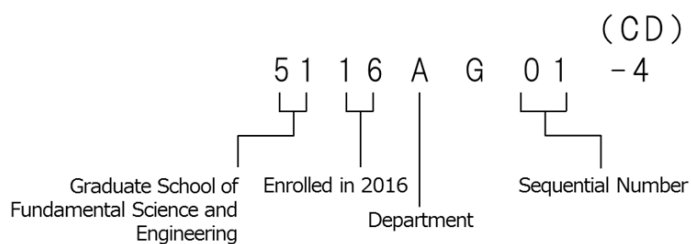
### <School Codes>

51	Graduate School of Fundamental Science and Engineering
52	Graduate School of Creative Science and Engineering
53	Graduate School of Advanced Science and Engineering

### <Department Codes>

Graduate School of Fundamental Science and Engineering	
A	Department of Pure and Applied Mathematics
B	Department of Computer Science and Engineering
C	Department of Applied Mechanics
D	Department of Electronic and Physical Systems
E	Department of Intermedia Studies
F	Department of Computer Science and Communications Engineering
Graduate School of Creative Science and Engineering	
A	Department of Architecture
B	Department of Modern Mechanical Engineering
C	Department of Industrial Management and Systems Engineering
D	Department of Civil and Environmental Engineering
E	Department of Earth Sciences, Resources and Environmental Engineering
F	Department of Business Design and Management

Graduate School of Advanced Science and Engineering	
A	Department of Pure and Applied Physics
B	Department of Chemistry and Biochemistry
C	Department of Applied Chemistry
D	Department of Life Science and Medical Bioscience
E	Department of Electrical Engineering and Bioscience
F	Department of Integrative Bioscience and Biomedical Engineering
G	Department of Nanoscience and Nanoengineering
L	Cooperative Major in Nuclear Energy



## 4 Student Consultation

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Graduate students should consult their supervisor if they have any concerns regarding their studies. Contact information for other resources is listed below.

### (1) Center for Science and Engineering

The Center, which is composed of General Affairs Section and Academic and Student Affairs Section, provides consultation on all academic matters including course registration, classes, examinations, grades, enrollment (leave of absence, studying abroad, withdrawal, etc.), classroom reservations, and scholarships. The Center also manages LOST and FOUND articles. If you have questions about any of these matters, contact the office as needed.

#### Contact Information:

[Address] 3-4-1 Okubo, Shinju-ku, Tokyo 169-8555  
(1<sup>st</sup> floor, Building 51, Nishi-Waseda Campus)  
[Tel / Fax] 03-5286-3002 / 03-5286-3500  
[E-mail] soumu@sci.waseda.ac.jp (General Affairs Section)  
gakumu@sci.waseda.ac.jp (Academic and Student Affairs Section)  
[URL] <http://www.waseda.jp/fsci/en/students/>

#### Office hours and holidays:

Monday - Saturday 9:00 -17:00

Saturdays 12:30 - 13:30 lunch hours

Holidays: Sundays, National holidays (partially open) , Waseda Founder's day (Oct 21, unless class opens) Year-end and New Year's holidays and Summer /Winter holidays, and Saturdays during the summer and winter closure and temporary closure

(Note) During the summer and winter holidays, office processing may require more time compared to normal season

### (2) How to contact part-time lecturers

Contact information (such as addresses, telephone numbers, etc.) of part-time lecturers is not officially announced. To contact a part-time lecturer, enclose necessary documents in a stamped envelope with the lecturer's name. Attach stamp and your address on a returning envelope with a letter where to contact, Bring it to the *Kyoinshitsu* (faculty room, Building 52, 2nd floor).Staff may check at certain points.

\* You can check the room numbers of *kenkyushitsu* (faculty labs) or e-mail addresses of full-time faculty in the websites or at Building 51 1<sup>st</sup> floor bulletin board.

### (3) Center for International Education (CIE)

The Center for International Education (CIE) provides various supports for international students. Contact the CIE office whenever you have questions or concerns about living in Japan.

### Contact Information:

[Address] 1-7-14 Nishi-Waseda, Shinjuku-ku, Tokyo 169-0051 (4<sup>th</sup> floor, Building 22, Waseda campus)  
[Tel / Fax] 03-3207-1454 / 03-3202-8638  
[E-mail] cie@list.waseda.jp  
[URL] <http://www.waseda.jp/inst/cie/>  
[Office hours] Monday -Saturday 9:00 – 17:00 (Lunch hours: 12:30-13:30)  
\* Office is closed on Saturdays during the summer and winter holidays.

## (4) Harassment Prevention

Waseda University has instituted a variety of measures as part of its commitment to harassment prevention. This includes not only the establishment of the *Waseda University Guidelines for Harassment Prevention*, as well as consultation and grievance procedures, but also through educational activities in print, online, and in seminars, etc. aimed at raising awareness and proactively deterring harassment.

Q: What constitutes harassment?

A: Harassment as defined by the University's guidelines includes all forms of expression and behavior, which reflects unfavorably, causes discomfort, or otherwise insults the dignity of the victim on matters including one's sex, social status, ethnicity, national origin, beliefs, age, occupation, physical characteristics or features, and one's identity. In general, harassment in universities takes one of the following forms: sexual harassment, any expression or behavior of an offensive, sexual nature; academic harassment, any offensive expression or behavior relating to one's studies, education, or research; and power harassment, any expression or behavior of an offensive nature made by a person of superior social standing or someone who has authority over the victim.

Q: Why is harassment considered a problem?

A: From the victim's perspective, harassment hinders the ability to establish and maintain a comfortable environment for learning, research, and employment; the overall impact of such negative behavior constitutes an infringement on the victim's human rights. Sometimes, actions and behavior taken by someone without the slightest thought can be the cause of almost unbearable distress to others. Harassment cases often have an adverse impact on the daily lives of those who have come forward as victims.

Q: Can students ever be accused of perpetrating harassment?

A: Yes, of course. For example, one could easily imagine the following scenario taking place at a social mixer involving students belonging to one of the University's many interest groups ("circles").  
When a student makes repeated comments of a sexual nature in front of others; pressures others into drinking alcohol; or persistently asks a member to go out on a date, and such behavior results in other students feeling uncomfortable, these actions become examples of sexual harassment and power harassment.

Q: If you feel that you or someone you know may be experiencing "harassment in some form," what should you do?

A: If you feel that you are a victim of harassment, or know of a friend who may be a victim, or have a question or opinion regarding the University's policy and procedures, please do



not hesitate to contact our Consultation Desk manned by our staff of trained professionals. For more information on the consultation process and other matters, check our website.

#### ■ CONSULTATION DESK

Anonymous consultations are accepted via phone, email, fax, letter, and any other means in the initial stages. Your privacy and wishes are of outmost concern to us. Persons requesting an in-person consultation are asked to make an appointment by phone or via email.

【TEL】 03-5286-9824

\*(When staff members are not available to answer calls due to a consultation appointment, callers may be asked to leave a message on the answering machine.)

【FAX】 03-5286-9825

【E-mail】 stop@list.waseda.jp

【URL】 <http://www.waseda.jp/stop/>

Consultation Hours: Mon – Fri, 9:30-17:00

Location (Consultation Desk):

Building 28, 1F

1-1-7 Nishi-Waseda

Shinjuku-ku, Tokyo 169-0051

## 5 Employment

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### (1) Job hunting

Science and engineering students can apply to companies for a job under two different systems: the open application system and the recommendation system. The open application system allows students to apply directly to companies for a job according to job postings by companies. The recommendation system, a unique job application style for science and engineering students, is based on requests from companies to recommend applicants and, in response, the university (undergraduate schools, departments, etc.) recommends students. Companies may specify a department or a quota, so the university (undergraduate schools, departments, etc.) will ask for interested students and decide which individuals to recommend. A selection process is conducted if the number of applications exceeds the quota. For more details, refer to the career advisors of your department.

### (2) Career advisors' guidance

Each department has career advisors who provide career guidance for graduating students. They provide appropriate and necessary guidance or advice on job hunting or going on to graduate school.

Students must report their job hunting activities to career advisors, including any informal job offers (*"Naitai"*).

### (3) Career Center

The Career Center in the Toyama Campus provides a wide variety of services ranging from how to go about job-hunting in Japan to supporting applications for a "job-hunting visa". The Career Center also periodically sends out emails of job listings for foreign students. To be placed on the mailing lists for this information, please send an email to [career@list.waseda.jp](mailto:career@list.waseda.jp) with stating your full name and student ID number.

#### <Major activities>

**Career workshop** (career experts give lectures on such topics as relationship between society and career planning.)

**Other events to support career building** (events to communicate with working people including alumni.)

**Career support events** (career guidance, workshops to learn about industries, seminars to learn manners, and mini-seminars on job hunting.)

**Company and recruitment information** (through "Career Compass" in MyWaseda)

**Introduction of internships and related seminars**

**Visa application support ("job-hunting" visa)**

## **Contact Information:**

[Address] 3rd floor of the Student Union Building, Building 30 in the Toyama Campus  
[Tel] 03- 3203- 4332  
[E-mail] [career@list.waseda.jp](mailto:career@list.waseda.jp)  
[URL] <http://www.waseda.jp/career/eng/index.html>  
[Office hours] Weekdays: 9:00 – 18:00 Saturday: 9:00 – 17:00

## **(4) Career Information room**

- (i) Job-postings (cards) for science and engineering students, company profiles and other materials are available in the Career Information Room located in the Building 61 in the Nishi-Waseda Campus.
- (ii) In the Career Information Room in Building 61, you can get information on recruiting, various companies, and government and municipal offices, and find reference books to study industries or companies, information magazines, job hunting experience notes from your senior schoolmates and other materials.

## 6 Student Identification Card

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Your student identification card can be used as an ID, and you may be required to present it in various academic situations. So always carry your student identification card with you and be careful not to damage or lose it.

The student identification card consists of a card and a back side sticker in which the validity year is printed. The card is not valid until the back side sticker is put on to the back side of the card. A student identification card is valid for 1 year, specifically from April 1<sup>st</sup> of the year printed on the sticker on the back of the card to March 31<sup>st</sup> of the following year. Put your name in the signature space of the front side.

### (1) Issuance

For new students, a student identification card is issued in exchange for his/her examination admission card.

For second year students or above, a back side sticker is issued at the end of the fall semester. The student identification card can be renewed by replacing the sticker for the previous year with the new sticker.

If you want to change the picture on your student identification card, which is to be used while you are in school, it can be changed for free only once while in school. In that case, go to the Center for Science and Engineering and ask for a change of picture.

### (2) Lost card

If you lose your student identification card, report to the police immediately because it may be used fraudulently. Then, go through the reissuance procedure at the Center for Science and Engineering.

### (3) Reissuance

To apply for reissuance of a lost card, submit the Application for Reissuance with a color photograph (4 cm vertical and 3 cm horizontal) of your face to the Office of the Faculty of Science and Engineering. A fee of 2,000 yen is charged for reissuance.

### (4) Presentation

Students must present their student identification card when they take examinations, use the Waseda University Library or students' reading rooms, apply for issuance of various certificates or student discount cards (“*Gakuwar*”(学割)), receive handouts or are requested by the faculty or staff member of the university.

### (5) Invalidation

When your status as a student ends following graduation or withdrawal, your student identification card is invalidated. Immediately return the card to the Center for Science and Engineering. When you graduate from the university, you are granted a diploma in exchange for your student identification card.

## 7 Issuance of Various Certificates

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The Center for Science and Engineering issues certificates listed in the following table. Certificates are basically issued on the spot, but you should request for issuance of a certificate well in advance because it may take several days to issue one due to system maintenance or depending on the certificate type.

### (1) Fees

Issuance of certificates costs you some fees.

Certificate issued to students: 200 yen per copy (including certificates requested by students by the end of the month of his/her graduation date)

Certificate issued to graduates or those who withdrew: 300 yen per copy

### (2) Method of issuance

- (1) Through automatic certificate issuing machines:

To use the machines which are installed at several locations in campuses, it is necessary to have your student identification card and your password for your MyWaseda ID.

- (2) Through application at a counter of the Center for Science and Engineering:

Fill in the specified Application for Certificate Issuance, affix stamps (you can buy them on a vending machine inside the Center) on the application form, and submit it with your student identification card to the Center staff.

Certificate types
★Certificate of Enrollment
★Academic Transcript
★Certificate of Expected Graduation
Certificate of Graduation
★Certificate of Academic Transcript and Expected Graduation (Japanese only)
Certificate of Academic Transcript and Graduation (Japanese only)
Certificate of Withdrawal

\*Certificates with (★) can be issued by an automatic certificate-issuing machine.

### (3) Student discount card (“*Gakuwari*”)

You can get up to 10 student discount cards (“*Gakuwari*”) issued per year from an automatic certificate-issuing machines.

## 8 Changes in the School Register

When there are any changes in your school registration status or in your guarantor's information, you must submit to the Center for Science and Engineering appropriate application forms and/or notices for such changes. The forms are available in the Center for Science and Engineering.

### (1) Application for a leave of absence

#### (i) Requirements for a leave of absence

If you cannot attend classes (including examinations) for 2 consecutive months or longer because of illness or other legitimate reasons, you can take leave of absence by obtaining a permission from the dean of your School through the application procedures specified by the Faculty of Science and Engineering. Please first consult and ask your class academic advisor or supervisor to write their opinions on the form requesting for leave of absence and submit it to the Center for Science and Engineering by specified deadlines for the semester. Please note that leave of absence for taking an entrance examination of other universities is not permitted.

	Deadline to submit an application for leave of absence	End of leave of absence	Date of returning to school	Number of years of leave of absence
Fall semester	November 30	March 31 of the following year	April 1 of the following year	0.5 years
Spring semester	May 31	September 20	September 21	0.5 years

#### (ii) Period of leave of absence

Leave of absence is either leave of absence for the fall semester or leave of absence for the spring semester. If you have special circumstances, you may be allowed to take leave of absence for more than one semester by submitting application forms to the Center for Science and Engineering. The periods in which you take leave of absence are not counted into enrollment years. You cannot take leave of absence for more than 4 years in total.

#### (iii) Tuition and fees for the period of leave of absence

The tuition and fees to be paid during leave of absence will depend on the submission date of application forms. The payment details are as follows:

Fall semester	School expense		Spring semester	School expense	
If submitted by October 31	Enrollment fee	50,000 yen	If submitted by April 30	Enrollment fee	50,000 yen
	Student Health Promotion Mutual Aid Association fee	1,500 yen		Student Health Promotion Mutual Aid Association fee	1,500 yen
If submitted from November 1 through November 30	Full amount for that semester		If submitted from May 1 through May 31	Full amount for that semester	

\* If you take a leave of absence upon entering the university, tuition and fees are not reduced.

\* If you take a leave of absence due to military service, please consult the Center for Science and Engineering.

## **(2) Application for studying abroad**

- (i) If you are to be engaged in educational or research activities at overseas universities or higher educational institutions for 4 months or longer, your registration status can be changed to “studying abroad” status with permission from the dean of your school through application procedures specified by the Faculty of Science and Engineering. If you are not sure whether your case is treated as studying abroad or not, check with the Center for Science and Engineering in advance.
- (ii) While you are enrolled in the school, you can study abroad for up to 1 year. You can study abroad for longer if you have special reasons.
- (iii) The period of study abroad is not basically included in the number of enrollment years, except for CS programs (see “15 Study Abroad” for details). However, one semester or one year of the studying abroad period can be included in the number of enrollment years of the School if what you studied abroad is judged by the University to be equivalent to completion of part of the programs in your School in light of the number of credits you earned at overseas universities, the period required for earning them and other conditions. For more details, contact the Center for Science and Engineering.
- (iv) For more details about tuition and fees during the period of studying abroad, contact the Center for Science and Engineering. If you join an overseas study program of the Center for International Education, contact them.

## **(3) Application for returning to school**

- (i) If you want to get readmitted to the School after a leave of absence or studying abroad, you have to follow instructions and necessary documents which are sent to your guarantor within an appropriate period of time by the Center for Science and Engineering.
- (ii) You are only allowed to return to the School at the beginning of a semester.

## **(4) Application for withdrawal**

- (i) If you want to withdraw from the university, apply at the Center for Science and Engineering with your student identification card.
- (ii) If you withdraw from the university during a semester, you have to pay tuition and fees for that semester. For more details, contact the Center for Science and Engineering.

## **(5) Application for readmission**

If you withdraw from the university for legitimate reasons and apply for re-admission within 7 years from the following academic year of your withdrawal, you may be re-admitted at the beginning of a school year. Detailed information on it for a given academic year becomes available around November the previous year. For more details, contact the Center for Science and Engineering.

## **(6) Notice of change of name, address, guarantor, etc.**

- (i) In case of any changes in your address, phone number or other personal information, immediately register the new information from the Profile screen of the My Waseda. If your address is changed, obtain a new back side sticker for the student identification card in the Center for Science and Engineering after an e-mail message for approval has been sent to your Waseda-net e-mail address.
- (ii) In case of any changes in addresses and/or phone numbers of your guarantor or payer of tuition & fees, immediately go through specified procedures in the Center for Science and Engineering.
- (iii) In case of any change in your visa status, immediately submit a copy of your foreign registration card or residence card (both sides) to the Center for Science and Engineering.
- (iv) A change of your given and/or family name must be reported with a copy of passport or other applicable relevant documents.
- (v) In case of change of your guarantor for death or other reasons, a new guarantor must be reported immediately to the Center for Science and Engineering.

## **9 Scholarships**

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Regular students enrolled in the undergraduate and graduate schools can apply for scholarships at Waseda University. However, the following students are **NOT** eligible: Japanese Government Scholarship (Monbukagakusho) students, students supported by overseas governments, students receiving scholarships from scholarship organizations for their tuition, and non-degree research students. Depending on your resident (VISA) status, there are two ways to apply for scholarships (You can only register one of the following).

### **(i) For students with resident (VISA) statuses of “Permanent Resident”, “Long-Term Resident/Teijusha”, “Spouse/Child of Japanese Resident”, or “Spouse/Child of Permanent Resident” and Japanese students**

Foreign nationals with the above statuses can only apply for scholarships for Japanese students in the same way as Japanese students. Those who wish to apply for the scholarships need to fill out an application document attached to the Scholarship Information Guidebook, “CHALLENGE”, which is sent together with other enrollment information, and submit it by the deadline. “CHALLENGE” is also available at the Center for Science and Engineering from January through March. Please note that the above students cannot apply for the scholarships (ii) below (described in the “International Students Handbook”).

Scholarship information is available on the website of the Faculty of Science and Engineering

(<http://www.waseda.jp/fsci/students/tuition/>) and also posted on the Main gate bulletin board in Nishi-Waseda Campus.

### **(ii) For students with resident (VISA) statuses other than the statuses in i) above**

Privately financed regular international students can apply for scholarships for international students. For more details, please refer to the “International Student Handbook.” Scholarship information is also posted on the bulletin board in Center for Science & Engineering (1st floor of Building 51) and the URL below:



## **10 Rules on Use of Bulletin Boards**

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### **(1) Strictly observe the following rules in using standing signboards, notices and fliers in campuses:**

- (i) Required information  
Clubs or student groups registered with the university: Specify the group name.  
Clubs or student groups not registered with the university: Specify the group name and the department, academic year and name of the representative of the group.
- (ii) False advertisements, invasions of privacy of other people and defamation are prohibited.
- (iii) Notices against these rules may be removed without prior notification. Groups that violate these rules may no longer be permitted to use any standing signboards or give out notices or fliers.

### **(2) Standing signboards**

As a rule, clubs or other student groups are not permitted to use standing signboards on the Nishi-Waseda Campus. However, they may be permitted to use standing signboards if it is judged that there is a justifiable reason.

### **(3) Notices**

For details about bulletin boards, refer to the table on the next page. Observe the following rules in using bulletin boards. Notices against these rules will be removed.

- (i) Apply to the Center for Science and Engineering (Academic and Student Affairs Section) for approval for use of the bulletin board.
- (ii) Notices can be put on the bulletin boards for up to 3 weeks after approval is obtained.
- (iii) Follow the notice size and number rules described below:  
Bulletin board near the main gate: 55 cm long and 45 cm wide (size of a newspaper page) or smaller, 1 sheet  
  
Bulletin board in buildings: 40 cm long and 27 cm wide (size of half a newspaper page) or smaller, Up to 2 sheets
- (iv) Please use thumbtack when putting notices on bulletin boards. For bulletin boards on which thumbtacks cannot be used, use masking tape.
- (v) Remove expired notices on your own.

### **(4) Distribution of fliers**

Observe the following rules strictly in distributing fliers on campus:

- (i) Distributing fliers for advertisement or for other commercial purposes (as a part-timer, etc.) is prohibited.

- (ii) You are only allowed to distribute fliers by hand. Do not force people to accept fliers. Putting fliers on classroom desks, which gets in the way of conducting classes, is prohibited.

### List of bulletin boards

Location	Bulletin board	Purpose
Main gate bulletin board	General information bulletin board	Information about notices posted on other bulletin boards Information about lecture meetings Event information Information about student societies' events, internship
	Admission bulletin board	Entrance examination information
	Student Support bulletin board	Scholarship (mainly for Japanese students) Event information, job search related information, notices from career center
	Class information bulletin board for	Undergraduate and graduate school calendars Information on Open Education Center, Teacher Training Program, MNC, etc. Course registration / grade announcement information Class cancellation information Reports, Examination information, Course Time tables, Classroom change
North Side Pathway of Building 51 <sup>st</sup> , 60 <sup>th</sup> , 61 <sup>st</sup>	Bulletin board for each School	Information on individual departments
1 <sup>st</sup> floor of Building 51 (Center for Science & Engineering)	International student support bulletin board	Scholarship for international students, Career Info. and Information from ICC
1 <sup>st</sup> floor of Building 61	Career Info. bulletin board	Career Information for Japanese and international students, Internship information for Japanese and international students
1 <sup>st</sup> floor of Building No. 56	Laboratory work bulletin board	Information about Basic Experiments in Science and Engineering, Applied Physics Laboratory, etc.
2 <sup>nd</sup> floor of Building 57	Bulletin board for clubs recognized by the Faculty of Science and Engineering	Space for announcement from clubs recognized by the Faculty of Science and Engineering
Lounge in the 2 <sup>nd</sup> floor of Building 57	Event bulletin board	Announcement of different events
Student lounge of Building 51	Bulletin board for student societies only	Space for announcement from student societies
3 <sup>rd</sup> floor of Building 50	Bulletin board for the office of Building 50	TWIns information, seminar room timetable, lecture information

## **11 Use of Classrooms and Common Seminar Rooms**

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To use classrooms for extracurricular activities, you have to submit an “Application for Use of Classrooms / Seminar Rooms” form available in the Center for Science and Engineering (Academic and Student Affairs Section). When submitting the form, keep the following in mind:

### **(1) Qualification to use classrooms**

Only clubs recognized by the Faculty of Science and Engineering and equivalents and other groups headed, chaired or consulted by a full-time faculty member of the Faculty of Science and Engineering can use classrooms.

### **(2) Responsible person**

The responsible person (full-time faculty member) must put his/her seal on the application for use.

### **(3) Submission of an application for use**

An application for use must be submitted at least 3 business days before use.

### **(4) Available period**

As a rule, use of classrooms is allowed except for the following periods:

Sundays, national holidays, Saturdays during holiday periods, period between the entrance ceremony and the start of classes, 2-week periods after the start of fall and spring semester classes, end of fall and spring semester examination periods, summer construction period, Rikoh-ten (exhibition for Science and Engineering Schools) periods, entrance examination periods during which campuses are closed, preparation periods for entrance examinations and periods during which classes are cancelled for other events

### **(5) Available time**

As a rule, classrooms can be used between 18:15 and 20:00 on Monday through Friday, and between 14:45 and 20:00 on Saturday. During holiday periods, classrooms can be used between 9:00 and 17:30.

### **(6) Classrooms available**

All classrooms located in Building 52, 53, 54, 56, 57, 58, 60 and 61 and common seminar rooms in Building 51, 60, 61 and 63 in Nishi-Waseda Campus.

### **(7) Available period**

As a rule, a classroom can be used for up to 1 month. If you want to use a classroom for a longer period, submit an application for use again.

### **(8) Notes on using classrooms**

- (i) Using classrooms in a matter that interferes with classes, education, research or business of the university or undergraduate/graduate schools is not allowed.

- (ii) Pay attention to the surrounding classrooms and do not disturb classes taking place in other classrooms.
- (iii) Do not move tables, chairs, and other furniture in classrooms.
- (iv) When using a classroom, please strictly observe the time period allowed.
- (v) In case of an emergency that makes it necessary for the university to use the classrooms, you may be assigned other rooms.
- (vi) There are cases when a classroom is not available due to reasons such as construction of school building.

## 12 Extracurricular Activities

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### (1) International Community Center

The International Community Center (ICC) provides a meeting point for international students and Japanese students studying at Waseda University. It promotes mutual exchange between students beyond nationality and cultures. Throughout the year, the ICC organizes various sightseeing trips and events on campus. Please refer to the ICC website or visit the reception to confirm event information.

#### **Contact Information:**

[Address] 1<sup>st</sup> floor, Building 3, Waseda campus

[Tel] 03- 5286 - 3990

[E-mail] [icc@list.waseda.jp](mailto:icc@list.waseda.jp)

[URL] <http://www.waseda.jp/inst/icc/en/>

[Office hours]

During Semester: Weekdays: 11:00 - 19:00 Saturday: 10:00 - 17:00

During Semester Breaks: Weekdays: 10:00 - 17:00 Saturday: Closed

### (2) Student Club Activities

Waseda students organize a wide variety of clubs, covering every interest and activity imaginable. Joining in club activities will be useful for you to establish bonds with Japanese students and to understand Japanese culture and social systems. You can visit the website (<http://www.waseda.jp/student/gakusei/circle-e.html>) for a list of clubs.

Also, reference books of student clubs are available at the Center for International Education. There are clubs and groups especially for international students. Please refer to the International Student Handbook for details.

### (3) The International Association for the Exchange of Students for Technical Experience (IAESTE)

The International Association for the Exchange of Students for Technical Experience (IAESTE) is an association established to support students' practical training in foreign companies or international exchange and to deepen mutual understanding and friendship between students around the world. This association was established in 1948, and Japan became a member of this association in 1964. Currently, the association has more than 100 member countries, and about 1,000 universities of science and engineering and agriculture have participated in overseas student exchange programs of IAESTE International. It is sponsored by about 4,000 companies and has had more than 300,000 students in student exchange programs.

## 13 Safety Management

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In the Nishi-Waseda Campus of Waseda University, more than 10,000 people including students, faculty and staff gather for education and research activities. As is often the case with a university of science and engineering, more than 4,000 fourth year students of undergraduate schools and graduate students are engaged in a variety of research activities. To prevent possible accidents during education and research activities and work on and improve other safety issues, the Nishi-Waseda Campus Safety and Health Committee of faculty and staff has been established. The committee has developed various safety management systems and supervises school-wide safety and health inspections and other safety management functions.

Students should observe the following rules:

- In laboratory classes, observe safety precautions explained during the Laboratory Work Guidance and work on experiments with safety in mind.
- As for the safety of experiments carried out as part of your graduation thesis, you have to listen to special precautions for your field of research. Follow the directions of supervisors and work on experiments safely.
- Participate actively in safety workshops held by laboratories and observe school rules, etc.

Use the Safety Guide and “Safety e-learning program” (Course N@vi) issued by the Nishi-Waseda Campus Safety and Health Committee, which describes the safety of experiments carried out as part of graduation and master’s theses, and contact technical staff of relevant laboratories, etc. if you have questions ([anzenrenraku@list.waseda.jp](mailto:anzenrenraku@list.waseda.jp)). The Safety Guide is available at the laboratories and the Technology Planning Section or can be checked from the following URL:

Nishi-Waseda Campus Safety Guide: <http://www.sci.waseda.ac.jp/LABSafety/guidance>

About Safety Management at TWIns: <http://www.twins.sci.waseda.ac.jp/LOCAL/rule/index.html>

As a science and engineering school student, you must observe school rules as well as relevant laws and regulations, and always be aware of the safety of yourself and your surroundings and the safety and conservation of the global environment.

## **Response to emergencies**

### **(1) Injury / serious illness**

If you are injured seriously or become seriously ill, call the school emergency number (main gate security guard office: extension: 3000, external number: 03-5286-3022). If you call 119 directly in an emergency (including in the event that the injured or ill persons should not be or cannot be moved), call the school emergency number too because an ambulance must be guided by security guard personnel. If the injured or ill persons can be moved, have him/her receive treatment in the Health Support Center (Nishi-Waseda branch at the 1st floor of Building No. 51, extension: 2640 / 2641) and have him/her get external medical help if needed. If the center is closed, call the school emergency number (extension: 3000, external number: 03-5286-3022). On the Nishi-Waseda campus, there are 7 AEDs (for their locations, see <http://www.sci.waseda.ac.jp/LABSafety/guidance> \*written in Japanese) available for use in emergency situations. If you are interested in learning how to perform CPR or use an AED, you can take “普通救命講習” (First Aid Seminar) (offered 4 times a year). Details for the seminars will be posted on the Technology Planning Section website or Waseda-net Portal.

### **(2) Fire**

Use a nearby fire extinguisher to initially extinguish the fire, and immediately call the school emergency number (main gate security guard office: extension: 3000, external line: 03-5286-3022) to report the place and condition of the fire and receive instructions. If the fire cannot be extinguished with a fire extinguisher, escape to a safe place with those around you. Corridors of classroom buildings are equipped with emergency telephones (red boxes). You can use them to call extension 3000.

### **(3) Earthquake**

Secure your safety under a desk or other shelter until the earthquake dies down. In case of a major earthquake, the university is supposed to set up disaster countermeasures offices in the headquarters and campuses to collect information and secure the safety of students, faculty and staff. Follow the instructions of the offices. Refer to the “Earthquake Response Manual for Students” and the website below for more information:

<https://www.waseda.jp/top/en/about/work/organizations/general-affairs/safety/manual/earthquake>

## 14 Study Abroad

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Students who are considering to study abroad should participate in the Study Abroad Fair held by the Center for International Education in May and October. This fair provides useful information for those who are considering study abroad, such as an overview and notes on studying abroad, how to obtain program information and how to use Waseda Global Gate (1st floor of Building No. 22 of the Waseda Campus). In particular, long-term overseas study requires more than 1 year of preparation. You should check the 1-year application procedure for overseas study and other detailed schedules, and other information in the MyWaseda and the website of the Center for International Education as needed.

When you study abroad through a university program, the expenses will depend on each program and may vary from year to year depending on circumstances of host universities. Scholarships for studying abroad include scholarships granted under the short-term overseas study promotion system of the Japan Student Services Organization, the Waseda University Student Exchange Scholarship, and the Scholarship for Exchange Program Scheme. The scholarship application bulletin and other documents are provided after your host university is confirmed.

For more details about when you should study abroad, tuition and fees, whether credits earned in a foreign university are approved or not, and overseas study programs provided by the school, consult the Academic and Student Affairs Section of the Center for Science and Engineering. For more details about overseas study programs for all students provided by the university or the application procedure, refer first to STUDY ABROAD --The Study Abroad Bulletin-- or other information prepared by the Center for International Education (<http://www.waseda.jp/inst/cie/en>).

Study abroad programs for all students provided by the university are divided roughly into the types described below.

### **Program overview: long-term study abroad and short-term study abroad**

#### **(1) Long-term study abroad (half year/ one year)**

##### **(i) Exchange Programs (EX)**

These are programs where you will go abroad to study based on the exchange agreements between the universities or the departments. The term is one academic year in principle, but there are also programs whose term is one semester. Relatively high-level language skills are required from the beginning, and usually, you will take ordinary courses with local students. However, there are some programs where you mainly focus on studying a foreign language. Usually, the number of students recruited is one to three per university. You will usually be put priority over other international students in taking courses and arranging accommodation. In principle, tuition is paid to Waseda, and you will be exempted from paying tuition to the host university. Please check the latest information about application details on the website of CIE.

##### **(ii) Customized Study Programs (CS)**

These are programs where you will participate in the curriculum prepared for students from Waseda by the host university. There are roughly two types of programs. One is the



programs where you may take ordinary courses from the beginning. The other is the programs where, while you mainly focus on studying a foreign language, you will at the same time follow the curriculum prepared based on a certain theme if your level of the foreign language is adequate to do so. The term is one academic year in principle, but there are also programs whose term is one semester. In principle, you will be exempted from paying tuition to Waseda, and you will be paying a designated program fee to the host university.

## **(2) Short-term study abroad (several weeks)**

The Faculty of Science and Engineering and the Center for International Education provide short-term study abroad programs during long school breaks. In the programs, you will learn the local language, culture and customs for a short period of time. Please contact each office for more information.

## **(3) Other study abroad programs**

Studying abroad without receiving any scholarship, or at your own expense, including living expenses, by gaining entry -permission from a university or a language learning institution of your choice is called privately financed overseas study. For privately financed overseas study, you have to go through required procedures on your own or through an overseas study agency. Check how your registration status at Waseda University and tuition and fees are treated, which depends on your particular case, with the Office of the Faculty of Science and Engineering. There are cases when study abroad programs conducted by individual departments recruit applicants on the bulletin board of each Graduate school/ Department.

## **15 Nonsmoking Campus**

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The following rules on separation of smoking areas in the Nishi-Waseda Campus have been established in accordance with the enforcement of the Health Promotion Law, which advocates the prevention of passive smoking (second-hand smoke), the notice regarding smoking issued by the Ministry of Education, Culture, Sports, Science and Technology, the ordinance regarding smoking on the street enacted by Shinjuku Ward, and the decision of the Executive Board on thorough separation of smoking areas. Observe these rules strictly. Also observe manners and rules on smoking on the street on the way to and from school. You should act with an awareness of being a student of Waseda University.

1. Smoking in public places is prohibited including classrooms, seminar rooms, laboratories, meeting rooms, lounges, foyers, atriums, libraries, students' reading rooms, CO-OP facilities, yards, corridors, stairs, passages, elevators, rest rooms and in open-air spaces, except for designated smoking areas.
2. Smoking is prohibited in laboratories and other places where seminars or student guidance is given, which are considered as classrooms.
3. Smoking while walking, and cigarette littering are strictly prohibited.

## **16 Ban on Commuting by Bicycle, Motorcycle or Car**

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As a rule, students are prohibited from riding and parking a bicycle or driving a motorcycle or car into the Nishi-Waseda Campus. Since parking on streets around the campus is prohibited around the clock, commuting by bicycle, motorcycle, or car is prohibited. As to bicycles use only in special circumstances, you can inquire the General Affairs Section in the Center for Science and Engineering.

We have received many complaints from nearby residents about bicycles, motorcycles, and cars parked on the street in front of the main gate or in the walkways on the side of Meiji Dori and have been warned strictly by the local police stations repeatedly. This nuisance parking has caused traffic accidents. Be sure to observe these rules strictly. Do not think that you are an exception, but act with an awareness of being a student of Waseda University.

## 17 Library

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Waseda University Library consists of more than 20 libraries and reading rooms. Graduate students can take out books from 14 libraries. You can find complete explanation about services on Library website: <http://www.wul.waseda.ac.jp/index.html>. Please check the newest information on that website. Library materials can be searched through WINE: <http://wine.wul.waseda.ac.jp/search/>. By using the “View Your Records” function of WINE, you can check the status of your borrowed books or renew the due dates.

Waseda University Library has made a contract with many databases, such as online journals and e-books, not only actual materials (books, journals, newspapers, audio-visual materials, etc.). You can access these online materials through Waseda E-Resource Portal: <http://www.wul.waseda.ac.jp/imas/index-e.html>. When you want to use them from outside the university, please access via Off-Campus Access: <http://www.wul.waseda.ac.jp/remote/index-e.html>.

Nishi-Waseda Campus has the Science and Engineering Students’ Reading Room and Science and Engineering Library. Notes on each feature and use are introduced as follows:

### (1) Science and Engineering Students’ Reading Room (Building 52, B1F)

The Room is mainly for undergraduate students, providing Japanese books centered on science and engineering fields along with curriculum. It holds multiple copies for frequently used books.

### (2) Science and Engineering Library (Building 51, B1F)

This is a research library holding many journals and reference books both in Japanese and foreign languages in the field of science and engineering. We introduce online version of journals and books as much as possible. You can use online journals through WINE and the Waseda Portal for Online Journals: <http://tm3xa4ur3u.search.serialssolutions.com/>. Textbooks of IPSE courses are located in the IPSE corner, and you can use them inside the library.

### (3) Notes on use

#### ( i ) Service hours during the semester

Mon. through Fri.: 9:00-21:00 Sat.:9:00-19:00

For summer, winter and spring vacations, please check service days and hours on the website.

- ( ii ) Be sure to store your bags and personal belongings in a locker and lock it before entering the Science and Engineering Library. A 100 yen coin is required, but it will be returned after use.
- ( iii ) Carry your student ID card at any time. If you forget it, you cannot use any library.
- ( iv ) Smoking, chatting, eating and talking on mobile phones are prohibited inside the library.
- ( v ) Please handle all library materials with care and be careful not to damage or get them wet. If you lose or damage library materials, you will be asked to compensate for them.

Strict measures will be taken for malicious violations such as stealing library books, writing, underlining and marking library material, or cutting or tearing pages out of books.

(vi) When books are not returned by the due date, a penalty of 1 point per day per book will be applied. User's library privileges are suspended for 14 days every 50 penalty points.

(vii) Please keep the rule "User instructions for databases, electronic journals, etc.":

[http://www.wul.waseda.ac.jp/db/db\\_notice-e.html](http://www.wul.waseda.ac.jp/db/db_notice-e.html)

(viii) Some of the journals are located at the Honjo Deposit Library in Saitama Prefecture.

(ix) When you have any question on how to use library, please search the library website first. Please use an online reference or ask at a counter if it is still not clear.

MyWaseda→Research→Library Online Request →Online References

## 18 Computer Rooms

Nishi-Waseda Campus has about 700 computers which are mainly for classes. These computers can also be used for preparing reports or for browsing Internet sites unless they are being used for a class.

### 3rd floor of Building 63

Name	Capacity	Available OS				Remarks
		Win (J)	Win (E)	Linux	MacOS X	
Room A	80 people	○		○		Standard computer room (island type)
Room B	80 people	○		○		
Room C	100 people	○		○		
Room D	48 people	○			○	Standard computer room (classroom type) Equipped with iMac
Room E	50 people	○			○	
Room F	48 people	○	○	○		Computer room designed for foreign language class (classroom type)
Room G	48 people	○	○	○		
Room H	12 people	○	○	○		Computer room designed for group study (island type)

### Others

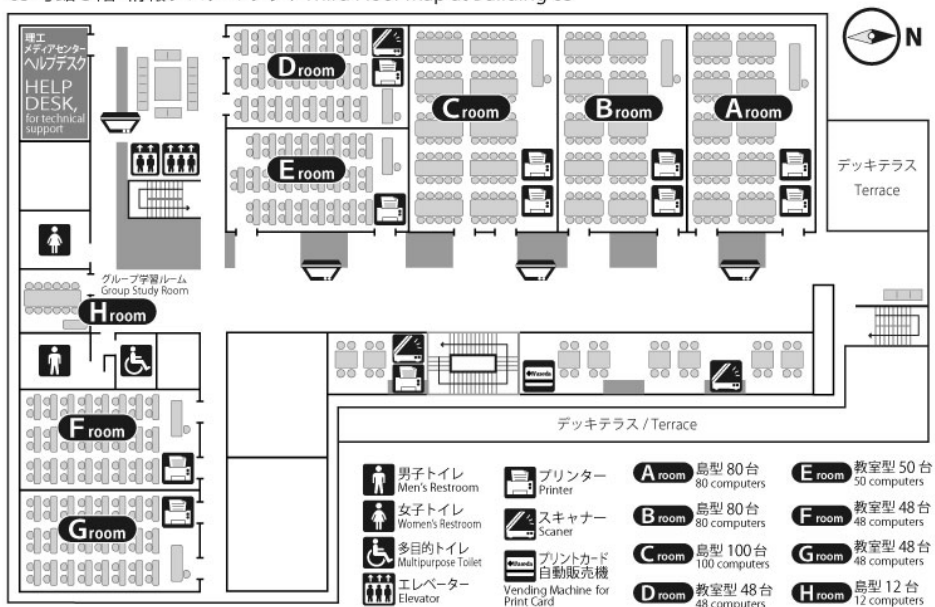
Name	Capacity	Available OS	Location
Drafting/CAD room	208 people	Windows (Japanese)	1st floor of Building No. 57

The availability of computer rooms can be checked in the information panels which are placed at 1<sup>st</sup> and 3<sup>rd</sup> floor of Building 63 and the website of the Media System Support Section. (⇒ <http://www.mse.waseda.ac.jp/> \*written in Japanese)

## <Consultation service>

A help desk is located on the south side of the 3rd floor of Building 63, which provides a consultation service concerning school information accessibility and services.

63号館3階 情報フロアマップ / Third Floor Map at Building 63



### ○ Using Windows

Windows can be used in all the computer rooms. Word, Excel, PowerPoint, science and engineering software, and software development environments are available.

### ○ Using Linux

A Linux environment can be accessed from computer room A, B, C, F, G and H. Linux environments are mainly used in classes in programming languages, algorithms, and numerical analysis. To use a Linux environment, you must apply for use through the Science and Engineering School Students website of the Waseda-net portal.

### ○ Using MacOS X

MacOS X environment can be accessed from computer room D, E. Word, Excel, PowerPoint, Photoshop and Illustrator are available.

### ○ Using computers with foreign language learning equipment

Computers in Rooms F and G are equipped with a headset, with which you can use a foreign language learning support system (CALL system). These are mainly used in foreign language classes and in self-directed learning.

## 19 Experimental Facilities

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### (1) Common laboratories

Nishi-Waseda Campus and Building 50 (TWIns) have educational experiment facilities used for basic laboratory courses to be taken by first, second and third year undergraduate students and for specialized laboratory courses provided by different departments. These facilities are shared among different departments and are called “common laboratories.” Educational experiments are mainly conducted in these laboratories, but facilities in these laboratories are also widely used for research activities.

#### ○ Laboratories for basic experiments in science and engineering

Laboratories for basic experiments in science and engineering are used for “Science and Engineering Laboratory 1” and “Science and Engineering Laboratory 2” courses. Laboratories for basic experiments in science and engineering consist of 4 laboratories for different fields of academic study: laboratory for basic physical experiments, laboratory for basic chemical experiments, laboratory for basic bioscience experiments and laboratory for basic engineering experiments.

(Laboratory for basic physics experiments) Building 56, 2F

This laboratory is used for basic physics experiments in “Science and Engineering Laboratory 1” course. You can learn the basics of physics through creative and unique experiments based on production.

(Laboratory for basic chemistry experiments) Building 56, 3F

This laboratory is used for basic chemistry experiments in “Science and Engineering Laboratory 1” and “Science and Engineering Laboratory 2” courses. You can learn the basic knowledge and method of experiment in chemistry such as synthesis, extraction, and analysis.

(Laboratory for basic bioscience experiments) Building 56, 3F

This laboratory is used for basic bioscience experiments in “Science and Engineering Laboratory 1” course. You can learn the basics of bioscience through observation of cells and extraction of DNA.

(Laboratory for basic engineering experiments) Building 63, B1F east side

This laboratory is used for basic engineering experiments in “Science and Engineering Laboratory 2” course. You can learn advanced and practical basic engineering technologies through operation of scanning electron microscopes and automatic computer measurement.

#### ○ Materials laboratory: Building 59, 1F east side

Strength tests or physical property tests of structural materials (metals, wood, concrete, etc.) and specialized experiments for evaluating the strength of structures are conducted.

#### ○ Machining laboratory: Building 59, 1F west side

This laboratory is used for machine shop practice using machines. You can receive guidance on machining and machine or experimentally produce laboratory equipment or parts.

- Thermal engineering laboratory, fluid engineering laboratory and control engineering laboratory: Building 58, 1F  
Specialized experiments on thermal engineering, fluid engineering, or control engineering are conducted in these laboratories. In the fluid engineering laboratory, specialized experiments on hydraulics or water quality are also conducted.
- Drafting/CAD room: Building 57, 1F  
In this room, which is equipped with about 400 drafters (drafting tables), laboratory training on the basics of drafting or computer-aided design and drafting exercises are conducted.
- Survey practice room: Building 61, B1F  
Laboratory training on surveys using various types of surveying equipment is provided. This room is also used for photo survey-based reading of changes in the natural environment or measurement, archaeological research or other research.
- Electrical engineering laboratory: Building 63, B1F west side  
Specialized experiments in the fields of electricity/electronics and information communications are conducted. Technical support on making measurements of voltage, current, or magnetic fields, or on building of circuits is also provided.
- Chemical analysis laboratory: Building 56, 5F  
Specialized experiments in the fields of gravimetric analysis, volumetric analysis, instrumental analysis and other inorganic analytical chemistry are conducted. You can learn an extensive knowledge of analysis ranging from the basics of classic chemical analysis to instrumental analysis using large equipment.
- Physical chemistry laboratory: Building 56, 4F  
Specialized experiments are conducted on chemical substances compounds or molecules that constitute them, based on physical methods.
- Organic chemistry laboratory: Building 56, 5F  
Students learn the basics of conducting organic chemistry experiments from how to use reagents, equipments, and instruments to synthesis, separation and purification of organic compounds. Students deepen their understanding of organic chemistry by confirming what they have learned in lectures about reaction systems through experiments. They also acquire skills on experimental methods of organic chemistry by practicing and performing experiments repeatedly.
- Bioscience laboratory: Center for Advanced Biomedical Sciences TWIns Common Laboratory: Building 50, 3F  
Students learn how to treat biomolecules such as gene or protein and a wide range of bioscience techniques by conducting morphological/ physiological experiments using culture/ fraction of cells or biont.



## **(2) Shared research facilities**

In the shared research facilities, large equipment and precise measuring equipment that can be shared for research are intensively managed and used in a wide variety of research activities. Seminars and technical support on the use of equipment are also provided.

- **Materials Characterization Central Laboratory: Building 55, South Tower, B1F**  
The Materials Characterization Central Laboratory is a shared research facility used for analyzing the structure of materials. This laboratory is used by fourth year students assigned to a laboratory, master's degree students, doctoral degree students and researchers for research in a wide range of fields. The laboratory, which is equipped with state-of-the-art measurement instruments for research, is also used by other universities and research institutions.
- **Microtechnology Laboratory: Building 55, North Tower, B1F**  
Semiconductor processing equipment and clean rooms are available as shared research facilities. This laboratory is used by researchers in a wide range of fields including mechanical engineering, solid-state physics, chemistry and material engineering.
- **Media Design Laboratory: Building 61, 3F**  
Image information equipment for multimedia research or preparing teaching materials is available as shared research equipment. You can use a large color printer to prepare posters for conference presentations.
- **Center for Advanced Biomedical Sciences Shared Instruments Room**  
At TWIns (Building 50), this room provides equipments such as centrifuge, MS, FC, DNA sequencer, real-time PCR, X-ray analysis apparatus, and gas chromatograph used for bioscience material analysis. Under the management of Research Support Center, it is available for use.

## 20 Health Support Center

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### Health Support Center

The Health Support Center was established to help students lay the groundwork for their health and acquire the ability to self-administer their mental and physical health so that they can lead a school life in good condition. Health Support Center has branches in each campus.

For more details, refer to the website below:

<http://www.waseda.jp/hoken/english>

### Health Support Center on Nishi-Waseda Campus (1st floor of Building 51)

Open hours: Monday through Saturday 9:00 – 17:00

Tel: 03-5286-3021 < 03-5286-3082 (direct line for consultation) >

#### <Services>

- (i) Annual health check-ups
- (ii) Special health examinations
- (iii) Issuance of various health certificates
  - \*Only for those who have taken annual health check-ups
- (iv) Health consultation
  - Monday through Friday 9:00 – 17:00
- (v) Clinical examination by physician
  - Monday through Friday 13:30 – 15:40
- (vi) First-aid treatment and care of sick persons
  - Monday through Saturday 9:00 – 17:00
- (vii) Mental health consultation by psychiatrist (Room07, 1<sup>st</sup> floor of Building 51)
  - Monday through Friday 13:00-17:00(by appointment only)
- (viii) Other consultation

### School Infectious Disease Prevention Policy - Class Absence Procedures

In order to prevent the spread of highly infectious diseases, students who have contracted any of the diseases listed under Table I: Infectious Disease Prevention in School will not be allowed to attend class based on the authority of the *School Health and Safety Act*. (The length of the mandatory suspension period is based on Table II: Mandatory Suspension Guidelines below.)

Students who have contracted one of the diseases indicated below are required to (I) contact the Nishi-Waseda branch of the Health support center (Tel. 03-5286-3021) and the Academic and Student Affairs Section in the Center for Science and Engineering. (Tel. 03-5286-3002 / E-mail [gakumu@sci.waseda.ac.jp](mailto:gakumu@sci.waseda.ac.jp)) to report your disease. and (II) undergo the following **Report of Absence** procedures as indicated.

- ① Ask your physician to fill out a designated *Certificate of Recovery from Infectious Disease Form* (学校における感染症治癒証明書): <http://www.waseda.jp/hoken/infection>  
Upon completion, submit this form to your affiliated organization (undergraduate school, graduate school, etc.)
- ② Obtain and fill out a designated **Report of Absence Form** (欠席届) from your affiliated organization (undergraduate school, graduate school, etc.) and follow all instructions. Present this form to your course instructor and ask for due consideration regarding your absence.

Table I: School Infectious Disease Prevention Policy (Regulations on the School Health and Safety Act, Article 18)

Type	Infection Characteristics	Infectious Disease
Type I	Occurrences of infection are rare but any occurrence of these infectious diseases is considered extremely serious (a public health emergency).	<ul style="list-style-type: none"> <li>• Ebola Hemorrhagic Fever</li> <li>• Crimean-Congo Hemorrhagic Fever</li> <li>• Variola Virus</li> <li>• South American Hemorrhagic Fever</li> <li>• Plague</li> <li>• Marburg Hemorrhagic Fever</li> <li>• Lassa Fever</li> <li>• Polio</li> <li>• Diphtheria</li> <li>• Severe Acute Respiratory Syndrome (SARS Corona Virus)</li> <li>• Highly Pathogenic Avian Influenza A (H5N1) Virus</li> <li>• Designated Infectious Diseases</li> <li>• New Infectious Diseases</li> </ul>
Type II	Infection can spread through the air and has the possibility of spreading over a large area.	<ul style="list-style-type: none"> <li>• Seasonal Influenza (Flu)</li> <li>• Pertussis (Whooping Cough)</li> <li>• Measles (Rubeola)</li> <li>• Rubella (German Measles, Three-day Measles)</li> <li>• Parotitis (Mumps)</li> <li>• Chicken Pox (Varicella)</li> <li>• Adenovirus</li> <li>• Tuberculosis (TB)</li> </ul>
Type III	Although not primarily spread through the air, these diseases when left untreated can spread and cause an epidemic.	<ul style="list-style-type: none"> <li>• Cholera</li> <li>• Shigellosis</li> <li>• E.coli (Escherichia coli) (0-157)</li> <li>• Typhoid Fever</li> <li>• Paratyphoid Fever</li> <li>• Epidemic Keratoconjunctivitis</li> <li>• Acute Hemorrhagic Conjunctivitis</li> <li>• Other Infectious Diseases</li> </ul>

Table II: Mandatory Suspension Guidelines (Regulations Implementing the School Health and Safety Act, Article 19)

Type	Length of Mandatory Suspension for Health Reasons	
Type I	Suspension shall remain in effect until the patient has made a full recovery.	
Type II	Seasonal Influenza (Flu)	Until at least 5 days have elapsed since the onset of symptoms and 2 days have passed since the fever has subsided.
	Pertussis (Whooping Cough)	Until the whooping cough has subsided or the patient has completed a 5-day treatment program of the appropriate antibiotics that is generally prescribed.
	Measles (Rubeola)	Until 3 days have elapsed after the fever has subsided.
	Rubella (German Measles, Three-day Measles)	Until all rash and skin lesions have subsided.
	Parotitis (Mumps)	Until 5 days have elapsed since the onset of swelling of the parotid salivary glands, the submandibular glands, and/or the sublingual glands, and the patient's overall condition has returned to normal.
	Chicken Pox (Varicella)	Until all chicken pox blisters have formed scabs.
	Adenovirus	Until 2 days have elapsed after major symptoms have subsided.
	Tuberculosis (TB)	Until your physician has determined that there is no further risk of infection based on an up-to-date diagnosis.
Type III	Until it has been determined that there is no further risk of infection by a physician.	

## 21 Transportation Strikes and Classes

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For three campuses at Waseda, Toyama and Nishi-Waseda, and Center for Advanced Biosciences (TWIns), see (1), (2), (3), and (4). For Tokorozawa campus, see (1), (2), (3), and (5).

- (1) When employees of Japan Railways (hereinafter called JR) and other public transportation systems go on strike (general strike), whether classes will be held is determined as noted below.
  - (i) If the strike is called off by 12:00 am (midnight), classes will be given as usual.
  - (ii) If the strike is called off by 8:00 am, the third and subsequent period classes (classes after 1:00 pm) will be held.
  - (iii) If a decision to call off the strike is not made by 8:00 am, classes will be cancelled for the day.Please note that these rules do not apply to work-to-rule strikes of JR and strikes of private railways.
- (2) When employees of JR in the Tokyo metropolitan area go on partial strike (spot strike), classes are given as usual.
- (3) When employees of JR in the Tokyo metropolitan area go on full strike for a limited number of hours, whether classes will be held is determined as noted below.
  - (i) If the strike ends by 8:00 am, the third and subsequent period classes (classes after 1:00 pm) will be held.
  - (ii) If the strike ends by noon, the sixth and subsequent period classes (classes after 6:15 pm) will be held.
  - (iii) If the strike does not end by noon, all classes for that day will be cancelled.
- (4) If only private railway and urban transportation goes on strike, classes will be held as usual.
- (5)
  - (i) When either or both of the Shinjuku line and the Ikebukuro line of Seibu Railway go on strike or
  - (ii) When these lines do not go on strike, but Seibu Bus goes on strike whether classes will be held is determined as noted below.
    - A. If the strike ends by 8:00 am, the third and subsequent period classes (classes after 1:00 pm) will be held.
    - B. If the strike does not end 8:00 am, all classes for that day will be cancelled.

## 22 Contingency Measures Due to Severe Weather

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Any decision to cancel classes, postpone examinations, and enact other contingency measures due to severe weather shall be the responsibility of the University and shall not be based solely on warnings and advisories issued by the Japan Meteorological Agency.

However, when weather conditions are severe (heavy rainfall, flooding, high winds, blizzard conditions, heavy snow, etc.) or when a warning has been issued by the Japan Meteorological Agency and a determination has been made by the University that current conditions pose a danger to the safety of students and employees, the University will enact contingency measures such as the cancellation of classes, postponement of examinations, etc. Directives enacting such contingency measures on any campus (or campuses) shall apply to all courses and examinations taking place on the designated campus (or campuses).

1. Based on prevalent weather conditions such as during a typhoon, heavy snow, etc. where forecasts with reasonable accuracy can be made, and the University deems that conditions pose a danger to the safety of students and employees, the University will issue an emergency bulletin a day in advance to cancel classes, postpone examinations, etc. In such cases, a decision will be made by no later than 7 pm and a notification posted for students through the University's website and other communication channels by 9 pm on the day prior to the day in question.

2. In all other circumstances which do not fall under Item 1 above, any directive to cancel classes, postpone examinations, etc. will be issued no less than 60 minutes before the start of each affected class period and examination. Notifications will be posted on the University's website, as well as being disseminated via other communication channels.

\*For the purposes of emergency bulletins, the Art and Architecture School, as well as the Kawaguchi Art School of Waseda University are grouped together with the Nishi-Waseda Campus.

\*The contingency measures described here do not apply to Waseda University's two senior high schools, nor to the University's Extension Center.

### ■Emergency Communication Channels

1. Waseda University Website:

<http://www.waseda.jp/top/en>

2. Waseda University Emergency Bulletin Website for Mobile Phones (also PC-compatible):

<http://m.waseda.jp/>

3. Waseda University Emergency Bulletin Website (Yahoo! Japan Blog) (Mobile phone-compatible):

[http://blogs.yahoo.co.jp/waseda\\_public](http://blogs.yahoo.co.jp/waseda_public)

4. MyWASEDA (PC only):

<https://my.waseda.jp/login/login>

\*The websites listed above can be accessed via the “Emergency” function on the “WASEDA Mobile.”

• For iOS Version : Search “WASEDA Mobile” from AppStore

URL: <http://itunes.apple.com/jp/app/waseda-mobile/id548395130?mt=8>

• For Android Version : Search “WASEDA Mobile” from Google Play

URL:

<https://play.google.com/store/apps/details?id=com.blackboard.android.central.wasedajp>

■Special Exemptions to the Cancellation of Classes and Examination Postponements

1. On-Demand courses:

Directives to cancel classes do not apply.

2. Distance Learning System classes which take place simultaneously on multiple campuses:

Any Distance Learning System classes taking place on multiple campuses (Waseda, Nishi-Waseda, Honjo) and which are directly impacted by the cancellation of classes at any of the campuses will be cancelled on a university wide-basis.

In general, during severe and dangerous weather conditions, the University will issue a directive to cancel classes, postpone examinations, etc. All affected students are expected to keep themselves informed and heed such directives. Students are advised to delay their commute or to refrain from coming to the University when their commuting routes (to the campus where their respective classes are taking place) are under any severe weather warnings issued by the Meteorological Agency, and they feel that commuting will endanger their safety. In such cases, the student should process a completed Report of Absence Form (*Kesseki-todoke*) with his/her affiliated undergraduate school (graduate school), and ask the course instructor in question for due consideration regarding his/her absence.

## 23 Class Cancellation in the Event of a Severe Earthquake

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In the event that a severe earthquake occurs at such intensity that course instructors are not able to conduct classes safely, the following measures will be activated as soon as a decision is made by the University to cancel or postpone classes, as well as examinations.

These measures will apply to all scheduled classes and examinations at designated campuses.

1. When a decision is made to cancel or postpone classes and examinations, notices will be posted on the University's webpage and through other media.
2. When a decision is made during instructional hours, an announcement will be made over the campus public address system.

### ■Emergency Communication Channels

1. Waseda University Website:  
<http://www.waseda.jp/top/en>
2. Waseda University Emergency Bulletin Website for Mobile Phones (also PC-compatible):  
<http://m.waseda.jp/>
3. Waseda University Emergency Bulletin Website (Yahoo! Japan Blog) (Mobile phone-compatible):  
[http://blogs.yahoo.co.jp/waseda\\_public](http://blogs.yahoo.co.jp/waseda_public)
4. My WASEDA (PC only):  
<https://my.waseda.jp/login/login>

\*The websites listed above can be accessed via the "Emergency" function on the "WASEDA Mobile."

- For iOS Version : Search "WASEDA Mobile" from AppStore  
URL: <http://itunes.apple.com/jp/app/waseda-mobile/id548395130?mt=8>
- For Android Version : Search "WASEDA Mobile" from Google Play  
URL: [https://play.google.com/store/apps/details?id=com.blackboard.android.central.waseda\\_jp](https://play.google.com/store/apps/details?id=com.blackboard.android.central.waseda_jp)

5. Waseda University Twitter  
Account name: @waseda\_univ

### ■Special Exemptions to the Cancellation of Classes and Examination Postponements

1. On-Demand courses:  
Directives to cancel classes do not apply.
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In general, during severe and dangerous weather conditions, the University will issue a directive to cancel classes, postpone examinations, etc. All affected students are expected to keep themselves informed and heed such directives. Students are advised to delay their commute or to refrain from coming to the University when their commuting routes (to the campus where their respective classes are taking place) are under any severe weather warnings issued by the Meteorological Agency, and they feel that commuting will endanger their safety. In such cases, the student should process a completed Report of Absence Form (*Kesseki-todoke*) with his/her affiliated undergraduate school (graduate school), and ask the course instructor in question for due consideration regarding his/her absence.



## **24 Class Cancellation in the Event of a Large-Scale Power Outage**

In the event a large-scale power outage occurs unpredictably in the wake of overwhelming demand for electricity, the University will cancel classes as follows. Classes will be resumed with the 1<sup>st</sup> Period of the next day following the restoration of electric power.

- ① If a large-scale power outage occurs during class period (1 ~ 7 periods):  
Remain calm inside the classroom until the situation is under control. All classes scheduled for the rest of the day will be cancelled.
- ② If a large-scale power outage occurs outside class period:  
All classes scheduled for the day will be cancelled.

## 25 Granting of Special Consideration to Students on Bereavement Leave

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Special consideration allows the University to take account of extenuating circumstances; specifically, family bereavement. If you become unable to attend classes, submit papers, or sit exams due to the death of your family member, please present appropriate documentation to back your claim (e.g. a funeral acknowledgement card) and take necessary procedures at the office of your affiliation in order to request special academic consideration during your leave.

### Overview:

The University has systems in place to prevent students who are on a leave of absence due to a death in their family from being unfairly disadvantaged in terms of academic performance assessment. Students who fail to meet their following coursework requirements due to bereavement in the family: class attendance (including for on-demand courses), paper submission, exam-taking, may request the “Application for Special Consideration for Leave of Absence (bereavement)” form to be issued by the office of your affiliation and seek special academic consideration from your course instructors.

Please note that the final decision on a student’s absences is left to the discretion of each lecturer.

### Students entitled to special consideration:

All students of Waseda University

### Applicable Relationship to the Deceased:

First-degree family members (parents, children), Second-degree family members (siblings, grandparents, grandchildren), and spouse

### Number of days granted for bereavement leave:

Up to seven (7) consecutive class-meeting days

※ If international travel is involved, extra number of days may be granted.

### Procedures

- ① Notify the office of your affiliation within ten (10) days from the end of the period for which consideration is sought, and obtain the “Report of Absence (bereavement)” form.
- ② Promptly submit the completed “Report of Absence (bereavement)” form, along with appropriate documentation, such as a funeral acknowledgement card, to the office of your affiliation.
  - ※ In the case that the deceased is your guarantor, follow the procedure for a change of guarantor. Submit the form after having it signed and sealed by the new guarantor.
- ③ Request to have the “Application for Special Consideration for Leave of Absence (bereavement)” form issued by the office of your affiliation.
- ④ Submit the “Application for Special Consideration for Leave of Absence (bereavement)” form to your course instructor and seek special consideration for academic work missed during your bereavement leave.

If you are taking an on-demand course, direct your request to the affiliation offering the course.

# V

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## Appendix

- |   |                                    |
|---|------------------------------------|
| 1 | Alma Mater                         |
| 2 | List of URLs and Telephone Numbers |
| 3 | Campus Map                         |

# 1 Alma Mater

## 早稲田大学校歌

相馬 御風 作詞  
東儀 鉄笛 作曲

Moderato



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こ え そ ら え の て そ ら も と ど ろ に ま



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聳ゆる臺はわれらが母校  
われらが日ごろの抱負を知るや  
進取の精神 学の独立  
現世を忘れぬ 久遠の理想  
かがやくわれらが行手を見よや  
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わせた わせた わせた

二、  
東西古今の文化のうしほ  
一つに渦巻く大島国の  
大なる使命を担ひて立てる  
われらが行手は 窮り知らず  
やがても久遠の理想の影は  
あまねく天下に輝き布かん  
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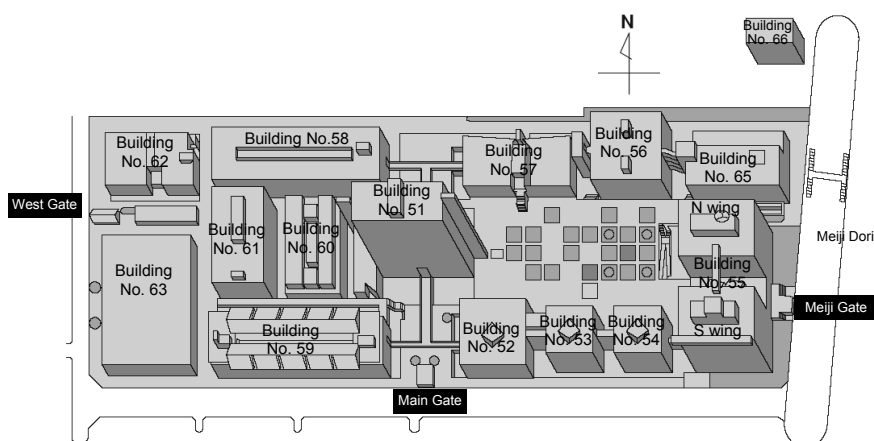
三、  
あれ見よかしこの常盤の森は  
心のふるさとわれらが母校  
集まり散じて人は変れど  
仰ぐは同じき理想の光  
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われらが母校の名をばたたへん  
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## 2 List of URLs and Telephone Numbers

If you cannot find an answer to your question in the bulletin or website, contact the following:

Course	Contact	Telephone number	URL and E-mail address
Consult individually about study and courses required for graduation, etc	Class academic advisor		<a href="http://www.waseda.jp/fsci/en/students/counter/#anc_4">http://www.waseda.jp/fsci/en/students/counter/#anc_4</a>
Course registration Examinations & Grades Certificates Tuition and fees Scholarships School register (study abroad, leave of absence, withdrawal and re-admission) VISA Student clubs and activities	Office of the Faculty of Science and Engineering (Academic and Student Affairs Section)	03-5286-3002	<a href="mailto:gakumu@sci.waseda.ac.jp">gakumu@sci.waseda.ac.jp</a>
Entrance examinations Transferring to another department Details about research of faculty members	Office of the Faculty of Science and Engineering (Admissions Office)	03-5286-3003	<a href="mailto:gyoumu@sci.waseda.ac.jp">gyoumu@sci.waseda.ac.jp</a>
Notices on campus Bicycle parking Management and reservation of meeting rooms TA Various research subsidy programs	Office of the Faculty of Science and Engineering (General Affairs Section)	03-5286-3000	<a href="mailto:soumu@sci.waseda.ac.jp">soumu@sci.waseda.ac.jp</a>
Waseda-net Personal computers	Media System Support Section	03-5286-3355	<a href="mailto:helpdesk@mse.waseda.ac.jp">helpdesk@mse.waseda.ac.jp</a>
Lecture Cancellation Information	Faculty of Science and Engineering website		<a href="http://www3.sci.waseda.ac.jp/LOCAL/kyuko/">http://www3.sci.waseda.ac.jp/LOCAL/kyuko/</a>
Renovation/ Electrical work in labs Safety measures during the research activities, etc	Technology Planning Section	03-5286-3050	<a href="http://www.tps.sci.waseda.ac.jp/">http://www.tps.sci.waseda.ac.jp/</a>
Injury and sickness	Nishi-Waseda branch of the Health support center	03-5286-3021	<a href="http://www.waseda.jp/hoken/english">http://www.waseda.jp/hoken/english</a>
Shuttle bus schedule	Faculty of Science and Engineering website	03-5286-3000	<a href="http://www.waseda.jp/fsci/en/access/">http://www.waseda.jp/fsci/en/access/</a>
Libraries	Science and Engineering Library	03-5286-3889	<a href="http://www.wul.waseda.ac.jp/RIKOU/index-e.html">http://www.wul.waseda.ac.jp/RIKOU/index-e.html</a>
CO-OP	CO-OP of Waseda University	03-3200-4206	<a href="mailto:info@wcoop.ne.jp">info@wcoop.ne.jp</a>
Advice on immigration formalities	Center for International Education	03-3207-1454	<a href="mailto:cie@list.waseda.jp">cie@list.waseda.jp</a> <a href="http://www.waseda.jp/inst/cie/en">http://www.waseda.jp/inst/cie/en</a>
Extracurricular activities and event for international students	International Community Center	03-5286-3990	<a href="mailto:icc@list.waseda.jp">icc@list.waseda.jp</a> <a href="http://www.waseda.jp/inst/icc/en/">http://www.waseda.jp/inst/icc/en/</a>
Career consultation	Career Center	03-3203-4332	<a href="mailto:career@list.waseda.jp">career@list.waseda.jp</a> <a href="http://www.waseda.jp/career/eng/index.html">http://www.waseda.jp/career/eng/index.html</a>
Other inquiries	Office of the Faculty of Science and Engineering	03-5286-3000	<a href="mailto:info@sci.waseda.ac.jp">info@sci.waseda.ac.jp</a>

### 3 Campus Map

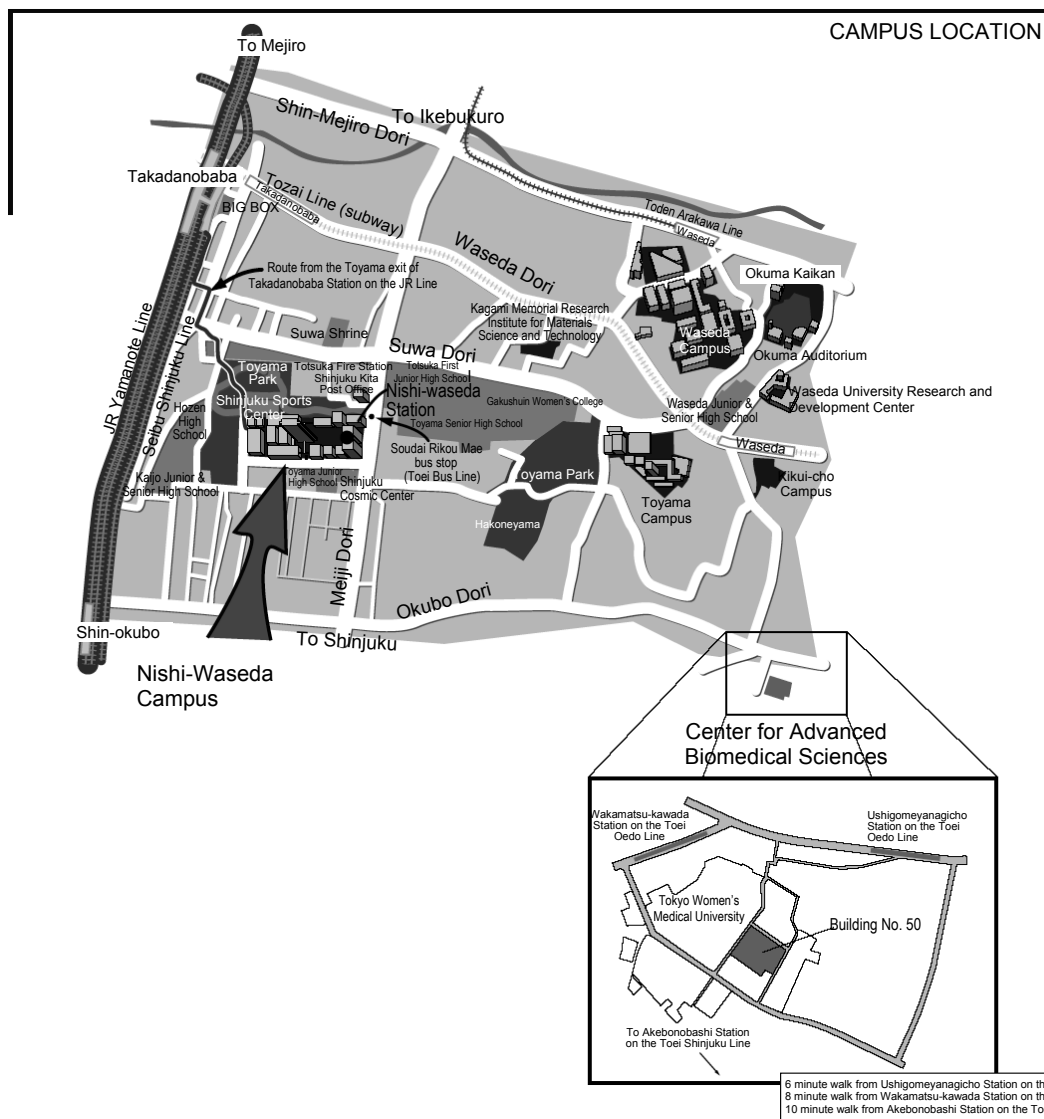
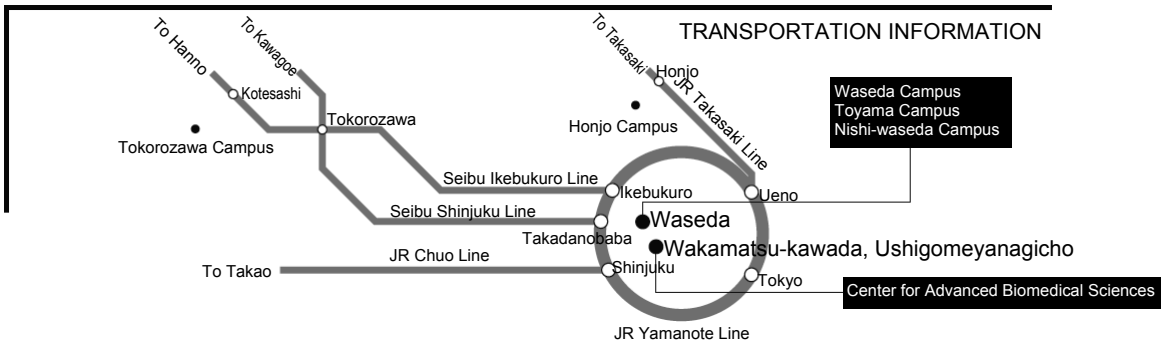


Media System Support Section Help Desk 3rd floor of Building No. 63	WASEDA Monodukuri koubou 1st floor of Building No. 61	Laboratory for basic experiments in science and engineering (Chemistry, Bioscience) Building No. 56	Office of the Faculty of Science and Engineering 1st floor of Building No. 51
Computer Rooms A to H 466 personal computers 3rd floor of Building No. 63	Career information Room 1st floor of Building No. 61	Laboratory for basic experiments in science and engineering (Physics) 2nd floor of Building No. 56	Health support center Nishi-Waseda branch Student Counseling Room 1st floor of Building No. 51
Rikoh Restaurant 1st floor of Building No. 63	Drafting/CAD Room 208 personal computers 1st floor of Building No. 57	Rikoh Cafeteria basement 1st floor of Building No. 56	Student Lounge 2nd floor of Building No. 51
Laboratory for basic experiments in science and engineering (Engineering) 1st basement of Building No. 63	CO-OP school store and book store 1st basement of Building No. 57	Students' Reading Room 1st basement of Building No. 52	Science and Engineering Library 1st basement of Building No. 51

## List of the offices of departments

Fundamental Science and Engineering	Creative Science and Engineering	Advanced Science and Engineering
Department of Pure and Applied Mathematics Room 01, 1 <sup>st</sup> floor of Building No.63	Department of Architecture Room 03, 2nd floor of N wing of Building No. 55	Department of Pure and Applied Physics Room 03, 2nd floor of N wing of Building No. 55
Department of Applied Mechanics Room 08, 2nd floor of Building No. 60	Department of Modern Mechanical Engineering Room 08, 2nd floor of Building No. 60	Department of Chemistry and Biochemistry Room 03, 2nd floor of N wing of Building No. 55
Department of Electronic and Physical Systems Room 01, 1st floor of Building No. 63	Department of Industrial and Management Systems Engineering Room 00, 13th floor of Building No. 51	Department of Applied Chemistry Room 03, 2nd floor of N wing of Building No. 55
Department of Computer Science and Communications Engineering Room 01, 1st floor of Building No. 63	Department of Business Design and Management Building No.51	Department of Life Science and Medical Bioscience 3rd floor of Building No. 50 Office of the Center for Advanced Biomedical Sciences 2-2, Wakamatsu-cho, Shinjuku-ku, 163
Department of Intermedia Studies Room 01, 1st floor of Building No. 63	Department of Civil and Environmental Engineering Room 07B, 17th floor of Building No. 51	Department of Electrical Engineering and Bioscience Room 03, 2nd floor of N wing of Building No. 55
Center for English Language Education in Science and Engineering Room 08, 1st floor of Building No. 51	Department of Earth Sciences, Resources and Environmental Engineering 13th floor of Building No. 51	Department of Integrative Bioscience and Biomedical Engineering Room 03, 2nd floor of N wing of Building No. 55
		Department of Nanoscience and Nanoengineering Room 01, 1st floor of Building No. 63
		Cooperative Major of Advanced Biomedical Sciences (Center for Advanced Biomedical Sciences) 3rd floor of Building No.50
		Cooperative Major of Advanced Health Science (Center for Advanced Biomedical Sciences) 3rd floor of Building No.50
		Cooperative Major of Nuclear Energy 1st floor of Building No.63
International Center for Science and Engineering Room 08, 1st floor of Building No. 51		

## NISHI-WASEDA CAMPUS









**Faculty of Science and Engineering, Waseda University**

3-4-1, Okubo, Shinjuku-ku, Tokyo, 169-8555

<http://www.waseda.jp/fsci/en/>

[info@sci.waseda.ac.jp](mailto:info@sci.waseda.ac.jp)