Students HANDBOOK

for the English-based Graduate Program in Science and Engineering

WASEDA UNIVERSITY

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Students HANDBOOK for the English-based Graduate Program in Science and Engineering 2022

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 regularly.

MyWaseda / Waseda 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 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/

Information categories

Information from the university

To log into the website, you must enter your MyWaseda ID and password issued to you when you enter the university.

Class support system “Waseda Moodle”

Waseda Moodle is a tool that has class support functions such as a lecture material download function. To use Waseda Moodle, log into MyWaseda and select “Waseda Moodle” from “Learning Support” in the left menu.

Faculty of Science and Engineering website

Course registration, scholarship, admission and other important information are updated as needed.
https://www.waseda.jp/fsci/en/

*** Check these university web sites on a regular basis since the content of this handbook is subject to change. Specially the latest office opening hours should be referred at each web site.**

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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 English-based Graduate Program in Science and Engineering (EBSE) at Waseda University. In this handbook, we will refer to students in this program as "EBSE students". EBSE has academic policies, curricula, and graduation requirements distinct from other programs.

The Faculty of Science and Engineering is composed of three undergraduate schools and five 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 and Aerospace Engineering
Department of Electronic and Physical Systems
Department of Computer Science and Communications Engineering
Department of Intermedia Studies
Department of Materials Science

Graduate School of Creative Science and Engineering

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

Gradute 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

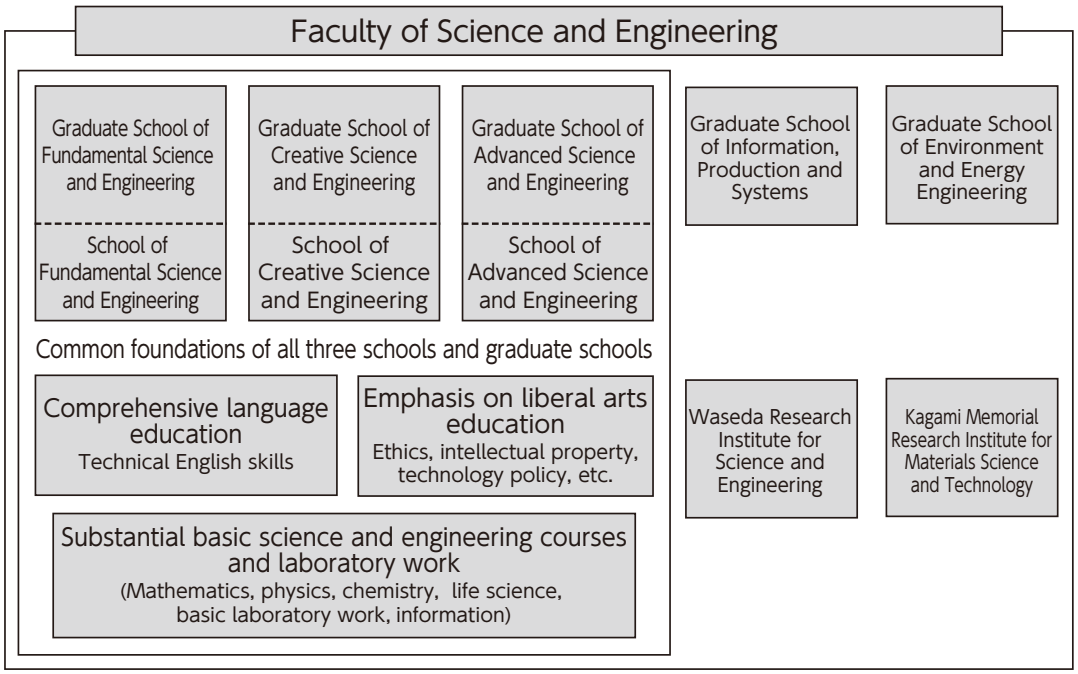
Cooperative Major in Nuclear Energy
Department of Advanced Science and Engineering

Graduate School of Information, Production and Systems

Graduate School of Environment and Energy Engineering

It is important to note that not all departments accept EBSE students to the master's program. The five departments of the Graduate School of Fundamental Science and Engineering accept EBSE master students except for the Department of Materials Science. The four departments of the Graduate School of Creative Science and Engineering accept EBSE master students except for the Department of Industrial and Management System Engineering and the Department of Business Design & Management. 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 EBSE 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 the Department of Advanced Science and Engineering accept EBSE doctoral students.

〈Organization of the Faculty of Science and Engineering〉



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History and Profile of the Faculty of Science and Engineering

1 History

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 of as 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..

1882	**Tokyo College established.**
1902	Renamed Waseda University.
1908	**Science and Engineering Department established**, along with Mechanical Engineering and Electrical Engineering Divisions.
1920	Becomes a university under the New University Act; Science and Engineering Department renamed the School of Science and Engineering; **Graduate School established.**
1940	Science and Engineering School Research Laboratory established.
1949	Waseda University established under new educational system; eleven departments created in the First School of Science and Engineering: Mechanical Engineering, Electrical Engineering, Mining, Architecture, Applied Chemistry, Metallurgy, Electrical and Communications Engineering, Industrial Management, Civil Engineering, Applied Physics, and Mathematics. Established in the Second School of Science and Engineering are the departments of Mechanical Engineering, Electrical Engineering, Architecture, and Civil Engineering.
1951	Graduate School Master's Degree Programs established at Waseda University under the new educational system; Mechanical Engineering, Electrical Engineering, Structural Engineering, Mining and Metallurgy, and Applied Chemistry established as departments in the Graduate Schools of Engineering.
1953	**Doctoral Degree Programs established** in the Graduate School.
1967	**Campus relocated to the Okubo Campus.**
1968	Second School abolished; the First School of Science and Engineering renamed the School of Science and Engineering.
2007	System of three undergraduate schools and three graduate schools adopted; Environment and Energy Engineering Department became the independent Graduate School of Environment and Energy Engineering.
2008	**100th anniversary of the founding of the School of Science and Engineering;** Center for Advanced Biomedical Sciences established.
2009	Campus name changed to Nishi-Waseda Campus. Graduate School of Global Information and Telecommunication Studies, Graduate School of Information Production and Systems, and Graduate School of Environment and Energy Engineering incorporated into the Faculty of Science and Engineering.
2010	International program started.
2018	International program reorganized as English-based program.

2 Profiles and Policies

Profiles

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, the Department of Intermedia Studies and the Department of Materials Science. 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 and Management 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, Cooperative Major in Advanced Biomedical Sciences, Cooperative Major in Advanced Health Science 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.

Policies

Graduate School of Fundamental Science and Engineering

(I) Diploma Policy <Development of trailblazers>

The goal is to promote diverse exchanges in academic studies, culture, languages and values through providing systematic educational curriculums, as well as university-wide educational and student life environments, by taking advantage of the comprehensiveness and innovativeness of Waseda University, thereby developing human resources that can make proactive contributions to the global community.

In modern society, there is a demand to develop people who are equipped with broad scientific and technological knowledge, have a well-rounded education in liberal arts, social sciences and other areas, and blaze new trails with insights into the future. In addition, it is also a major calling of the times to reconstruct frameworks and meanings of learning, as well as relationship between studies and applications of them, while at the same time establishing a new era of science and technology. The Graduate School of Fundamental Science and Engineering implements educational and research activities in respective areas of specialty, revolving around basic scientific technology in key areas of technology that supports society—information, mechanics, aerospace, electronics, materials science, energy, and art & media—pure mathematics that forms the foundations of these areas, and applied mathematics which bridges the two. The aim is to develop researchers and advanced specialist scientific engineers who can not only contribute to the evolution and development of each discipline but also expand into new academic areas with creative ideas, be trailblazers, and play important roles on a global scale.

(II) Curriculum Policy <Educational continuity between undergraduate and graduate studies>

The Graduate School of Fundamental Science and Engineering, which comprises six departments, namely Pure and Applied Mathematics, Applied Mechanics and Aerospace Engineering, Electronic and Physical Systems, Computer Science and Engineering, Intermedia Art and Science and Materials Science, develops people who undertake more advanced studies as graduate students, building upon their undergraduate education and research. While graduate curriculums have traditionally consisted of highly specialized subjects, it is becoming increasingly difficult today to complete basic studies and acquire necessary related knowledge in undergraduate studies alone, given the rapid advances in science and technology. This is the reason that the Graduate School regards not only undergraduate but also Master's programs as stages of basic education and aims to provide educational continuity between undergraduate and graduate (Master's) studies. As such, its Master's curriculums are deeply interlinked with undergraduate education. The prime advantages are that students can learn about their areas of specialty and related areas in a systematic manner and that learning about a broad spectrum of related disciplines gives them better understanding of where their own areas of specialty lie within the realm of science and technology. Master's students can develop research and problem-solving skills by working on

their own research topics through educational and research activities mainly in their respective laboratories, where they receive research guidance.
Doctoral students can continue research on more advanced and specialized ideas and applications to delve into the deepest reaches of their studies.

(III) Admission Policy <People sought after by the Graduate School of Fundamental Science and Engineering>

Under its educational principle of the “Independence of Scholarship,” Waseda University would like to welcome many students, from both Japan and abroad, who have reached a certain level of basic academic skills and have a great deal of intellectual curiosity, that are filled with the Waseda Enterprising Spirit and are highly motivated for learning. As the realm of science and technology has expanded exponentially in recent years, individual areas have accordingly differentiated and evolved. Educational and research systems of universities have also gone through transformations in response to this. At the same time as the advancement of specialized areas, however, we have entered a new era where we are required more than ever to create new values and explore new areas of science and technology, and academic disciplines.

Consequently, The Graduate School of Fundamental Science and Engineering would like to admit people who can think and act globally and blaze new trails to the future. For the master’s program, students are required to have basic knowledge, abilities, and the spirit of inquiry to master specialized areas that form the core of science and technology, such as mathematical science, mechanical science, aerospace engineering, materials science, electronic physics, computer engineering, communications and intermedia art. For the doctoral course, students are required to have advanced knowledge, abilities, pioneering spirit, and ethics not only to contribute to the evolution and development of each of these specialized areas but also to expand into new academic areas with innovative ideas.

Graduate School of Creative Science and Engineering

(I) Policy concerning the certification of graduation and conferment of degree (Diploma Policy)
The goal is to promote diverse exchanges in academic studies, culture, languages and values through providing systematic educational curriculums, as well as university-wide educational and student life environments, by taking advantage of the comprehensiveness and innovativeness of Waseda University, thereby developing human resources that can make proactive contributions to the global community.
One of the foundational principles of Waseda University is “Practical Application of Scholarship.” This clearly indicates how much importance the University places on applying basic scholarship to contribute to society, rather than just developing basic scholastic skills to establish academic foundations.
The word “creative” refers not only to the act of breaking things down to analyze them and discover

laws in them but also to proposing comprehensive solutions to a wide range of issues facing society.

The Graduate School of Creative Science and Engineering implements research and education on advanced and specialized scholastic theories and applications and explores them at the deepest level to develop human resources who can produce abundance as seen from the viewpoint of the many different values of many different people, contribute to the creation and evolution of culture and wellbeing of human beings and support human activities from a worldwide point of view.

(II) Policy concerning the composition and implementation of educational curriculums (Curriculum Policy)

The prime educational and research principle of the Graduate School is to provide practical education and carry out pioneering research on technology related to systems for the creation and circulation of spaces, equipment, communities, etc. and social technology systems.

In more specific terms, the Graduate School offers to Master's students the Provisionary Graduate Enrollment Program and also allows them to enroll in basic subjects offered by undergraduate schools specializing in other fields of specialization, while at the same time providing an inter-disciplinary unit system and special courses, including the Urban Planning Course and Macro Materials Course (Master's), Advanced Architectural Practical Exercise Course (Master's/Doctoral), Systematic Robotics Course (Doctoral) and Management Technology Leadership Course (Master's/Doctoral), to help them to develop a broad spectrum of knowledge and skills beyond the boundaries of different research categories, areas of specialty and departments.

This unit system and its courses are designed to allow students to understand the latest conditions of their own research areas early on, acquire basic knowledge and skills in other areas, and receive systematic education that is organically related to their own studies beyond their areas of specialty.

(III) Policies concerning the admission of students (Admission Policy)

Under its educational principle of the "Independence of Scholarship," Waseda University would like to welcome many students, from both Japan and abroad, who have reached a certain level of basic academic skills and have a great deal of intellectual curiosity, that are filled with the Waseda spirit of enterprise and are highly motivated for learning.

In the master's program, students are required to have basic abilities related to architecture, general mechanical engineering, management systems engineering, management design, construction engineering, and earth and environmental resources science and engineering, as well as basic knowledge to learn in depth and from a broad perspective at the same time in a specialized field.

In the doctoral course, students are required to have the abilities necessary to obtain the above-mentioned master's degree and to possess a high level of expertise, experience, theory, and motivation to solve various problems of modern society from the perspective of science and

technology and to contribute to the creation of a truly affluent society.

Graduate School of Advanced Science and Engineering

(I) Policy concerning the certification of graduation and conferment of degree (Diploma Policy)

The goal is to promote diverse exchanges in academic studies, culture, languages and values through providing systematic educational curriculums, as well as university-wide educational and student life environments, by taking advantage of the comprehensiveness and innovativeness of Waseda University, thereby developing human resources that can make proactive contributions to the global community.

The Graduate School of Advanced Science and Engineering endeavors to explore academic theories and put them into practice, with the aim of realizing world-class research and education environments, and pioneers inter-disciplinary, cutting-edge domains of scholarship as a member of society. Another aim is to fulfill three functions of graduate education, namely “research” (creation of knowledge), “education” (transference of knowledge) and “practical contribution to society” (application of knowledge), based on proactive interactions between science and engineering, and consequently produce researchers and engineers who can boldly make their ways into new fields and pioneer new domains, building upon the specialist knowledge they have acquired through their graduate education. In other words, the Graduate School aims to equip students with the qualities and abilities required for Master’s students to work professionally as researchers, technological developers or system development managers, and Doctoral students as research specialists or technological development leaders, before completing their degrees and going on to careers in society.

(II) Policy concerning the composition and implementation of educational curriculums (Curriculum Policy)

In modern society, due to rapid advances in science and technology taking place on a global scale, in particular, where new inter-disciplinary domains are emerging due to fusions between diverse areas of scholarship, there is demand for the development of human resources who can respond effectively to these changes and constantly play important roles as leaders in cutting-edge, global situations. This is the reason that the Graduate School offers multiple inter-disciplinary departments to produce such human resources. Its educational curriculums are designed to accept students who have built solid academic foundations in their own areas of specialty through undergraduate studies and allow them to further strengthen their expertise, while at the same time helping them to develop the ability to expand into other fields of specialization and pioneer new multi-disciplinary domains (i.e., practical skills). To this end, specialized subjects are offered in respective departments as basic education, while research guidance and seminars are provided in each research category to help students learn thinking skills required of researchers. Furthermore, the Graduate School provides Combined Undergraduate/Graduate Courses, the Provisionary Graduate Enrollment Program, which allows undergraduate students in their senior years who

are admitted to the Graduate School to take graduate subjects early, and also allows graduate students to enroll in basic subjects offered by undergraduate schools specializing in other fields of specialization, to further facilitate smoother acquisition of interdisciplinary knowledge. In addition, emphasis is also placed upon the development of research ethics throughout the composition and implementation of its educational curriculums.

(III) Policies concerning the admission of students (Admission Policy)

Under its educational principle of the “Independence of Scholarship,” Waseda University would like to welcome many students, from both Japan and abroad, who have reached a certain level of basic academic skills and have a great deal of intellectual curiosity, that are filled with the Waseda spirit of enterprise and are highly motivated for learning.

In the master’s program, students are required to have basic abilities in pure and applied physics, chemistry and biochemistry, applied chemistry, life science and medical bioscience, electrical engineering and bioscience, integrative bioscience and biomedical engineering, nanoscience and nanoengineering, advanced biomedical sciences, advanced health science, nuclear energy, as well as basic knowledge to learn in depth and from a broad perspective.

In the doctoral course, students are required to have the abilities necessary to obtain a master’s degree as described above, and to have a high level of expertise, experience, theory, and motivation to play an active role as a leader in a wide range of fields while challenging their own potential in pure and applied physics, chemistry and biochemistry, applied chemistry, life science and medical bioscience, electrical engineering and bioscience, integrative bioscience and biomedical engineering, nanoscience and nanoengineering, advanced biomedical sciences, advanced health science, nuclear energy.

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Requirements for a Degree (Graduation)

1 Guidelines on Course Selection

Master's Program

(I) The instructor in charge of research guidance selected at the time of admission will become the student's supervisor.

(II) To start working on a master's thesis, the student must 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.

(III) To receive a master's degree, the student must 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 will be deemed as fulfilling the attendance period.

(IV) 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 personalized learning goals. Make sure not to register for courses incorrectly or fail to register for planned courses.

Web syllabus: https://www.wsl.waseda.jp/syllabus/JAA101.php?pLng=en

Students may not attend courses for which they are not registered. Students cannot earn credits for attending courses that have not been registered for, even if they attend the course classes or take examinations. Students may not change or cancel registered courses outside of the designated period. Course registration should be done carefully and in person. Be sure to confirm the results of registration. When registering for courses, students should be sure to confirm their selections with their supervisors in advance, and that they only register for approved courses. For actual application procedures, check the instructions on the Faculty of Science and Engineering website.

(V) When taking courses with names numbered I and II, you must take them in that order. When taking courses with names followed by A, B, C, and D, there is no specific order for the courses.

(VI) 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.

(VII) In principle, lecture courses are to be selected from the courses provided by the student's department, but the student may select courses in other departments in the Faculty of Science and Engineering and, with the permission of the student's supervisor, courses offered by other Faculties. Depending on the student's 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 1 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.

Table 1: The maximum number of credits students can count toward graduation from credits earned in other departments and faculties

Department	Non-EBSE lecture courses offered by any department in FSE (*note: Non-EBSE means existing regular programs taught mostly in Japanese*)	EBSE lecture courses offered by departments other than one's home department	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 & Applied Mathematics	18 credits	No limit	No limit	No limit
Applied Mechanics and Aerospace Engineering	18 credits	No limit	No limit	No limit
Electronic & Physical Systems	18 credits	No limit	No limit	No limit
Computer Science & Communications Engineering	6 credits	No limit	No limit	No limit
Intermedia Studies	No limit	No limit	No limit	No limit
Architecture*	6 credits*	6 credits*	6 credits*	6 credits*
Modern Mechanical Engineering	10 credits	No limit	No limit	No limit
Civil & Environmental Engineering	No limit	No limit	No limit	No limit
Earth Sciences, Resources & Environmental Engineering	No limit	No limit	No limit	No limit
Pure & Applied Physics	18 credits	No limit	No limit	No limit
Chemistry & Biochemistry	18 credits	No limit	No limit	No limit
Applied Chemistry	18 credits	No limit	No limit	No limit
Life Science & Medical Bioscience	18 credits	No limit	No limit	No limit
Electrical Engineering & Bioscience	18 credits	No limit	No limit	No limit
Integrative Bioscience & Biomedical Engineering	18 credits	No limit	No limit	No limit
Nanoscience & Nanoengineering	18 credits	No limit	No limit	No limit

*The department of Architecture limits the combined number of credits earned from all four categories up to 6 credits altogether that may be counted as part of the required 30 credits.

(VIII) If the student has a special reason, the student may change his/her academic supervisor within the same research area at the beginning of his/her second year with the approval of the relevant faculty members.

(IX) In preparing a master's thesis, follow the instructions of the student's supervisor.

(X) The maximum period of study in a master's program is four years.

(XI) 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 2:

Table 2: The upper limit on the number of credits (earned under this system)to be counted toward completion of master's programs

Graduate School	Department	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 credits
	Applied Mechanics and Aerospace Engineering	4 credits
	Electronic & Physical Systems	10 credits
	Computer Science & Communications Engineering	10 credits
	Intermedia Studies	10 credits
Creative Science and Engineering	Architecture	10 credits
	Modern Mechanical Engineering	10 credits
	Civil & Environmental Engineering	0 credit
	Earth Sciences, Resources & Environmental Engineering	10 credits
Advanced Science and Engineering	Pure & Applied Physics	10 credits
	Chemistry & Biochemistry	10 credits
	Applied Chemistry	10 credits
	Life Science & Medical Bioscience	10 credits
	Electrical Engineering & Bioscience	10 credits
	Integrative Bioscience & Biomedical Engineering	10 credits
	Nanoscience & Nanoengineering	10 credits

(XII) 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 has been already taken as an undergraduate student.

(XIII) Each Graduate School has special requirements regarding research ethics for submitting a master's thesis.

【Graduate School of Fundamental Science and Engineering】

In preparing a master's thesis, students are recommended to take one of the following courses on research ethics.

・"Introduction to Research Ethics" offered by Global Education Center

・e-Learning Course on Research Ethics offered by Japan Society for the Promotion of Science (JSPS, https://www.jsps.go.jp/english/e-kousei/index.html)

【Graduate School of Creative Science and Engineering】

In submitting a master's thesis, students are required to receive confirmation as to knowledge of research ethics.

【Graduate School of Advanced Science and Engineering】

Students are required to take a course on research ethics prescribed by the Graduate School of Advanced Science and Engineering.

When they submit their master's thesis, they are required to indicate that they have fulfilled this requirement.

Doctoral Program

(I) The instructor in charge of research guidance at the time of admission will become the student's supervisor.

(II) To receive a doctorate degree, the student must be enrolled in the doctoral program for five years or longer (including time spent in a master's program), earn the required credits prescribed for each department, receive the required research guidance, and pass a doctoral dissertation defense. For students who are recognized by the Graduate School Steering Committee as having made outstanding achievements, three years or more (including time spent in a master's program) will be considered sufficient time to fulfill the attendance period.

(III) Students of the doctoral program may not attend the program for a period exceeding six years.

(IV) Students must register (apply for and confirm their registration for) courses to take for the year of their specified course registration period. When selecting courses, read this handbook, web syllabus, etc., thoroughly and set personalized learning goals. Make sure not to register for courses incorrectly or fail to register for planned courses.

Web syllabus: https://www.wsl.waseda.jp/syllabus/JAA101.php?pLng=en

Students may not attend courses for which they are not registered. Students cannot earn credits for attending courses that have not been registered for, even if they attend the course classes or take the examinations. Students may not change or cancel registered courses outside of the designated period. Course registration should be done carefully and in person. Be sure to confirm the results of your registration. When registering for courses, students should be sure to confirm their selections with their supervisors in advance, and that they only register for approved courses. For actual application procedures, check the instructions on the Faculty of Science and Engineering website.

(V) Writing of the doctoral dissertation and research work in general should be performed in accordance with the supervisor's instructions.

(VI) To earn credits for research ethics course designated by each graduate school is a prerequisite for submitting doctoral application.

(VII) For students choosing to leave the program without submitting a doctoral dissertation, if the student has attended the doctoral program for three years or more and received all required research guidance, the dissertation may be submitted and the qualifying examination taken within a three-year period beginning on the day of withdrawal.

(VIII) If it is indicated that Master's courses are counted toward the credits required for the Doctoral degree in the guidelines for earning a Doctoral degree and it is recognized as beneficial for educational and research purposes by the supervisor, Master's courses in the Faculty of Science and Engineering may be taken. A student cannot take a course that has been already taken as a Master student.

Objective of the doctoral program credit system

Doctoral students strive to set clear goals for their studies, conduct research, and collect results, thereby conducting research activities that enhance the future of humanity. Such work often requires deep reflection on the state of humanity. The purpose of introducing the credit system in the doctoral program is to encourage researchers to engage in deeper reflection and to enable them to have greater expressive power.

2 Degree and Academic Thesis/Dissertation Screening Criteria

Master's Program

Department	Degree
Pure & Applied Mathematics	Master of Engineering or Master of Science
Applied Mechanics and Aerospace Engineering	Master of Engineering
Electronic & Physical Systems	Master of Engineering or Master of Science
Computer Science & Communications Engineering	Master of Engineering
Intermedia Studies	Master of Engineering
Architecture	Master of Architecture or Master of Engineering
Modern Mechanical Engineering	Master of Engineering
Civil & Environmental Engineering	Master of Engineering
Earth Sciences, Resources & Environmental Engineering	Master of Engineering or Master of Science
Pure & Applied Physics	Master of Engineering or Master of Science
Chemistry & Biochemistry	Master of Science
Applied Chemistry	Master of Engineering
Life Science & Medical Bioscience	Master of Engineering or Master of Science
Electrical Engineering & Bioscience	Master of Engineering or Master of Science
Integrative Bioscience & Biomedical Engineering	Master of Engineering or Master of Science
Nanoscience & Nanoengineering	Master of Engineering or Master of Science

Doctoral Program

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

Academic Thesis/Dissertation Screening Criteria

Graduate School of Fundamental Science and Engineering

The Graduate School of Fundamental Science and Engineering examines Master's Theses to judge whether the studies have adequate academic significance and originality to earn the authors a Master's Degree from the Graduate School, as well as whether the degree applicants have good logical expression skills, advanced scholastic expertise and other required qualities. Degree applicants will be granted a Master's Degree only when they are judged to be qualified for the degree as the result of the above screening process.

Doctoral Dissertations are examined to judge whether the studies have adequate academic significance and originality to earn the authors a Doctoral Degree from the Graduate School and have been carried out by appropriate means, as well as whether the degree applicants have good research planning and implementation skills, logical expression skills, advanced scholastic expertise and other required qualities. Degree applicants will be granted a Doctoral Degree only when they are judged to be qualified for the degree as the result of the above screening process.

Graduate School of Creative Science and Engineering

Master's Theses need to have adequate academic significance and originality to earn the authors a Master's Degree from the Graduate School of Creative Science and Engineering. The Graduate School examines whether individual degree applicants have observed scholastic research ethics and have good logical thinking skills, research planning and implementation skills and scholastic expertise in their own areas of specialty. Degree applicants will be granted a Master's Degree only when they are judged to be qualified for the degree as the result of the above screening process.

Doctoral Dissertations need to have adequate academic significance and originality to earn the authors a Doctoral Degree from the Graduate School. The Graduate School examines whether individual degree applicants have observed scholastic research ethics and have the qualities and abilities required to work as independent researchers, as well as advanced scholastic expertise. Degree applicants will be granted a Doctoral Degree only when they are judged to be qualified for the degree as the result of the above screening process.

Graduate School of Advanced Science and Engineering

A Master's Thesis must be of adequate academic significance and originality to earn its author a Master's Degree from the Graduate School. An examination committee in the Graduate School of Advanced Science and Engineering reviews the thesis and evaluates whether the degree applicant has followed academic research ethics and has high-level research design and implementation skills, logical thinking skills, presentation skills, advanced academic expertise and other qualities required for the conferment of a Master's Degree. Degree applicants will be granted a Master's Degree only when they are judged to be qualified for the degree from the Graduate School as the result of the above screening process.

A Doctoral Dissertation must be of adequate academic significance and originality to earn its author a Doctoral Degree from the Graduate School. An examination committee in the Graduate School of Advanced Science and Engineering reviews the dissertation and examines whether the degree applicant has followed academic research ethics and has high-level problem-setting and -solving skills, research design and implementation skills, logical thinking skills, information communication skills, advanced academic expertise and other qualities required for conferment of a Doctoral Degree. The committee in addition examines whether the applicant has the qualities and abilities required to work as an independent researcher. Degree applicants will be granted a Doctoral Degree only when they are judged to be qualified for the degree from the Graduate School as the result of the above screening process.

Master's and Doctoral research guidance

Master's research guidance

(First year)

Students will be instructed to acquire basic knowledge and deepen their insight by studying a wide range of previous research in the field, and to summarize their own research plan in a research plan.

(Second year)

Students will be instructed to deepen their understanding of various issues and devise solutions using theories and experiments in the field. Students are instructed to compile the results of their research into a master's thesis.

Doctoral research guidance

(First year)

At the time of admission, the student's main supervisor, vice supervisor, and research project are determined, and research guidance begins. Students will be instructed to understand the current status of various research themes by reading literature, conducting experiments, and conducting fieldwork, as well as to consider ways to solve problems.

(Second year)

Students will be instructed to report their research results through presentations at domestic and international conferences and academic meetings, as well as through publication in journals, so as to accumulate research results.

(Third year)

Students will be instructed to compile the results of their research into a doctoral dissertation. In addition, students will be instructed to prepare their papers in sufficient time, and the records of research guidance will be managed appropriately.

For specific guidance methods, please refer to the syllabus of each research guidance subject.

The guidance system includes not only the supervisor but also guidance and advice from faculty members in related fields inside and outside the department.
Please note that the above schedule is based on the assumption that the instruction will be completed within the standard period, and that the schedule may change depending on the progress and results of each student.

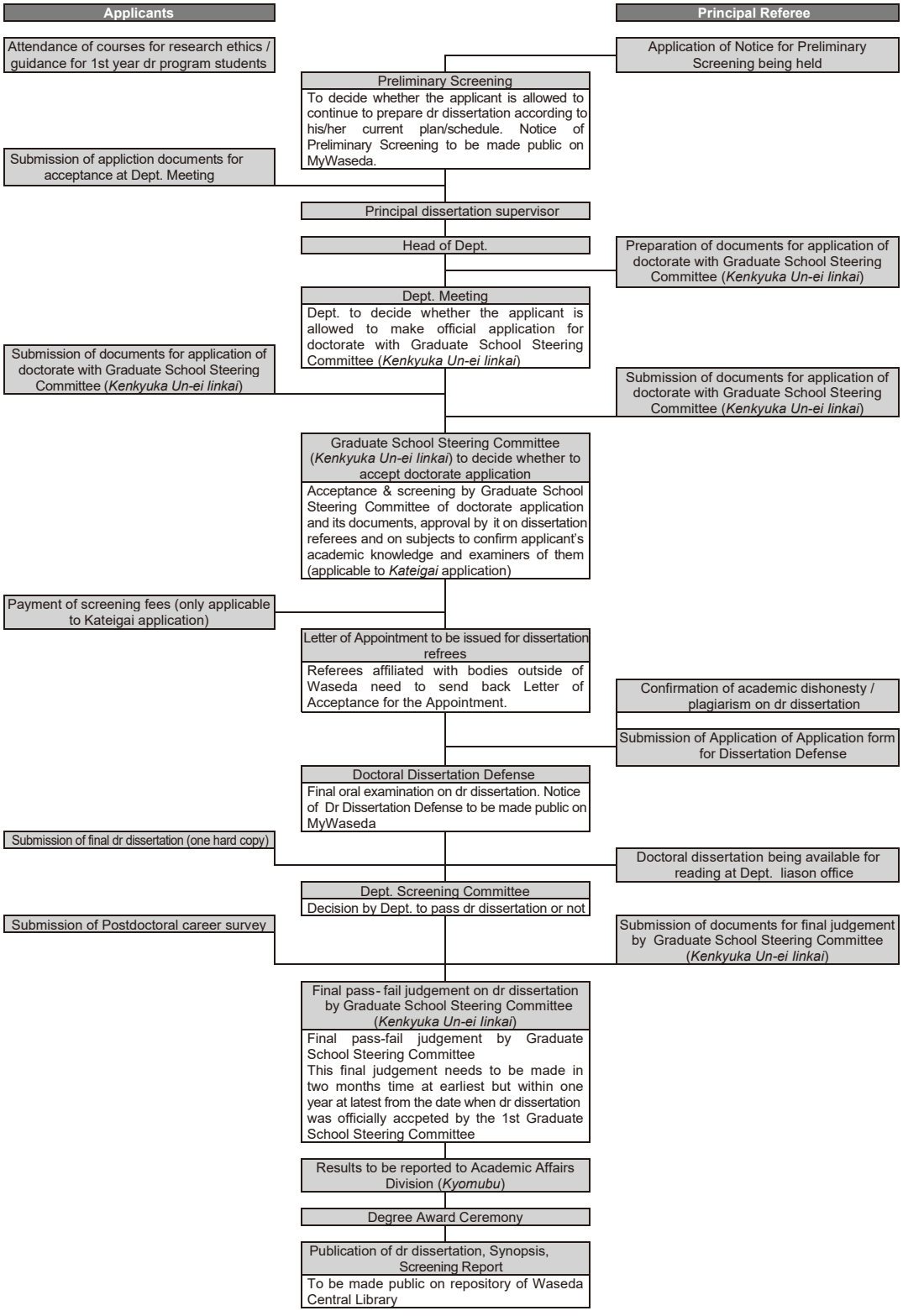
How to submit Master's thesis

First-year Master's students must submit Master's Thesis Research Plan. Students who will complete their Master's program must submit Master's Thesis Summary. For more details, please refer to the website.
Website: https://www.waseda.jp/fsci/students/dissertation/#anc_3

How to apply for Doctorate

If your application for doctorate has been accepted by the Graduate School's Steering Committee, you will need to have the final Decision on your doctoral dissertation by another Graduate School's Steering Committee to be held in 2 month time at the earliest but within one year at the latest from the date your application for doctorate was accepted. For more details on the application procedure, please refer to the website.
Website: https://www.waseda.jp/fsci/en/students/dissertation/

Please refer to the following flow of application procedures for doctorate


Applicants
Principal Referee
Attendance of courses for research ethics / guidance for 1st year dr program students
Application of Notice for Preliminary Screening being held
Preliminary Screening
To decide whether the applicant is allowed to continue to prepare dr dissertation according to his/her current plan/schedule. Notice of Preliminary Screening to be made public on MyWaseda.
Submission of appliction documents for acceptance at Dept. Meeting
Principal dissertation supervisor
Head of Dept.
Preparation of documents for application of doctorate with Graduate School Steering Committee (Kenkyuka Un-ei linkai)
Dept. Meeting
Dept. to decide whether the applicant is allowed to make official application for doctorate with Graduate School Steering Committee (Kenkyuka Un-ei linkai)
Submission of documents for application of doctorate with Graduate School Steering Committee (Kenkyuka Un-ei linkai)
Submission of documents for application of doctorate with Graduate School Steering Committee (Kenkyuka Un-ei linkai)
Graduate School Steering Committee (Kenkyuka Un-ei linkai) to decide whether to accept doctorate application
Acceptance & screening by Graduate School Steering Committee of doctorate application and its documents, approval by it on dissertation referees and on subjects to confirm applicant's academic knowledge and examiners of them (applicable to Kateigai application)
Payment of screening fees (only applicable to Kateigai application)
Letter of Appointment to be issued for dissertation refrees
Referees affiliated with bodies outside of Waseda need to send back Letter of Acceptance for the Appointment.
Confirmation of academic dishonesty / plagiarism on dr dissertation
Submission of Application of Application form for Dissertation Defense
Doctoral Dissertation Defense
Final oral examination on dr dissertation. Notice of Dr Dissertation Defense to be made public on MyWaseda
Submission of final dr dissertation (one hard copy)
Doctoral dissertation being available for reading at Dept. liason office
Dept. Screening Committee
Decision by Dept. to pass dr dissertation or not
Submission of Postdoctoral career survey
Submission of documents for final judgement by Graduate School Steering Committee (Kenkyuka Un-ei linkai)
Final pass - fail judgement on dr dissertation by Graduate School Steering Committee (Kenkyuka Un-ei linkai)
Final pass-fail judgement by Graduate School Steering Committee
This final judgement needs to be made in two months time at earliest but within one year at latest from the date when dr dissertation was officially accpeted by the 1st Graduate School Steering Committee
Results to be reported to Academic Affairs Division (Kyomubu)
Degree Award Ceremony
Publication of dr dissertation, Synopsis, Screening Report
To be made public on repository of Waseda Central Library

3 PEP WISE Program

Program Overview

The Graduate Program for Power Energy Professionals (PEP), Waseda University, under the MEXT WISE Program (Doctoral Program for World-leading Innovative & Smart Education), is a 5-year integrated doctoral professional program delivered through collaboration among 13 universities, Waseda University, Hokkaido University, Tohoku University, University of Fukui, University of Yamanashi, Tokyo Metropolitan University, Yokohama National University, Nagoya University, Osaka University, Hiroshima University, Tokushima University, Kyushu University, and University of the Ryukyus.

The purpose of the program is to foster high-level knowledge professionals who will lead the creation of new industries in various sectors by optimizing the energy value chain, which is the core of Japan's Society 5.0.

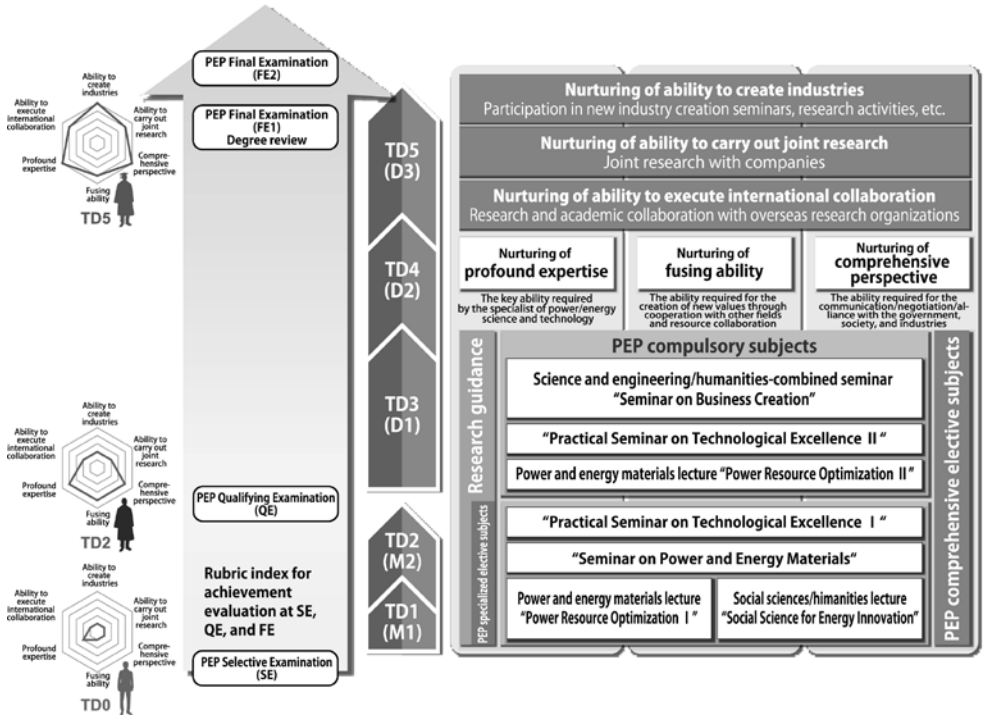
The program has a comprehensive curriculum that includes the fields of energy materials and power engineering; it provides systematic education in and a program of research on a new academic theory, Power Resource Optimization. The program aims to achieve technological innovation and social innovation through institutional design and the realization of unconventional added value as a business.

The 13 Japanese universities collaborate to bring together front-line faculty members in industry-academia collaboration with institutions and overseas universities. The PEP WISE Program is a 5-year integrated master's and doctoral degree program with guaranteed quality recognizable worldwide.

In addition to degrees for their own programs, students are awarded PEP Excellence Doctoral Program Completion Certificates upon satisfying the requirements of the program. In the program, PEP compulsory courses (7 courses for 10 credits) are offered at Waseda University, while PEP elective courses are offered by the students' programs at their own universities. PEP compulsory courses are designed with consideration of students from all participating universities, and are offered in multiple formats, including on-demand; several-day stay-overnight intensive-study sessions; and practicums at collaborating organizations.

Completion of the program constitutes completion in the students' own graduate schools, so it is essential that candidates check the requirements of their graduate schools and majors at their own universities.

Overview of the education program



Departments involved in the program

The program is implemented in the following departments of Waseda's 3 graduate schools in the Faculty of Science and Engineering.

- Graduate School of Fundamental Science and Engineering (Department of Applied Mechanics and Aerospace Engineering / Department of Electronic and Physical Systems)
- Graduate School of Advanced Science and Engineering (Department of Applied Chemistry/ Department of Electrical Engineering and Bioscience / Department of Nanoscience and Nanoengineering / Department of Advanced Science and Engineering)
- Graduate School of Environment and Energy Engineering (Department of Environment and Energy Engineering)

Features of the program

- 5-year integrated curriculum.
- The students in the course are categorized as TD1 to TD5. TD1 corresponds to the first year of the master's course; TD3 corresponds to the first year of the doctoral course.
- Students in the program who are not affiliated with Waseda University will be registered as graduate school exchange students at Waseda University.
- Each university supports expenses for RAs engaged in joint research with partner institutions and companies.
- The quality of the course is ensured by the guidance system, operated by principal advisor; deputy

advisors including those from partner universities; and consulting faculty from outside Waseda.

- After evaluation by means of a strict Qualifying Examination (hereinafter referred to as "QE") based on precisely specified evaluation criteria, and Final Examinations (hereinafter referred to as “FE”) including degree examination, approximately twenty Power and Energy Professionals are fostered each year.
- The degree examination in each affiliated university is designated FE1, and PEP’s own completion examination is designated FE2. Students can complete the program by passing both examinations.
- Graduates of this program will also receive a certificate of completion of the Graduate Program for Power Energy Professionals, jointly issued by the 13 partner universities.

Program eligibility and application procedures

The selective examination for admission/transfer to the PEP WISE Program (SE) is conducted twice a year, in April and September. The application periods for the SE are June to July and December to January. Application is open to fourth-year undergraduate students and first- and second-year master’s students. Applicants may apply for TD1 (the first year of the master’s program) or for transfer to TD2 (the second year of the master’s program) or TD3 (the first year of the doctoral program). For more information about the program, including eligibility requirements and procedures, please refer to the program web site at http://www.waseda.jp/pep/admissions/ .

Curriculum and program completion requirements

For details of the curriculum, please refer to *Appendix of Handbook for Graduate Program: Handbook for PEP WISE Program* (available on the program website at http://www.waseda.jp/pep/curriculum/).

The requirements for completion of the program are: a total of 45 credits or more PEP course credits or, for TD3 transfer students (admissions for mature students and international students), 15 credits or more; in principle, at least 1 paper co-authored with a partner institution and presented at an international conference; and a passing score on the final examinations (FE1 and FE2).

In addition, if the courses taken qualify as both (a) required credits for completion of the graduate school or program and (b) required credits for completion of the program, they will be valid for both completion requirements.

[Note]
Requirements such as QE/FE qualifications, and completion requirements differ depending on year of entry/transfer and SE classification, so be sure to refer to *Appendix of Handbook for Graduate Program: Handbook for PEP WISE Program* for the details.

Program Website

http://www.waseda.jp/pep/

4 Special Research, Seminars, and Laboratory Work (4 credits)

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.

5 Internships and Volunteers

Internships

Practical internships of at least 60 hours (10 days or more), upon application, can be recognized as credits for Common Courses (2 credits, no overlapping courses). The objective is to foster high-level skills through hands-on experience of how their laboratory research and knowledge in related fields is applied in the professional environment. Companies and programs are selected for their relevance to future research, in consultation with an academic supervisor.

[Note]

- To take this course, students must submit an application in advance via MyWaseda as well as an internship evaluation report depending on the period of time with the company or other organization. For further details, please check the Faculty of Science and Engineering website.
- With respect to individual internships, a voluntary insurance policy is strongly recommended, as students are ineligible for either for the Student Disaster/Injury Insurance or for the Student Education Research Responsibility for Compensation Insurance. Students would be able to sign up for Student Comprehensive Mutual Insurance with the University Co-operatives Mutual Aid Federation, at any Waseda University Co-op branch. Internships that are suggested by departments are eligible for student insurance and compensation schemes. If students are pursuing such an internship overseas, it is also required to take out overseas travel insurance as directed by the University. In this case, the student must obtain an application form from the Center for Science and Engineering and complete the process.
- In some cases, depending on the company hosting the internship, the intern may be required to sign an agreement with the university in addition to a pledge of participation. However, for internships that are entered into individually by the student, the university does not enter into any contract. Internships suggested by departments in principle do not require any contract to be entered.
- Students who have a “Student Visa”, should make sure that the work demands of the internship does not violate the terms of their visa.

Volunteers

This course requires students to submit an “activity report” and a report describing achievements in welfare activities, disaster relief activities, or other social activities related to human rights, peace, the environment, or other deep problems faced by human society in which they became involved for their own reasons. 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]

- To take this course, students must submit in advance to the Center for Science and Engineering a “volunteer application form” and consent letter by their guardian. For further details, please check the Faculty of Science and Engineering website.
- Volunteers are advised to apply for student insurance and compensation schemes. (Student Disaster/Injury Insurance and Student Education Research Responsibility for Compensation Insurance).

6 Tuition and Fees

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 spring semester	May 1
Tuition and Fees for the fall semester	October 1

Tuition and Fees

Master

*Students who enrolled at Waseda University Undergraduate/Graduate School as a regular degree-seeking student and paid the Admission Feepreviously are exempted from paying Admission Fee.
*Those who have graduated from Waseda University Undergraduate School are exempted from paying Alumni Association Membership Fee.
*For April enrollees, 1st semester is Spring semester and 2nd semester is Fall semester.
*For September enrollees, 1st semester is Fall semester and 2nd semester is Spring semester.
*School fees are subject to change.

Graduate School of Fundamental Science and Engineering / Graduate School of Creative Science and Engineering

		1st year		2nd year	
		1st semester	2nd semester	1st semester	2nd semester
Admission Fee		200,000	0	0	0
Tuition		481,000	481,000	581,000	581,000
Seminar Fee	Pure and Applied Mathematics	35,000	35,000	35,000	35,000
	Applied Mechanics and Aerospace Engineering	48,000	48,000	48,000	48,000
	Computer Science and Communications Engineering	48,000	48,000	48,000	48,000
	Electronic and Physical Systems	48,000	48,000	48,000	48,000
	Intermedia Studies	48,000	48,000	48,000	48,000
	Architecture	48,000	48,000	48,000	48,000
	Modern Mechanical Engineering	47,000	47,000	48,000	48,000
	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

		1st year		2nd year	
		1st semester	2nd semester	1st semester	2nd semester
Membership Fee of Student Health Promotion Mutual Aid Association		1,500	1,500	1,500	1,500
Alumni Association Membership Fee		0	0	0	40,000
Total amount	Pure and Applied Mathematics	717,500	517,500	617,500	657,500
	Applied Mechanics and Aerospace Engineering	730,500	530,500	630,500	670,500
	Computer Science and Communications Engineering	730,500	530,500	630,500	670,500
	Electronic and Physical Systems	730,500	530,500	630,500	670,500
	Intermedia Studies	730,500	530,500	630,500	670,500
	Architecture	730,500	530,500	630,500	670,500
	Modern Mechanical Engineering	729,500	529,500	630,500	670,500
	Civil and Environmental Engineering	727,500	527,500	627,500	667,500
	Earth Sciences, Resources and Environmental Engineering	730,500	530,500	630,500	670,500
Yearly amount	Pure and Applied Mathematics		1,235,000		1,275,000
	Applied Mechanics and Aerospace Engineering		1,261,000		1,301,000
	Computer Science and Communications Engineering		1,261,000		1,301,000
	Electronic and Physical Systems		1,261,000		1,301,000
	Intermedia Studies		1,261,000		1,301,000
	Architecture		1,261,000		1,301,000
	Modern Mechanical Engineering		1,259,000		1,301,000
	Civil and Environmental Engineering		1,255,000		1,295,000
	Earth Sciences, Resources and Environmental Engineering		1,261,000		1,301,000

Graduate School of Advanced Science and Engineering

		1st year		2nd year	
		1st semester	2nd semester	1st semester	2nd semester
Admission Fee		200,000	0	0	0
Tuition		535,500	535,500	635,500	635,500
Seminar Fee	Pure and Apllied Physics	39,750	39,750	39,750	39,750
	Chemistry and Biochemistry	54,750	54,750	54,750	54,750
	Applied Chemistry	44,750	44,750	45,500	45,500
	Life Science and Medical Bioscience	54,750	54,750	55,500	55,500
	Electrical Engineering and Bioscience	44,750	44,750	46,250	46,250
	Integrative Bioscience and Biomedical Engineering（Laboratories excluding Mechanical engineering/ Information science）	44,750	44,750	46,250	46,250
	Integrative Bioscience and Biomedical Engineering（Mechanical engineering/ Information science laboratories）	20,000	20,000	21,500	21,500
	Nanoscience and Nanoengineering (Solid-state Nanoscience / Nanoelectronics)	39,750	39,750	40,500	40,500
	Nanoscience and Nanoengineering (Nanochemistry)	44,750	44,750	45,500	45,500
Membership Fee of Student Health Promotion Mutual Aid Association		1,500	1,500	1,500	1,500
Alumni Association Membership Fee		0	0	0	40,000
Total amount	Pure and Apllied Physics	776,750	576,750	676,750	716,750
	Chemistry and Biochemistry	791,750	591,750	691,750	731,750
	Applied Chemistry	781,750	581,750	682,500	722,500
	Life Science and Medical Bioscience	791,750	591,750	692,500	732,500
	Electrical Engineering and Bioscience	781,750	581,750	683,250	723,250
	Integrative Bioscience and Biomedical Engineering（Laboratories excluding Mechanical engineering/ Information science）	781,750	581,750	683,250	723,250
	Integrative Bioscience and Biomedical Engineering（Mechanical engineering/ Information science laboratories）	757,000	557,000	658,500	698,500
	Nanoscience and Nanoengineering (Solid-state Nanoscience / Nanoelectronics)	776,750	576,750	677,500	717,500
	Nanoscience and Nanoengineering (Nanochemistry)	781,750	581,750	682,500	722,500
Yearly amount	Pure and Apllied Physics		1,353,500		1,393,500
	Chemistry and Biochemistry		1,383,500		1,423,500
	Applied Chemistry		1,363,500		1,405,000
	Life Science and Medical Bioscience		1,383,500		1,425,000
	Electrical Engineering and Bioscience		1,363,500		1,406,500
	Integrative Bioscience and Biomedical Engineering（Laboratories excluding Mechanical engineering/ Information science）		1,363,500		1,406,500
	Integrative Bioscience and Biomedical Engineering（Mechanical engineering/ Information science laboratories）		1,314,000		1,357,000
	Nanoscience and Nanoengineering (Solid-state Nanoscience / Nanoelectronics)		1,353,500		1,395,000
	Nanoscience and Nanoengineering (Nanochemistry)		1,363,500		1,405,000

Doctor

*Students who enrolled at Waseda University Undergraduate/Graduate School as a regular degree-seeking student and paid the Admission Fee previously are exempted from paying Admission Fee.
*For April enrollees, 1st semester is Spring semester and 2nd semester is Fall semester.
*For September enrollees, 1st semester is Fall semester and 2nd semester is Spring semester.
*School fees are subject to change.

		1st year		2nd year		3rd year	
		1st semester	2nd semester	1st semester	2nd semester	1st semester	2nd semester
Admission Fee		200,000	0	0	0	0	0
Tuition		353,500	353,500	453,500	453,500	453,500	453,500
Seminar Fee	Pure and Applied Mathematics	35,000	35,000	35,000	35,000	35,000	35,000
	Applied Mechanics and Aerospace Engineering	48,000	48,000	48,000	48,000	48,000	48,000
	Electronic and Physical Systems	48,000	48,000	48,000	48,000	48,000	48,000
	Computer Science and Communication Engineering	48,000	48,000	48,000	48,000	48,000	48,000
	Intermedia Studies	48,000	48,000	48,000	48,000	48,000	48,000
	Materials Science	35,000	35,000	35,000	35,000	35,000	35,000
	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	47,000	47,000
	Civil and Environmental Engineering	45,000	45,000	45,000	45,000	45,000	45,000
	Earth Sciences, Resources and Environmental Engineering	48,000	48,000	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 Apllied Physics	47,250	47,250	47,250	47,250	47,250	47,250
	Chemistry and Biochemistry	62,250	62,250	63,000	63,000	63,750	63,750
	Applied Chemistry	52,250	52,250	53,000	53,000	53,750	53,750
	Life Science and Medical Bioscience	52,250	52,250	53,000	53,000	53,750	53,750
	Electrical Engineering and Bioscience	52,250	52,250	53,000	53,000	53,750	53,750
	Integrative Bioscience and Biomedical Engineering	52,250	52,250	53,000	53,000	53,750	53,750
	Nanoscience and Nanoengineering	52,250	52,250	53,000	53,000	53,750	53,750
	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 Association		1,500	1,500	1,500	1,500	1,500	1,500
Total amount	Pure and Applied Mathematics	590,000	390,000	490,000	490,000	490,000	490,000
	Applied Mechanics and Aerospace Engineering	603,000	403,000	503,000	503,000	503,000	503,000
	Electronic and Physical Systems	603,000	403,000	503,000	503,000	503,000	503,000
	Computer Science and Communication Engineering	603,000	403,000	503,000	503,000	503,000	503,000
	Intermedia Studies	603,000	403,000	503,000	503,000	503,000	503,000
	Materials Science	590,000	390,000	490,000	490,000	490,000	490,000
	Architecture	603,000	403,000	503,000	503,000	503,000	503,000
	Modern Mechanical Engineering	602,000	402,000	503,000	503,000	503,000	503,000
	Industrial Management and Systems Engineering	602,000	402,000	502,000	502,000	502,000	502,000
	Civil and Environmental Engineering	600,000	400,000	500,000	500,000	500,000	500,000
	Earth Sciences, Resources and Environmental Engineering	603,000	403,000	503,000	503,000	503,000	503,000
	Business Design & Management	615,000	415,000	515,000	515,000	515,000	515,000
	Pure and Apllied Physics	602,250	402,250	502,250	502,250	502,250	502,250
	Chemistry and Biochemistry	617,250	417,250	518,000	518,000	518,750	518,750
	Applied Chemistry	607,250	407,250	508,000	508,000	508,750	508,750
	Life Science and Medical Bioscience	607,250	407,250	508,000	508,000	508,750	508,750
	Electrical Engineering and Bioscience	607,250	407,250	508,000	508,000	508,750	508,750
	Integrative Bioscience and Biomedical Engineering	607,250	407,250	508,000	508,000	508,750	508,750
	Nanoscience and Nanoengineering	607,250	407,250	508,000	508,000	508,750	508,750
	Cooperative Major in Nuclear Energy	602,250	402,250	502,250	502,250	502,250	502,250
Yearly amount	Pure and Applied Mathematics		980,000		980,000		980,000
	Applied Mechanics and Aerospace Engineering		1,006,000		1,006,000		1,006,000
	Electronic and Physical Systems		1,006,000		1,006,000		1,006,000
	Computer Science and Communication Engineering		1,006,000		1,006,000		1,006,000
	Intermedia Studies		1,006,000		1,006,000		1,006,000
	Materials Science		980,000		980,000		980,000
	Architecture		1,006,000		1,006,000		1,006,000
	Modern Mechanical Engineering		1,004,000		1,006,000		1,006,000
	Industrial Management and Systems Engineering		1,004,000		1,004,000		1,004,000
	Civil and Environmental Engineering		1,000,000		1,000,000		1,000,000
	Earth Sciences, Resources and Environmental Engineering		1,006,000		1,006,000		1,006,000
	Business Design & Management		1,030,000		1,030,000		1,030,000
	Pure and Apllied Physics		1,004,500		1,004,500		1,004,500
	Chemistry and Biochemistry		1,034,500		1,036,000		1,037,500
	Applied Chemistry		1,014,500		1,016,000		1,017,500
	Life Science and Medical Bioscience		1,014,500		1,016,000		1,017,500
	Electrical Engineering and Bioscience		1,014,500		1,016,000		1,017,500
	Integrative Bioscience and Biomedical Engineering		1,014,500		1,016,000		1,017,500
	Nanoscience and Nanoengineering		1,014,500		1,016,000		1,017,500
	Cooperative Major in Nuclear Energy		1,004,500		1,004,500		1,004,500

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:

Students falling under any of the following;	Tuition	Seminar fee, Membership Fee of Student Health Promotion Mutual Aid Association
Students who have only yet to pass a master's thesis or doctoral dissertation review	**50%** of the prescribed fee	For a master's program, the prescribed fee for the second year For a doctoral program, the prescribed fee for the third year
Students who have passed a master's thesis or doctoral dissertation review although the total number of credits required for graduation has not been reached		
Students who need to pass a master's thesis or doctoral dissertation review and the total number of credits required for graduation has not been reached	Prescribed fee	

*The "number of credits required 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.

Payment method

Please pay tuition and fees by account transfer through a bank account at the financial institution, including Japan Post Bank, which has been specified and registered with the university as part of the admission procedure.

Be sure to check the "Notification for Account Transfer of Tuition and Fees" that will be sent to the school expense payer in advance. In case of any changes in the financial institution or account, please notify the Center for Science and Engineering.

Tuition and fees must be paid by the specified due dates mentioned above. If there is any special reasons making it impossible to do so, consult the Center for Science and Engineering.

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 students want to withdraw from the university for some special reason before the date when they would be automatically removed from the school register (refer to the table below), consult the Center for 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 spring semester	May 1	September 20	March 31
Tuition and Fees for the fall semester	October 1	March 31 of the following year	September 20

7 Course List of Common Doctoral Courses

Common courses for the three graduate schools within the Faculty of Science and Engineering (the Graduate School of Fundamental Science and Engineering, the Graduate School of Creative Science and Engineering, and the Graduate School of Advanced Science and Engineering) are shown below.

Research Ethics Courses

Course Name	Credits	Term		Provided by
		Spring	Fall	
研究倫理概論A	1	Intensive		社会文化領域
研究倫理概論B	1		Intensive	
Ethics and Research	1	first-half		International Center for Science and Engineering

English Courses

Course Name	Credits	Term		Provided by
		Spring	Fall	
Doctoral Student Technical Writing	1	Intensive		Center for English Language Education in Science and Engineering
		○		
			○	
Doctoral Student Presentation Skills	1		Intensive	

Industrial Society/ Liberal Arts Courses

Course Name	Credits	Term		Provided by
		Spring	Fall	
異文化理解の心理学	1	second-half		社会文化領域
経済学概論A	1	first-half		
経済学概論B	1	second-half		
現代世界の貧困問題	1	first-half		
現代日本の貧困問題	1	second-half		
国際知財政策概論	1	second-half		
社会学的研究と方法	1	second-half		
社会学的思考と方法	1	first-half		
組織と集団の心理学	1	first-half		
地域社会論1	1	first-half		
地域社会論2	1	second-half		
Advanced Topics in History of Science	1	first-half		International Center for Science and Engineering
Advanced Topics in Philosophy and Religion	1		second-half	
Advanced Topics in Philosophy of Science	1	first-half		
Advanced Topics in Social and Political Theory	1		first-half	
Graduate History and Philosophy of Science	2		○	
Japanese Thought and Culture	1	second-half		
Philosophy of Education	1		first-half	
Science and Education	1		second-half	
Science and Rhetoric	1	second-half		

Self-Competence Development (Business Creation)

These courses listed below are provided by Global Education Center as Group of self-competence development (business creation). Please be aware of that when you register courses.

Course Name	Credits	Term	
		Spring	Fall
起業特論Ａ：トップリーダーマネジメント	1	first-half	
起業特論Ｂ：企業内新規事業開発	1	second-half	
データビジネスクリエーション α	1		first-half
Advanced Course on Entrepreneurship D	1		second-half
博士実践特論Ａ：イノベーションリーダーシップ	2	Intensive	
博士実践特論Ｂ：産業イノベーションとキャリアデザイン	1		second-half
博士実践特論Ｓ：ロジカルコミュニケーション	2	first-half	
グローバルビジネスコミュニケーション基礎	1		Intensive
グローバルビジネスコミュニケーション上級	1		Intensive
CSRマネジメント実践	2		○
イノベーション概論 α：次世代イノベーター―のためのエッセンシャルズ	1		first-half
イノベーション概論 β：次世代イノベーター―のためのエッセンシャルズ	1		second-half
イノベーションとテクノロジー基礎 α：人工知能・先端ロボットテクノロジーの基礎とスタートアップを学ぶ	1	first-half	
Innovation and Technology Fundamentals β	1	second-half	
イノベーションとテクノロジー実践 α：人工知能・先端ロボットテクノロジー実践	1		first-half
Innovation and Technology Practice β	1		second-half
起業の技術（12 Essentials）	2	second-half	
実践・起業インターン（REAL） Ⅰ	2		○
実践・起業インターン（REAL） Ⅱ	2	○	
人工知能とビジネスモデル創出 α	1	first-half	
Business Model Creation with AI Technologies β	1	second-half	
イノベーション創出思考法１　０２	1		Intensive
イノベーション創出思考法１　０１	1	Intensive	
イノベーション創出思考法２　０２	1		Intensive
イノベーション創出思考法２　０１	1	Intensive	
ビジネスアイディア創出法	1		first-half
データビジネスクリエーション β	2		second-half
デザインシンキング　０１	1	Intensive	
デザインシンキング　０２	1		Intensive
ビジネスアイデア・デザイン（BID）	2	first-half	
ビジネスモデル仮説検証（エッセンシャル）　０２	2		Intensive
ビジネスモデル仮説検証（エッセンシャル）　０１	2	Intensive	
ビジネスモデル仮説検証（プレミアム）　０１	4		Intensive
イノベーション人材になるためのコーチング研修（ベーシック）	1	first-half	
AIビジネスクリエーション α	1	Intensive	
AI Business Creation *β*	1		Intensive

Non-degree Courses

Courses that allow students to earn credits when achieving a passing score, which are recorded on the grade report, but do not count as credits for graduation.

Course Name	Credits	Term		Provided by
		Spring	Fall	Department
解析の基礎数学１	2	○		Pure and Applied Mathematics
解析の基礎数学２	2		○	
確率偏微分方程式特別講義	2	Intensive		
幾何学の基礎数学１	2	○		
幾何学の基礎数学２	2	○		
非線形方程式の計算機援用解析	2	○		
非線形力学特別講義	4	Intensive	Intensive	
流体数学特別講義	4	Intensive	Intensive	
Fluid Mechanics of Computing	2	Intensive		Modern Mechanical Engineering
流体構造連成系応用力学特論（構造力学編）	2		○	
流体構造連成系応用力学特論（流体編）	2		○	
Computational Fluid Mechanics	2		○	
複雑系とネットワーク科学	1	Intensive		Business Design and Management
場の古典論の数学的基礎	2		○	Pure and Applied Physics
非平衡系物理学特論Ａ	2		○	
非平衡系物理学特論Ｂ	2		○	
量子情報理論	2	○		
量子物理学特別講義	4	Intensive	Intensive	
量子力学の数学的基礎	2	○		
量子論特論	2	○		
Professional Communication 1	1	○		Center for English Language Education in Science and Engineering
Professional Communication 2	1		○	
Workplace English1	1	○		
Workplace English2	1		○	

8 List of Courses for Each Department

Department of Pure and Applied Mathematics

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 concepts required. In the next stage, students need to develop their ability to apply the theories and methods they have developed. At higher stages, students carry out research activities such as exploring unknown territory 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 of 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, and students are required to take the seminar courses provided by their supervisor. These seminars form the foundation 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 independent researchers.

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 infinites 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, algebraic geometry, and algebraic combinatorics.

◆ 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 differential geometry, complex and hyperbolic geometry, Lie groups and representation, algebraic analysis, and integrable systems.

The other pillar, Topology, is an active area 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, (c) theory of three-dimensional hyperbolic manifolds, and (d) applied singularity theory.

◆ Analysis

In the research area of Analysis, studies are conducted mainly on functional analysis, real analysis, 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 analysis, 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 vary widely.

◆ Mathematics of 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

Mathematical models to describe various phenomena are often constructed in a form involving some unknown parameters, which should be estimated by observing a realization of the phenomena. At this stage, we always need to make a statistical decision to choose a “favorable” model. In the research area of Statistical Science, we first introduce the concept of “probability” or “distribution” as well as its properties based on the measure theory, and then progress to the modern theories of mathematical statistics. Our main goal is to master a systematic stream from “Mathematical Statistics” to “Data Science”, which should eventually reach the analysis of real data. The themes of our study include: estimation, testing hypotheses, statistical model selection, multivariate analysis, Bayesian statistics, asymptotic theory, time series, stochastic processes, as well as their applications to data science in a lot of fields such as finance, insurance, econometrics, analysis of medical and biological statistics, gene analysis, machine learning, among many others.

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.

(I) Research guidance (Master's program)

Course Name	Supervisor
Research on Algebraic Geometry	KAJI, Hajime
Research on Topology	MURAKAMI, Jun
Research on Topology	WATANABE, Nobuya
Research on Partial Differential Equations	KYED, Mads/SHIBATA, Yoshihiro
Research on Partial Differential Equations	YAMAZAKI, Masao
Research on Applications of Mathematics to Materials Engineering	ITO, Kimihisa/HIRATA, Akihiko
Research on Nonlinear Systems	KUTO, Kousuke
Research on Nonlinear Systems	TAKAHASHI, Daisuke
Research on Numerical Analysis	OISHI, Shinichi
Research on Numerical Analysis	KASHIWAGI, Masahide
Research on Applied Statistics	INOUE, Kiyoshi
Research on Differential Geometry	GUEST, Martin
Research on Mathematical Logic and Set Theory	USUBA, Toshimichi
Research on Stochastic and Statistical Analysis	SHIMIZU, Yasutaka
Research on Harmonic Analysis and Nonlinear Partial Differential Equation	OZAWA, Tohru
Research on Real Analysis	SOBUKAWA, Takuya
Research on Applied Probabilistic Model	TOYOIZUMI, Hiroshi
Research on Information Theory	MATSUSHIMA, Toshiyasu
Research on Nonlinear Differential Equations	BOWEN, Mark
Research on Algebraic Geometry	NAGAI, Yasunari
Research on Algebraic Number Theory	OZAKI, Manabu
Research on Geometry	HOMMA, Yasushi
Research on Hyperbolic Geometry	MATSUZAKI, Katsuhiko
Research on Complex Analytic Geometry	KOMORI, Yohei
Research on Functional Analysis and Non-linear Partial Differential Equations	KOZONO, Hideo
Research on Nonlinear Analysis	TANAKA, Kazunaga
Research on Stochastic Analysis	KUMAGAI, Takashi
Research on Nonlinear Systems	MARUNO, Kenichi
Research on Theory of Relativity	YONEDA, Gen
Research on Stochastic Processes and Statistical Inference	NISHIYAMA, Yoichi
Research on Partial Differential Equations	KAWASHIMA, Shuichi
Research on Topology	KOJIMA, Sadayoshi
Research on Number Theory and Automorphic Forms	NARITA, Hiroaki
Research on Dynamical Systems	YOSHIMURA, Hiroaki
Research on Special Varieties	IKEDA, Takeshi
Research on Applied Analysis and Nonlinear Partial Differential Equations	KOIKE, Shigeaki
Research on Algebraic Combinatorics	MIEZAKI, Tsuyoshi
Research on Applied Probability Theory	TRINH, Khanh Duy
Research on Applied Discrete Mathematics	HAYAMIZU, Momoko
Research on Applied Singularity Theory	Not Determined

(II) Lecture courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Advanced Geometry	2		○
Advanced Number Theory	2	○	
Advanced Numerical Analysis	2	○	
Advanced Partial Differential Equations	2		○
Advanced Probability and Statistics	2	○	
Advanced Topics in Pure and Applied Mathematics A	2	○	
Advanced Topics in Pure and Applied Mathematics B	2		○
Advanced Topics in Pure and Applied Mathematics C	2	○	
Advanced Topics in Pure and Applied Mathematics D	2		○
Advanced Topics in Pure and Applied Mathematics E	2	Int.	
Advanced Topics in Pure and Applied Mathematics F	2		fall quarter
Advanced Topics in Pure and Applied Mathematics G	2	Int.	
Algebraic Combinatorics A	2		○
Algebraic Combinatorics B	2		○
Applied Partial Differential Equations	2	○	
Complex Systems and Network Science	1	Int.	
Cyclotomic Field and Iwasawa Theory	2		○
Financial Econometrics	2	○	
Statistical Science A	2	○	
Statistical Science B	2		○
Statistical Science C	2		○
Topics in Applied Singularity Theory A	2		○
Topics in Applied Singularity Theory B	2		○
Topics in Probability Theory A	2	○	
Topics in Probability Theory B	2		○

(III) Seminar courses

Course Name	Supervisor	Credits	Term	
			Spring Semester	Fall Semester
Seminar on Topology A	MURAKAMI, Jun	3	○	
Seminar on Topology B	MURAKAMI, Jun	3		○
Seminar on Topology C	MURAKAMI, Jun	3	○	
Seminar on Topology D	MURAKAMI, Jun	3		○
Seminar on Topology A	WATANABE, Nobuya	3	○	
Seminar on Topology B	WATANABE, Nobuya	3		○
Seminar on Topology C	WATANABE, Nobuya	3	○	
Seminar on Topology D	WATANABE, Nobuya	3		○
Seminar on Nonlinear Partial Differential Equations A	KYED, Mads/ SHIBATA, Yoshihiro	3	○	
Seminar on Nonlinear Partial Differential Equations B	KYED, Mads/ SHIBATA, Yoshihiro	3		○
Seminar on Nonlinear Partial Differential Equations C	SHIBATA, Yoshihiro	3	○	
Seminar on Nonlinear Partial Differential Equations D	SHIBATA, Yoshihiro	3		○
Seminar on Nonlinear Partial Differential Equations A	YAMAZAKI, Masao	3	○	
Seminar on Nonlinear Partial Differential Equations B	YAMAZAKI, Masao	3		○
Seminar on Nonlinear Partial Differential Equations C	YAMAZAKI, Masao	3	○	
Seminar on Nonlinear Partial Differential Equations D	YAMAZAKI, Masao	3		○
Seminar on Applications of Mathematics to Materials Engineering A	ITO, Kimihisa	3	○	
Seminar on Applications of Mathematics to Materials Engineering B	ITO, Kimihisa	3		○
Seminar on Applications of Mathematics to Materials Engineering C	ITO, Kimihisa	3	○	

Course Name	Supervisor	Credits	Term	
			Spring Semester	Fall Semester
Seminar on Applications of Mathematics to Materials Engineering D	ITO, Kimihisa	3		○
Seminar on Nonlinear Systems A	TAKAHASHI, Daisuke	3	○	
Seminar on Nonlinear Systems B	TAKAHASHI, Daisuke	3		○
Seminar on Nonlinear Systems C	TAKAHASHI, Daisuke	3	○	
Seminar on Nonlinear Systems D	TAKAHASHI, Daisuke	3		○
Seminar on Numerical Analysis A	OISHI, Shinichi	3	○	
Seminar on Numerical Analysis B	OISHI, Shinichi	3		○
Seminar on Numerical Analysis C	OISHI, Shinichi	3	○	
Seminar on Numerical Analysis D	OISHI, Shinichi	3		○
Seminar on Numerical Analysis A	KASHIWAGI, Masahide	3	○	
Seminar on Numerical Analysis B	KASHIWAGI, Masahide	3		○
Seminar on Numerical Analysis C	KASHIWAGI, Masahide	3	○	
Seminar on Numerical Analysis D	KASHIWAGI, Masahide	3		○
Seminar on Algebraic Geometry A	KAJI, Hajime	3	○	
Seminar on Algebraic Geometry B	KAJI, Hajime	3		○
Seminar on Algebraic Geometry C	KAJI, Hajime	3	○	
Seminar on Algebraic Geometry D	KAJI, Hajime	3		○
Seminar on Applied Statistics A	INOUE, Kiyoshi	3	○	
Seminar on Applied Statistics B	INOUE, Kiyoshi	3		○
Seminar on Applied Statistics C	INOUE, Kiyoshi	3	○	
Seminar on Applied Statistics D	INOUE, Kiyoshi	3		○
Seminar on Differential Geometry A	GUEST, Martin	3	○	
Seminar on Differential Geometry B	GUEST, Martin	3		○
Seminar on Differential Geometry C	GUEST, Martin	3	○	
Seminar on Differential Geometry D	GUEST, Martin	3		○
Seminar on Mathematical Logic and Set Theory A	USUBA, Toshimichi	3	○	
Seminar on Mathematical Logic and Set Theory B	USUBA, Toshimichi	3		○
Seminar on Mathematical Logic and Set Theory C	USUBA, Toshimichi	3	○	
Seminar on Mathematical Logic and Set Theory D	USUBA, Toshimichi	3		○
Seminar on Stochastic and Statistical Analysis A	SHIMIZU, Yasutaka	3	○	
Seminar on Stochastic and Statistical Analysis B	SHIMIZU, Yasutaka	3		○
Seminar on Stochastic and Statistical Analysis C	SHIMIZU, Yasutaka	3	○	
Seminar on Stochastic and Statistical Analysis D	SHIMIZU, Yasutaka	3		○
Seminar on Real Analysis A	SOBUKAWA, Takuya	3	○	
Seminar on Real Analysis B	SOBUKAWA, Takuya	3		○
Seminar on Real Analysis C	SOBUKAWA, Takuya	3	○	
Seminar on Real Analysis D	SOBUKAWA, Takuya	3		○
Seminar on Harmonic Analysis and Nonlinear Partial Differential Equation B	OZAWA, Tohru	3		○
Seminar on Harmonic Analysis and Nonlinear Partial Differential Equation D	OZAWA, Tohru	3		○
Seminar on Applied Probabilistic Model A	TOYOIZUMI, Hiroshi	3	○	
Seminar on Applied Probabilistic Model B	TOYOIZUMI, Hiroshi	3		○
Seminar on Applied Probabilistic Model C	TOYOIZUMI, Hiroshi	3	○	
Seminar on Applied Probabilistic Model D	TOYOIZUMI, Hiroshi	3		○
Seminar on Information Theory B	MATSUSHIMA, Toshiyasu	3		○
Seminar on Information Theory A	MATSUSHIMA, Toshiyasu	3	○	
Seminar on Information Theory C	MATSUSHIMA, Toshiyasu	3	○	
Seminar on Information Theory D	MATSUSHIMA, Toshiyasu	3		○
Seminar on Nonlinear Differential Equations A	BOWEN, Mark	3	○	
Seminar on Nonlinear Differential Equations B	BOWEN, Mark	3		○
Seminar on Nonlinear Differential Equations C	BOWEN, Mark	3	○	
Seminar on Nonlinear Differential Equations D	BOWEN, Mark	3		○

Course Name	Supervisor	Credits	Term	
			Spring Semester	Fall Semester
Seminar on Algebraic Geometry A	NAGAI, Yasunari	3	○	
Seminar on Algebraic Geometry B	NAGAI, Yasunari	3		○
Seminar on Algebraic Geometry C	NAGAI, Yasunari	3	○	
Seminar on Algebraic Geometry D	NAGAI, Yasunari	3		○
Seminar on Algebraic Number Theory A	OZAKI, Manabu	3	○	
Seminar on Algebraic Number Theory B	OZAKI, Manabu	3		○
Seminar on Algebraic Number Theory C	OZAKI, Manabu	3	○	
Seminar on Algebraic Number Theory D	OZAKI, Manabu	3		○
Seminar on Geometry A	HOMMA, Yasushi	3	○	
Seminar on Geometry B	HOMMA, Yasushi	3		○
Seminar on Geometry C	HOMMA, Yasushi	3	○	
Seminar on Geometry D	HOMMA, Yasushi	3		○
Seminar on Hyperbolic Geometry A	MATSUZAKI, Katsuhiko	3	○	
Seminar on Hyperbolic Geometry B	MATSUZAKI, Katsuhiko	3		○
Seminar on Hyperbolic Geometry C	MATSUZAKI, Katsuhiko	3	○	
Seminar on Hyperbolic Geometry D	MATSUZAKI, Katsuhiko	3		○
Seminar on Complex Analytic Geometry A	KOMORI, Yohei	3	○	
Seminar on Complex Analytic Geometry B	KOMORI, Yohei	3		○
Seminar on Complex Analytic Geometry C	KOMORI, Yohei	3	○	
Seminar on Complex Analytic Geometry D	KOMORI, Yohei	3		○
Seminar on Functional Analysis and Non-linear Partial Differential Equations A	KOZONO, Hideo	3	○	
Seminar on Functional Analysis and Non-linear Partial Differential Equations B	KOZONO, Hideo	3		○
Seminar on Functional Analysis and Non-linear Partial Differential Equations C	KOZONO, Hideo	3	○	
Seminar on Functional Analysis and Non-linear Partial Differential Equations D	KOZONO, Hideo	3		○
Seminar on Variational Problems A	TANAKA, Kazunaga	3	○	
Seminar on Variational Problems B	TANAKA, Kazunaga	3		○
Seminar on Variational Problems C	TANAKA, Kazunaga	3	○	
Seminar on Variational Problems D	TANAKA, Kazunaga	3		○
Seminar on Stochastic Analysis A	KUMAGAI, Takashi	3	○	
Seminar on Stochastic Analysis B	KUMAGAI, Takashi	3		○
Seminar on Stochastic Analysis C	KUMAGAI, Takashi	3	○	
Seminar on Stochastic Analysis D	KUMAGAI, Takashi	3		○
Seminar on Nonlinear Systems A	MARUNO, Kenichi	3	○	
Seminar on Nonlinear Systems B	MARUNO, Kenichi	3		○
Seminar on Nonlinear Systems C	MARUNO, Kenichi	3	○	
Seminar on Nonlinear Systems D	MARUNO, Kenichi	3		○
Seminar on Theory of Relativity A	YONEDA, Gen	3	○	
Seminar on Theory of Relativity B	YONEDA, Gen	3		○
Seminar on Theory of Relativity C	YONEDA, Gen	3	○	
Seminar on Theory of Relativity D	YONEDA, Gen	3		○
Seminar on Stochastic Processes and Statistical Inference A	NISHIYAMA, Yoichi	3	○	
Seminar on Stochastic Processes and Statistical Inference B	NISHIYAMA, Yoichi	3		○
Seminar on Stochastic Processes and Statistical Inference C	NISHIYAMA, Yoichi	3	○	
Seminar on Stochastic Processes and Statistical Inference D	NISHIYAMA, Yoichi	3		○
Seminar on Partial Differential Equations A	KAWASHIMA, Shuichi	3	○	
Seminar on Partial Differential Equations B	KAWASHIMA, Shuichi	3		○
Seminar on Partial Differential Equations C	KAWASHIMA, Shuichi	3	○	
Seminar on Partial Differential Equations D	KAWASHIMA, Shuichi	3		○

Course Name	Supervisor	Credits	Term	
			Spring Semester	Fall Semester
Seminar on Topology A	KOJIMA, Sadayoshi	3	○	
Seminar on Topology B	KOJIMA, Sadayoshi	3		○
Seminar on Topology C	KOJIMA, Sadayoshi	3	○	
Seminar on Topology D	KOJIMA, Sadayoshi	3		○
Seminar on Number Theory and Automorphic Forms A	NARITA, Hiroaki	3	○	
Seminar on Number Theory and Automorphic Forms B	NARITA, Hiroaki	3		○
Seminar on Number Theory and Automorphic Forms C	NARITA, Hiroaki	3	○	
Seminar on Number Theory and Automorphic Forms D	NARITA, Hiroaki	3		○
Seminar on Harmonic Analysis and Nonlinear Partial Differential Equation A	OZAWA, Tohru	3	○	
Seminar on Harmonic Analysis and Nonlinear Partial Differential Equation C	OZAWA, Tohru	3	○	
Seminar on Dynamical Systems A	YOSHIMURA, Hiroaki	3	○	
Seminar on Dynamical Systems B	YOSHIMURA, Hiroaki	3		○
Seminar on Dynamical Systems C	YOSHIMURA, Hiroaki	3	○	
Seminar on Dynamical Systems D	YOSHIMURA, Hiroaki	3		○
Seminar on Special Varieties A	IKEDA, Takeshi	3	○	
Seminar on Special Varieties B	IKEDA, Takeshi	3		○
Seminar on Special Varieties C	IKEDA, Takeshi	3	○	
Seminar on Special Varieties D	IKEDA, Takeshi	3		○
Seminar on Applied Analysis and Nonlinear Partial Differential Equations A	KOIKE, Shigeaki	3	○	
Seminar on Applied Analysis and Nonlinear Partial Differential Equations B	KOIKE, Shigeaki	3		○
Seminar on Applied Analysis and Nonlinear Partial Differential Equations C	KOIKE, Shigeaki	3	○	
Seminar on Applied Analysis and Nonlinear Partial Differential Equations D	KOIKE, Shigeaki	3		○
Seminar on Nonlinear Systems A	KUTO, Kousuke	3	○	
Seminar on Nonlinear Systems B	KUTO, Kousuke	3		○
Seminar on Nonlinear Systems C	KUTO, Kousuke	3	○	
Seminar on Nonlinear Systems D	KUTO, Kousuke	3		○
Seminar on Algebraic Combinatorics A	MIEZAKI, Tsuyoshi	3	○	
Seminar on Algebraic Combinatorics B	MIEZAKI, Tsuyoshi	3		○
Seminar on Algebraic Combinatorics C	MIEZAKI, Tsuyoshi	3	○	
Seminar on Algebraic Combinatorics D	MIEZAKI, Tsuyoshi	3		○
Seminar on Applied Probability Theory A	TRINH, Khanh Duy	3	○	
Seminar on Applied Probability Theory B	TRINH, Khanh Duy	3		○
Seminar on Applied Probability Theory C	TRINH, Khanh Duy	3	○	
Seminar on Applied Probability Theory D	TRINH, Khanh Duy	3		○
Seminar on Applied Dsicrete Mathematics A	HAYAMIZU, Momoko	3	○	
Seminar on Applied Discrete Mathematics B	HAYAMIZU, Momoko	3		○
Seminar on Applied Discrete Mathematics C	HAYAMIZU, Momoko	3	○	
Seminar on Applied Discrete Mathematics D	HAYAMIZU, Momoko	3		○
Seminar on Applied Singularity Theory A	Not Determined	3	○	
Seminar on Applied Singularity Theory B	Not Determined	3		○
Seminar on Applied Singularity Theory C	Not Determined	3	○	
Seminar on Applied Singularity Theory D	Not Determined	3		○

Guidelines for earning a Doctoral Degree

1. Five credits must be earned from the list of prescribed group courses.
2. One credit must be earned from the research ethics courses.
3. One credit must be earned from the English course “Doctoral Student Technical Writing”.
4. Three credits must be earned from the English courses (excluding the course named in 3. above), industrial society/liberal arts courses, self-competence development (business creation), or courses offered by the department.

(I) Research guidance (Doctoral program)

Course Name	Supervisor
Research on Mathematical Logic and Set Theory	USUBA, Toshimichi
Research on Algebraic Number Theory	OZAKI, Manabu
Research on Algebraic Geometry	KAJI, Hajime
Research on Algebraic Geometry	NAGAI, Yasunari
Research on Topology	MURAKAMI, Jun
Research on Topology	WATANABE, Nobuya
Research on Geometry	HOMMA, Yasushi
Research on Differential Geometry	GUEST, Martin
Research on Partial Differential Equations	KYED, Mads/ SHIBATA, Yoshihiro
Research on Partial Differential Equations	YAMAZAKI, Masao
Research on Functional Analysis and Non-linear Partial Differential Equations	KOZONO, Hideo
Research on Nonlinear Analysis	TANAKA, Kazunaga
Research on Applications of Mathematics to Materials Engineering	ITO, Kimihisa/HIRATA, Akihiko
Research on Nonlinear Systems	TAKAHASHI, Daisuke
Research on Theory of Relativity	YONEDA, Gen
Research on Numerical Analysis	OISHI, Shinichi
Research on Numerical Analysis	KASHIWAGI, Masahide
Research on Information Theory	MATSUSHIMA, Toshiyasu
Research on Applied Statistics	INOUE, Kiyoshi
Research on Nonlinear Systems	KUTO, Kousuke
Research on Mathematics and Applied Mathematics	YAMAMOTO, Hirosuke
Research on Hyperbolic Geometry	MATSUZAKI, Katsuhiko
Research on Applied Probabilistic Model	TOYOIZUMI, Hiroshi
Research on Complex Analytic Geometry	KOMORI, Yohei
Research on Stochastic and Statistical Analysis	SHIMIZU, Yasutaka
Research on Nonlinear Systems	MARUNO, Kenichi
Research on Harmonic Analysis and Nonlinear Partial Differential Equation	OZAWA, Tohru
Research on Real Analysis	SOBUKAWA, Takuya
Research on Stochastic Processes and Statistical Inference	NISHIYAMA, Yoichi
Research on Stochastic Analysis	KUMAGAI, Takashi
Research on Number Theory and Automorphic Forms	NARITA, Hiroaki
Research on Dynamical systems	YOSHIMURA, Hiroaki
Research on Special Varieties	IKEDA, Takeshi
Research on Applied Analysis and Nonlinear Partial Differential Equations	KOIKE, Shigeaki
Research on Algebraic Combinatorics	MIEZAKI, Tsuyoshi
Research on Discrete Applied Mathematics	HAYAMIZU, Momoko
Research on Applied Singularity Theory	Not Determined
Research on Nonlinear Differential Equations	BOWEN, Mark

(II) Courses offered by the Department

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Advanced Study of Nonlinear Mechanics	4	Intensive	
Special Lecture on Mathematical Fluid Mechanics	4	Intensive	
Foundations of Mathematical Analysis 1	2	○	
Foundations of Mathematical Analysis 2	2		○
Foundations of Geometry 1	2	○	
Computer Assisted Proof of Nonlinear Equations	2	○	
幾何学の基礎数学２	2	○	
Special Lecture on Stochastic Partial Differential Equations	2	Intensive	
Complex Systems and Network Science	1	Intensive	

Department of Applied Mechanics and Aerospace Engineering

The Department of Applied Mechanics and Aerospace Engineering 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.

Guidelines for earning 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.

(I) Research guidance (Master's program)

Course Name	Supervisor
Research on Fluid Engineering	OTA, Yutaka
Research on Thermofluid Science	NAITOH, Ken
Research on Applied Mathematics	YOSHIMURA, Hiroaki
Research on Dynamics and Control of Mechanical Systems	KAYUKAWA, Yohei/SAITO, Kiyoshi/ YAMAGUCHI, Seiichi
Research on Energy and Systems Engineering	AMANO, Yoshiharu
Research on Composite Materials Engineering	KAWADA, Hiroyuki
Research on Tribology	TOMIOKA, Jun
Research on Aerospace Transportation Systems	SATOU, Tetsuya
Research on Aerodynamics	TEZUKA, Asei
Research on Applied Mathematics	YANAO, Tomohiro/YONEDA, Gen
Research on Fluid Engineering	MIYAGAWA, Kazuyoshi
Research on Materials Process Engineering	SUZUKI, Shinsuke/TAKAMURA, Masato
Research on Micro and Nano Mechanics	IWASE, Eiji
Research on Mechanics of Materials	KITANO, Makoto/HOSOI, Atsushi
Research on Process Control Engineering	YAMAGUCHI, Seiichi

Course Name	Supervisor
Research on Design Optimization	TAKEZAWA, Akihiro
Research on Nanomaterials Engineering	ARAO, Yoshihiko

(II) Lecture Courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Continuum Mechanics	2	○	
Mechanics of Composite Materials	2	○	
Tribology 1	2	○	
Tribology 2	2		○
Nonlinear Mechanics	2	○	
Nonlinear Finite Element Methods	2		○
Advanced Fluid Mechanics	4	○	○
Micro-mechanical Engineering	2		○
Advanced Dynamics and Control of Mechanical Systems	2		○
Advanced Energy and Systems Engineering	2		○
Flow-Induced Vibration	2	○	
Advanced System Analysis	2	○	
Thermofluid Science	2	○	
High Speed Aerospace Propulsion	2	○	
Damage Case Analysis	2		○
Risk Base Management of Materials	2		○
Advanced Aerodynamics	2	○	
Space utilization engineering	2		○
Advanced Statistical Mechanics	2		○
Advanced Fluid Machinery	2		○
Material Science for Energy Industry Application	2	○	
Advanced Course on Metal Forming	2	○	
Reliability Structural Design	2		○

(III) Seminar Courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Fluid Engineering A	3	○	
Seminar on Fluid Engineering B	3		○
Seminar on Fluid Engineering C	3	○	
Seminar on Fluid Engineering D	3		○
Seminar on Thermofluid Science A	3	○	
Seminar on Thermofluid Science B	3		○
Seminar on Thermofluid Science C	3	○	
Seminar on Thermofluid Science D	3		○
Seminar on Applied Mathematics and Mechanics A	3	○	
Seminar on Applied Mathematics and Mechanics B	3		○
Seminar on Applied Mathematics and Mechanics C	3	○	
Seminar on Applied Mathematics and Mechanics D	3		○
Seminar on Dynamics and Control of Mechanical Systems A	3	○	
Seminar on Dynamics and Control of Mechanical Systems B	3		○
Seminar on Dynamics and Control of Mechanical Systems C	3	○	
Seminar on Dynamics and Control of Mechanical Systems D	3		○

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Energy and Systems Engineering A	3	○	
Seminar on Energy and Systems Engineering B	3		○
Seminar on Energy and Systems Engineering C	3	○	
Seminar on Energy and Systems Engineering D	3		○
Seminar on Mechanics of Composite Materials A	3	○	
Seminar on Mechanics of Composite Materials B	3		○
Seminar on Mechanics of Composite Materials C	3	○	
Seminar on Mechanics of Composite Materials D	3		○
Seminar on Tribology A	3	○	
Seminar on Tribology B	3		○
Seminar on Tribology C	3	○	
Seminar on Tribology D	3		○
Seminar on Aerospace Transportation A	3	○	
Seminar on Aerospace Transportation B	3		○
Seminar on Aerospace Transportation C	3	○	
Seminar on Aerospace Transportation D	3		○
Seminar on Aerodynamics A	3	○	
Seminar on Aerodynamics B	3		○
Seminar on Aerodynamics C	3	○	
Seminar on Aerodynamics D	3		○
Seminar on Nonequilibrium Statistical Mechanics A	3	○	
Seminar on Nonequilibrium Statistical Mechanics B	3		○
Seminar on Nonequilibrium Statistical Mechanics C	3	○	
Seminar on Nonequilibrium Statistical Mechanics D	3		○
Seminar on Fluid Machinery A	3	○	
Seminar on Fluid Machinery B	3		○
Seminar on Fluid Machinery C	3	○	
Seminar on Fluid Machinery D	3		○
Seminar on Materials Process Engineering A	3	○	
Seminar on Materials Process Engineering B	3		○
Seminar on Materials Process Engineering C	3	○	
Seminar on Materials Process Engineering D	3		○
Seminar on Micro and Nano Mechanics A	3	○	
Seminar on Micro and Nano Mechanics B	3		○
Seminar on Micro and Nano Mechanics C	3	○	
Seminar on Micro and Nano Mechanics D	3		○
Seminar on Mechanics of Materials A	3	○	
Seminar on Mechanics of Materials B	3		○
Seminar on Mechanics of Materials C	3	○	
Seminar on Mechanics of Materials D	3		○
Seminar on Process Control Engineering A	3	○	
Seminar on Process Control Engineering B	3		○
Seminar on Process Control Engineering C	3	○	
Seminar on Process Control Engineering D	3		○
Seminar on Design Optimization A	3	○	
Seminar on Design Optimization B	3		○
Seminar on Design Optimization C	3	○	
Seminar on Design Optimization D	3		○
Seminar on Nanomaterials Engineering A	3	○	
Seminar on Nanomaterials Engineering B	3		○
Seminar on Nanomaterials Engineering C	3	○	
Seminar on Nanomaterials Engineering D	3		○

Guidelines for earning a Doctoral Degree

1. Five credits must be earned from the list of prescribed group courses.
2. One credit must be earned from the research ethics courses.
3. Four credits must be earned from the English courses, industrial society/liberal arts courses, self-competence development (business creation), or courses offered by the department.

(I) Research guidance (Doctoral program)

Course Name	Supervisor
Research on Fluid Engineering	OTA, Yutaka
Research on Thermofluid Science	NAITOH, Ken
Research on Applied Mathematics	YOSHIMURA, Hiroaki
Research on Dynamics and Control of Mechanical Systems	KAYUKAWA, Yohei/SAITO, Kiyoshi/ YAMAGUCHI, Seiichi
Research on Energy and Systems Engineering	AMANO, Yoshiharu
Research on Composite Materials Engineering	KAWADA, Hiroyuki
Research on Tribology	TOMIOKA, Jun
Research on Aerospace Transportation Systems	SATOU, Tetsuya
Research on Aerodynamics	TEZUKA, Asei
Research on Applied Mathematics	YANAO, Tomohiro
Research on Fluid Engineering	MIYAGAWA, Kazuyoshi
Research on Materials Process Engineering	SUZUKI, Shinsuke/TAKAMURA, Masato
Research on Micro and Nano Mechanics	IWASE, Eiji
Research on Mechanics of Materials	KITANO, Makoto/HOSOI, Atsushi
Research on Process Control Engineering	YAMAGUCHI, Seiichi
Research on Design Optimization	TAKEZAWA, Akihiro
Research on Nanomaterials Engineering	ARAO, Yoshihiko

(II) Courses offered by the Department

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Applied Mechanics and Aerospace Engineering A	1	○	
Seminar on Applied Mechanics and Aerospace Engineering B	1		○

Department of Electronic and Physical Systems

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.

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.

(I) Research guidance (Master's program)

Course Name	Supervisor
Research on Advanced Theoretical Physics for Condensed Matter	YAMANAKA, Yoshiya
Research on Quantum Solid-state Science	YAMAMOTO, Tomoyuki
Research on Molecular Nano-engineering	TANII, Takashi
Research on Nano-device	KAWARADA, Hiroshi
Research on Nano and Microsystem	SHOJI, Shuichi
Research on Nano Materials Informatics	WATANABE, Takanobu
Research on Functional Photonics	UTAKA, Katsuyuki

Course Name	Supervisor
Research on Design and Analysis Systems	YANAGISAWA, Masao
Research on Integrated System Design	SHI, Youhua/YANAGISAWA, Masao
Research on Radio and Optical Converged Systems	KAWANISHI, Tetsuya

(II) Lecture courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Nanodevice Engineering	2	○	
Topics on Photonics	2	○	
Introduction to Molecular Nano-engineering	2		○
Quantum Solid-State Science	2		fall quarter
Radio and Optical Converged Systems	2		○
System LSI Design and CAD	2		○
Nanobiotechnology Fusion Systems	2		○
Computational Experiments	2		○
Digital System Design	2		winter quarter

(III) Seminar courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Advanced Theoretical Physics for Condensed Matter A	3	○	
Seminar on Advanced Theoretical Physics for Condensed Matter B	3		○
Seminar on Advanced Theoretical Physics for Condensed Matter C	3	○	
Seminar on Advanced Theoretical Physics for Condensed Matter D	3		○
Seminar on Quantum Solid-state Science A	3	○	
Seminar on Quantum Solid-state Science B	3		○
Seminar on Quantum Solid-state Science C	3	○	
Seminar on Quantum Solid-state Science D	3		○
Seminar on Molecular Nano-engineering A	3	○	
Seminar on Molecular Nano-engineering B	3		○
Seminar on Molecular Nano-engineering C	3	○	
Seminar on Molecular Nano-engineering D	3		○
Seminar on Functional Photonics A	3	○	
Seminar on Functional Photonics B	3		○
Seminar on Functional Photonics C	3	○	
Seminar on Functional Photonics D	3		○
Seminar on Design and Analysis Systems A	3	○	
Seminar on Design and Analysis Systems B	3		○
Seminar on Design and Analysis Systems C	3	○	
Seminar on Design and Analysis Systems D	3		○
Seminar on Integrated System Design A	3	○	
Seminar on Integrated System Design B	3		○
Seminar on Integrated System Design C	3	○	
Seminar on Integrated System Design D	3		○
Seminar on Radio and Optical Converged Systems A	3	○	
Seminar on Radio and Optical Converged Systems B	3		○
Seminar on Radio and Optical Converged Systems C	3	○	
Seminar on Radio and Optical Converged Systems D	3		○
Seminar on Nanoelectronics A	3	○	

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Nanoelectronics B	3		○
Seminar on Nanoelectronics C	3	○	
Seminar on Nanoelectronics D	3		○
Seminar on Microsystem Engineering A	3	○	
Seminar on Microsystem Engineering B	3		○
Seminar on Microsystem Engineering C	3	○	
Seminar on Microsystem Engineering D	3		○
Seminar on Nanomaterials for Informatics A	3	○	
Seminar on Nanomaterials for Informatics B	3		○
Seminar on Nanomaterials for Informatics C	3	○	
Seminar on Nanomaterials for Informatics D	3		○

Guidelines for earning a Doctoral Degree

1. Five credits must be earned from the list of prescribed group courses.
2. One credit must be earned from the research ethics courses.
3. One credit must be earned from the English course “Doctoral Student Technical Writing”.
4. Three credits must be earned from the English courses, industrial society/liberal arts courses, self-competence development (business creation), or courses offered by the department.
5. For requirement 4. above, up to two credits from Master’s courses offered by the department registered during doctoral program may be counted towards doctoral credits.

(I) Research guidance (Doctoral program)

Course Name	Supervisor
Research on Solid State Physics	KOYAMA, Yasumasa
Research on Advanced Theoretical Physics for Condensed Matter	YAMANAKA, Yoshiya
Research on Quantum Solid-state Science	YAMAMOTO, Tomoyuki
Research on High Temperature Physical Chemistry	ITO, Kimihisa/YAMAMOTO, Tomoyuki
Research on Molecular Nano-engineering	TANII, Takashi
Research on Nano-device	KAWARADA, Hiroshi
Research on Nano and Microsystem	SHOJI, Shuichi
Research on Nano Materials Informatics	WATANABE, Takanobu
Research on Functional Photonics	UTAKA, Katsuyuki
Research on Design and Analysis Systems	YANAGISAWA, Masao
Research on High-level Verification Technologies	KIMURA, Shinji/YANAGISAWA, Masao
Research on Integrated System Design	SHI, Youhua/YANAGISAWA, Masao
Research on Wireless Communication Circuit Technologies	YANAGISAWA, Masao/ YOSHIMASU, Toshihiko
Research on Radio and Optical Converged Systems	KAWANISHI, Tetsuya
Research on Physics and Engineering of Semiconductor Nano Devices	YAMAMOTO, Tomoyuki

Department of Computer Science and Communications Engineering

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 offers education and research opportunities in a broad range of disciplines related to computer science, computer engineering, and information and communications engineering.

In computer 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.

Computer engineering is a field that provides education and research in technological fields of computer 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.

In information and communications engineering, 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 and communications engineering 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.

As mentioned above, computer science, computer engineering, and information and communications 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 computer science, computer engineering, and information and communications 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.

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 applications

   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.

4. Computer graphics

   Since the advent of computers, many have strove to generate images exactly as they want them. Recently, it has become possible to create images indistinguishable from reality, and such techniques are being widely applied to movies, games, illustration, and medical simulation, among other fields. Computer graphics research aims to advance computer image generation technology and applications to a diversity of tasks.

5. 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 research is interdisciplinary, and covers areas such as information retrieval, databases, natural language processing, and human interfaces.

◇ Information Networks

There has been great demands for research and education in the technology of information networks because it accelerates dramatic progress in human society.

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

1. Intelligent information systems

   Research on modeling and analysis of intelligent information systems regarding information networking and machine learning. It usually requires knowledge in information theory, probability and statistics. This area of research focuses on devising new techniques and algorithms to evaluate the performance of computer and network.

2. Information transfer protocols

   Research on designing information transfer protocols that cryptographically controls which information to disclose and which not. This area of research serves to achieve secure, fair and privacy enhancing systems to be used in social systems, avoiding concentration of power. Knowledge on discrete mathematics and computational complexity is preferable.

◇ Advanced Computing Mechanisms

The role of computers is to amplify our intellectual ability and support our social life. Computers used to help us by performing routine operations on our behalf. However, computers nowadays play more and more important roles in human society, and are required to perform highly sophisticated and intellectual operations in a reliable and sometimes verifiable manner. With this view in mind, research in the field of Advanced Computing Mechanisms is being conducted from various aspects to enhance the functions of computers and software, aiming to present the foundations of Information Technology in the future.

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

1. Knowledge information processing

   Our research goal is to develop a framework for computation and programming that adequately addresses (i) modern computing platforms comprising many processors connected in various forms and (ii) a quest for future software technology that enhances our intellectual activities in a reliable manner. This seems to demand novel computational models for various high-level information such as human knowledge and mathematical concepts (as opposed to bits and bytes) and advanced programming languages as enabling technology. We tackle these challenges by designing and implementing high-level languages for programming, modeling, simulation, reasoning and verification, all with rigorous foundations. Research in this direction closely relates to Artificial Intelligence as well as to programming languages.

2. Computer programming languages

   A computer programming language is a formal language for writing computer programs, which specify the behavior of computation or algorithms. Programming languages is one of the oldest and most well-established branches of computer science, and an active area of research. Research in programming languages concerns, among others, design and implementation of programming languages and programming language features, programming techniques such as functional programming and logic programming, methods for reasoning about programs such as type systems, program verification, and program synthesis, research in theoretical foundations such as programming language semantics and type theory, and applications of programming language research techniques to other areas of science such as computer security.

◇ 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. 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.

2. 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.

3. 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.

4. Software development for computational biology

   Recent progress in genome sequence technology has encouraged large scale cohort studies, which produce huge amount of biological/biomedical data. In this research project, we aim to develop an efficient software for analyzing such biological/biomedical big data. The project includes various topics such as fast biological sequence analysis and privacy-preserving data mining for genome data.

5. Autonomous agent engineering

   Software systems embedded in the real world are exposed to various and uncertain changes occurred in the environment. We deal with engineering techniques to develop autonomous agent-based software that be able to adapt and/or evolve flexibly in response to the changes. Our research topics include self-adaptive systems that be able to change the software itself in response to the changes monitored at runtime, automated software evolution that updates software systems at runtime, Models@runtime that is a set of techniques to enable the self-adaptation and/or automated software evolution by utilizing models at runtime, and automatic program repair that automatically identifies and fixes program faults causing failures.

◇ 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. 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.
2. 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.

◆ 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.

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

1. Design and analysis system
   To create advanced computers, information communication systems, etc., SoC (System on a Chip) design, network systems, CAD algorithms for hardware/software codesign, and processing systems for medical data are studied.
2. Information system design
   We focus on the research topic on hardware/software design for advanced image processing

and network processings, Especially, we study SoC architecture design, processor design, hardware/software co-design, and their computer-aided design.

◇ 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. Optical communication system
   We study on advanced optical communication technologies, including modulation and demodulation, coding, multiplexing and signal processing technologies not only for reducing power consumption in high-capacity fiber optic communication systems but also for expanding the application area of optical communication to other than conventional fiber optic systems.
2. 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, airbone communication, stratosphric communication, small satellite communication, UAV network system, so on.
3. Wireless communication network
   Researches on wireless system technologies from link level to system level that contribute to enhancing wireless communication networks. Especially focusing on modulation and demodulation, error control coding, multiplexing, and resource allocation for realizing high-speed, high-capacity, and high reliability in wireless communication networks.
4. Distributed computing systems
   Distributed computing systems which integrate communication networks and information processing are the target of this research. In-network processing and cloud/fog computing are the specific topic of interest among distributed computing systems. “Information Centric Networking,” which is a future data network candidate, is also included as a topic in this research in conjunction with in-networking processing.
5. 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.

6. Wireless network systems

   Our research focuses on optical wireless communication network, cellular network system design, sensor network, and smart grid system design with an aim to meet the ever growing demand for improved network performance and ubiquitous access. Students can expect to develop skills relating to signal processing. wireless networking, communication link design and hardware configuration.

◇ 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

   In the field of audiovisual information processing, we conduct research on image processing, image recognition, video coding, video recognition, and accompanying speech and audio signal processing. Traditionally, image recognition based on image features has been the mainstream, but now it is shifting to image recognition using machine learning and artificial intelligence. In particular, we will proceed with research on the configuration of analysis models and optimization using convolutional neural networks, focusing on object recognition using deep learning, scene understanding, automatic video generation using AI, automatic music generation, and 3D scene reconstruction.

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.

5. Media intelligence

   We study acoustic and speech processing, image processing, human behavior processing, pattern recognition, and machine learning to seek for effective ways to use media information and understand human functions and behavioral principle. In addition, we attempt to establish methodology to evolve systems adaptively depending on surrounding environments and develop them automatically using data accumulated each day.

6. Optimization and learning for systems

   We are dedicated to optimization and learning theory and algorithm and its applications, which appear in various technical fields, for example, machine learning, statistical learning and signal processing. Our focus includes optimization and learning algorithms, optimization and learning models, and those practical applications. We investigate them with respect to empirical numerical evaluation and theoretical analysis. We also particularly address non-linear and non-convex optimization and structured learning constrained with non-linear structure.

7. Natural language processing

   We study and develop artificial intelligence systems that can understand language like humans. In particular, by combining findings and technologies of computer science and linguistics, we work on world knowledge acquisition/utilization and text analysis/understanding. Furthermore, we aim at elucidating the mechanisms by which humans understand language and developing systems which incorporate such mechanisms.

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.

(I) Research guidance (Master's program)

Course Name	Supervisor
Research on Computer Vision and Pattern Analysis	ISHIKAWA, Hiroshi
Research on Parallel Knowledge Information Processing	UEDA, Kazunori
Research on Software Development Engineering	FUKAZAWA, Yoshiaki
Research on Intelligent Software	SUGAWARA, Toshiharu
Research on Reliable Software Engineering	WASHIZAKI, Hironori
Research on Distributed Systems	NAKAJIMA, Tatsuo
Research on Advanced Computing Systems	KASAHARA, Hironori
Research on Parallel and Distributed Architecture	YAMANA, Hayato
Research on Advanced Processor Architecture	KIMURA, Keiji
Research on Wireless Access	SHIMAMOTO, Shigeru
Research on Multimedia Information Distribution Systems	KAMEYAMA, Wataru
Research on Audiovisual Information Processing	WATANABE, Hiroshi
Research on Distributed Computing Systems	NAKAZATO, Hidenori
Research on Perceptual Computing	KOBAYASHI, Tetsunori/HAYASHI, Yoshihiko
Research on Image Information	KATTO, Jiro
Research on Design and Analysis Systems	TOGAWA, Nozomu/YANAGISAWA, Masao
Research on Information System Design	TOGAWA, Nozomu
Research on Wireless Communication Network	MAEHARA, Fumiaki
Research on Networked Systems	MORI, Tatsuya
Research on Information Access	SAKAI, Tetsuya
Research on Bioinformatics	ABURATANI, Sachiyo/SHIMIZU, Kana/ TOMINAGA, Daisuke/FUKUI, Kazuhiko/ YAMANA, Hayato
Research on Media Intelligence	OGAWA, Tetsuji
Research on Computational Biology	SHIMIZU, Kana
Research on Performance Evaluation of Information Systems	UCHIDA, Masato
Research on Computer Programming Languages	TERAUCHI, Tachio
Research on Wireless Network Systems	SHIMAMOTO, Shigeru/LIU, Jiang
Research on Autonomous Agent System	TEI, Kenji/HONIDEN, Shinichi
Research on Information Security	MORI, Tatsuya
Research on Optimization and Learning for Systems	KASAI, Hiroyuki
Research on Natural Language Processing	KAWAHARA, Daisuke
Research on Cryptographic Protocols	SAKO, Kazue
Research on Computer Graphics	SIMO SERRA, Edgar
Research on Optical Communication System	MORITA, Itsuro

(II) Lecture courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Reliable Software	2	○	
Distributed Embedded and Real-Time Processing	2		○
Advanced Computer Architecture	2	○	
Information Retrieval	2		○
Advanced Processor Architecture	2	○	
Advanced Intelligent Software	2		○
Software Quality Assurance	2	○	
Computer Vision and Pattern Analysis	2	○	
Multimedia and Standards	2		○
Cloud Systems	2		○
Multimedia Representation and Content Distribution Systems	2	○	
Advanced Wireless Access	2		○
Perceptual Computing	2		○
Advanced Image Information	2	○	
Digital System Design	2		winter quarter
Wireless Communication Network	2	○	
Special Laboratory A in Computer Science and Communications Engineering	1	○	
Special Laboratory B in Computer Science and Communications Engineering	1		○
Foundations for Information Access Evaluation	2	○	
Analysis of Networked Systems	2		○
System LSI design and CAD	2		○
Pattern Recognition and Machine Learning	2	○	
Info-Telecommunication and the Standardization	2	○	
Algorithms in Computational Biology	2		○
Performance Evaluation of Information Systems	2		○
Design and Implementation of Programming Languages	2		○
Autonomous Agent System	2		○
Computer Graphics Optimization	2	○	
Natural Language Processing	2	○	
Optimization Theory and Applications	2		○
Cryptographic Protocols and Blockchain Technologies	2		○
Advanced Course in Computer Graphics	2		○
Optical Communication System	2	○	

(III) Seminar courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Computer Vision and Pattern Analysis A	3	○	
Seminar on Computer Vision and Pattern Analysis B	3		○
Seminar on Computer Vision and Pattern Analysis C	3	○	
Seminar on Computer Vision and Pattern Analysis D	3		○
Seminar on Parallel Knowledge Information Processing A	3	○	
Seminar on Parallel Knowledge Information Processing B	3		○
Seminar on Parallel Knowledge Information Processing C	3	○	
Seminar on Parallel Knowledge Information Processing D	3		○
Seminar on Software Development Engineering A	3	○	
Seminar on Software Development Engineering B	3		○
Seminar on Software Development Engineering C	3	○	
Seminar on Software Development Engineering D	3		○
Seminar on Intelligent Software A	3	○	
Seminar on Intelligent Software B	3		○
Seminar on Intelligent Software C	3	○	
Seminar on Intelligent Software D	3		○
Seminar on Reliable Software Engineering A	3	○	
Seminar on Reliable Software Engineering B	3		○
Seminar on Reliable Software Engineering C	3	○	
Seminar on Reliable Software Engineering D	3		○
Seminar on Distributed Systems A	3	○	
Seminar on Distributed Systems B	3		○
Seminar on Distributed Systems C	3	○	
Seminar on Distributed Systems D	3		○
Seminar on Advanced Computing Systems A	3	○	
Seminar on Advanced Computing Systems B	3		○
Seminar on Advanced Computing Systems C	3	○	
Seminar on Advanced Computing Systems D	3		○
Seminar on Parallel and Distributed Architecture A	3	○	
Seminar on Parallel and Distributed Architecture B	3		○
Seminar on Parallel and Distributed Architecture C	3	○	
Seminar on Parallel and Distributed Architecture D	3		○
Seminar on Advanced Processor Architecture A	3	○	
Seminar on Advanced Processor Architecture B	3		○
Seminar on Advanced Processor Architecture C	3	○	
Seminar on Advanced Processor Architecture D	3		○
Seminar on Wireless Access A	3	○	
Seminar on Wireless Access B	3		○
Seminar on Wireless Access C	3	○	
Seminar on Wireless Access D	3		○
Seminar on Multimedia Information Distribution Systems A	3	○	
Seminar on Multimedia Information Distribution Systems B	3		○
Seminar on Multimedia Information Distribution Systems C	3	○	
Seminar on Multimedia Information Distribution Systems D	3		○
Seminar on Audiovisual Information Processing A	3	○	
Seminar on Audiovisual Information Processing B	3		○
Seminar on Audiovisual Information Processing C	3	○	
Seminar on Audiovisual Information Processing D	3		○
Seminar on Distributed Computing Systems A	3	○	
Seminar on Distributed Computing Systems B	3		○

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Distributed Computing Systems C	3	○	
Seminar on Distributed Computing Systems D	3		○
Seminar on Perceptual Computing A	3	○	
Seminar on Perceptual Computing B	3		○
Seminar on Perceptual Computing C	3	○	
Seminar on Perceptual Computing D	3		○
Seminar on Image Information A	3	○	
Seminar on Image Information B	3		○
Seminar on Image Information C	3	○	
Seminar on Image Information D	3		○
Seminar on Design and Analysis Systems A	3	○	
Seminar on Design and Analysis Systems B	3		○
Seminar on Design and Analysis Systems C	3	○	
Seminar on Design and Analysis Systems D	3		○
Seminar on Information System Design A	3	○	
Seminar on Information System Design B	3		○
Seminar on Information System Design C	3	○	
Seminar on Information System Design D	3		○
Seminar on Wireless Communication Network A	3	○	
Seminar on Wireless Communication Network B	3		○
Seminar on Wireless Communication Network C	3	○	
Seminar on Wireless Communication Network D	3		○
Seminar on Networked Systems A	3	○	
Seminar on Networked Systems B	3		○
Seminar on Networked Systems C	3	○	
Seminar on Networked Systems D	3		○
Seminar on Information Access A	3	○	
Seminar on Information Access B	3		○
Seminar on Information Access C	3	○	
Seminar on Information Access D	3		○
Seminar on Bioinformatics A	3	○	
Seminar on Bioinformatics B	3		○
Seminar on Bioinformatics C	3	○	
Seminar on Bioinformatics D	3		○
Seminar on Media Intelligence A	3	○	
Seminar on Media Intelligence B	3		○
Seminar on Media Intelligence C	3	○	
Seminar on Media Intelligence D	3		○
Seminar on Hands-on Course on Computational Biology A	3	○	
Seminar on Hands-on Course on Computational Biology B	3		○
Seminar on Hands-on Course on Computational Biology C	3	○	
Seminar on Hands-on Course on Computational Biology D	3		○
Seminar on Performance Evaluation of Information Systems A	3	○	
Seminar on Performance Evaluation of Information Systems B	3		○
Seminar on Performance Evaluation of Information Systems C	3	○	
Seminar on Performance Evaluation of Information Systems D	3		○
Seminar on Computer Programming Languages A	3	○	
Seminar on Computer Programming Languages B	3		○
Seminar on Computer Programming Languages C	3	○	
Seminar on Computer Programming Languages D	3		○
Seminar on Autonomous Agent System A	3	○	

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Autonomous Agent System B	3		○
Seminar on Autonomous Agent System C	3	○	
Seminar on Autonomous Agent System D	3		○
Seminar on Cryptographic Protocols A	3	○	
Seminar on Cryptographic Protocols B	3		○
Seminar on Cryptographic Protocols C	3	○	
Seminar on Cryptographic Protocols D	3		○
Seminar on Optimization and Learning for Systems A	3	○	
Seminar on Optimization and Learning for Systems B	3		○
Seminar on Optimization and Learning for Systems C	3	○	
Seminar on Optimization and Learning for Systems D	3		○
Seminar on Natural Language Processing A	3	○	
Seminar on Natural Language Processing B	3		○
Seminar on Natural Language Processing C	3	○	
Seminar on Natural Language Processing D	3		○
Seminar on Wireless Network Systems A	3	○	
Seminar on Wireless Network Systems B	3		○
Seminar on Wireless Network Systems C	3	○	
Seminar on Wireless Network Systems D	3		○
Seminar on Computer Graphics A	3	○	
Seminar on Computer Graphics B	3		○
Seminar on Computer Graphics C	3	○	
Seminar on Computer Graphics D	3		○
Seminar on Optical Communication System A	3	○	
Seminar on Optical Communication System B	3		○
Seminar on Optical Communication System C	3	○	
Seminar on Optical Communication System D	3		○

(Ⅳ) Laboratory courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Special Laboratory A in Computer Science and Communications Engineering	1	○	
Special Laboratory B in Computer Science and Communications Engineering	1		○

Guidelines for earning a Doctoral Degree

1. Five credits must be earned from the list of prescribed group courses.
2. One credit must be earned from the research ethics courses.
3. Four credits must be earned from the English courses, industrial society/liberal arts courses, self-competence development (business creation), or courses offered by the department.
4. For requirement 3. above, up to two credits from Master's courses offered by the department registered during doctoral program may be counted towards doctoral credits.

(I) Research guidance (Doctoral program)

Course Name	Supervisor
Research on Computer Vision and Pattern Analysis	ISHIKAWA, Hiroshi
Research on Parallel Knowledge Information Processing	UEDA, Kazunori
Research on Software Development Engineering	FUKAZAWA, Yoshiaki
Research on Intelligent Software	SUGAWARA, Toshiharu
Research on Reliable Software Engineering	WASHIZAKI, Hironori
Research on Distributed Systems	NAKAJIMA, Tatsuo
Research on Advanced Computing Systems	KASAHARA, Hironori
Research on Parallel and Distributed Architecture	YAMANA, Hayato
Research on Advanced Processor Architecture	KIMURA, Keiji
Research on Wireless Access	SHIMAMOTO, Shigeru
Research on Multimedia Information Distribution Systems	KAMEYAMA, Wataru
Research on Audiovisual Information Processing	WATANABE, Hiroshi
Research on Distributed Computing Systems	NAKAZATO, Hidenori
Research on Perceptual Computing	KOBAYASHI, Tetsunori/HAYASHI, Yoshihiko
Research on Image Information	KATTO, Jiro
Research on Design and Analysis Systems	TOGAWA, Nozomu/YANAGISAWA, Masao
Research on Information System Design	TOGAWA, Nozomu
Research on Wireless Communication Network	MAEHARA, Fumiaki
Research on Networked Systems	MORI, Tatsuya
Research on Information Access	SAKAI, Tetsuya
Research on Bioinformatics	ABURATANI, Sachiyo/SHIMIZU, Kana/ TOMINAGA, Daisuke/FUKUI, Kazuhiko/ YAMANA, Hayato
Research on Media Intelligence	OGAWA, Tetsuji
Research on Computational Biology	SHIMIZU, Kana
Research on Performance Evaluation of Information Systems	UCHIDA, Masato
Research on Computer Programming Languages	TERAUCHI, Tachio
Research on Autonomous Agent System	TEI, Kenji/HONIDEN, Shinichi
Research on Information Security	MORI, Tatsuya
Research on Optimization and Learning for Systems	KASAI, Hiroyuki
Research on Natural Language Processing	KAWAHARA, Daisuke
Research on Cryptographic Protocols	SAKO, Kazue
Research on Computer Graphics	SIMO SERRA, Edgar
Research on Optical Communication System	MORITA, Itsuro

(II) Courses offered by the Department

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Special Seminar A in Computer Science and Communications Engineering	1	○	
Special Seminar B in Computer Science and Communications Engineering	1		○

Department of Intermedia Studies

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, human media technology as well as cognitive science.

◆ 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 as well as environmental art.

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.

(I) Research guidance (Master's program)

Course Name	Supervisor
Research on Ergonomics in Advanced Media	KAWAI, Takashi
Research on Communication Acoustics	OIKAWA, Yasuhiro
Research on Intermedia Music Study	KANNO, Yoshihiro
Research on Intelligence Dynamics and Representation Systems	OGATA, Tetsuya
Research on Biological Expression	GUNJI, Yukio
Research on Cognitive Science	WATANABE, Katsumi
Research on Human Media Technology	HASHIDA, Tomoko
Research on Environmental Art	JACK, James Carl

(II) Lecture Courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Applied media ergonomics	2	○	
Advanced media systems	2		○
Lecture on Representation Structure Theory	2	○	
Communication Acoustics	2	○	
Intelligence Dynamics and Representation System, Advanced	2	○	
Sound and Mathematical Physics	2		○
Advanced Digital Media Expression	2		○
Cognitive Science Study	2		○
Philosophical Foundations of Expression	2	○	
Human Media Technology Study	2		○
Cognitive Psychology	2	○	
Statistics for Psychological Experiments	2		○
Advanced Contemporary Art	2		○

(III) Seminar Courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Ergonomics in Advanced Media A	3	○	
Seminar on Ergonomics in Advanced Media B	3		○
Seminar on Ergonomics in Advanced Media C	3	○	
Seminar on Ergonomics in Advanced Media D	3		○
Seminar on Communication Acoustics A	3	○	
Seminar on Communication Acoustics B	3		○
Seminar on Communication Acoustics C	3	○	
Seminar on Communication Acoustics D	3		○
Seminar on Intermedia Music Study A	3	○	
Seminar on Intermedia Music Study B	3		○
Seminar on Intermedia Music Study C	3	○	
Seminar on Intermedia Music Study D	3		○
Seminar on Intelligence Dynamics and Representation System A	3	○	
Seminar on Intelligence Dynamics and Representation System B	3		○
Seminar on Intelligence Dynamics and Representation System C	3	○	
Seminar on Intelligence Dynamics and Representation System D	3		○
Seminar on Biologically Motivated Representation A	3	○	
Seminar on Biologically Motivated Representation B	3		○
Seminar on Biologically Motivated Representation C	3	○	
Seminar on Biologically Motivated Representation D	3		○
Seminar on Cognitive Science A	3	○	
Seminar on Cognitive Science B	3		○
Seminar on Cognitive Science C	3	○	
Seminar on Cognitive Science D	3		○
Seminar on Human Media Technology A	3	○	
Seminar on Human Media Technology B	3		○
Seminar on Human Media Technology C	3	○	
Seminar on Human Media Technology D	3		○
Seminar on Environmental Art A	3	○	
Seminar on Environmental Art B	3		○
Seminar on Environmental Art C	3	○	
Seminar on Environmental Art D	3		○

Guidelines for earning a Doctoral Degree

1. Five credits must be earned from the list of prescribed group courses.
2. One credit must be earned from the research ethics courses.
3. Four credits must be earned from the English courses, industrial society/liberal arts courses, self-competence development (business creation), or courses offered by the department.
4. Students of other departments are not allowed to take Seminar on Intermedia studies A/B.

(I) Research guidance (Doctoral program)

Course Name	Supervisor
Research on Ergonomics in Advanced Media	KAWAI, Takashi
Research on Communication Acoustics	OIKAWA, Yasuhiro
Research on Intermedia Music Study	KANNO, Yoshihiro
Research on Intelligence Dynamics and Representation Systems	OGATA, Tetsuya
Research on Biological Expression	GUNJI, Yukio
Research on Cognitive Science	WATANABE, Katsumi
Research on Human Media Technology	HASHIDA, Tomoko
Research on Environmental Art	JACK, James Carl

(II) Courses offered by the Department

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Intermedia Studies A	1	○	
Seminar on Intermedia Studies B	1		○

Department of Materials Science

In our department, we cover many fields of study from iron and steel to non-ferrous metals and other novel materials, and introduce a very unique mathematical approach towards developing new materials that can support the next generation industry. We aim also to develop in our students all the skills they need to commit themselves to research, development, and application of novel materials at their workplace. Concretely, they stand on a solid basis related to the fundamentals of materials from courses on thermodynamics, crystallography, and structural mechanics, and advance to studies on a variety of materials, from micromaterials to large-scale macromaterials through a hierarchically interwoven curriculum that is grounded on topology. Computational homology for mathematical materials science, advanced computing for simulation of materials, big-data analysis, and materials development for space or extreme environment applications are some examples of methodologies that can be mastered.

In the Department of Materials Science, in addition to preparing skilled professionals that can work at key materials manufacturers at the Fundamental Materials Division, we also set the Advanced Materials Division to enable our graduates to fulfill the needs of the next generation industry. Our education and research activities are conducted through these two branches in a way that covers a broad range of fields and applications.

Summary of Each Research Area

◇Advanced Materials Division

◆ Mathematics for Materials

Building a proper theory of the fundamental mathematics, or developing mathematical methods and high-accuracy numerical simulation methods, are needed for in-depth theoretical analysis of phenomena related to materials science. Research topics include development of novel numerical verification methods and application to concrete questions in materials science.

◆ Novel Structural Materials

Strength, durability, light-weight, and functionality are some of the properties that should be improved to achieve high-quality mechanical structural materials. With a strong background in mechanics of materials, and elasto-plasticity, strength of materials, fracture mechanics, structural mechanics, materials processing, and precision engineering, deformation and strength of materials in multi-scale, fracture events and functionalities are evaluated though experimental and simulation research. Design optimization, evaluation techniques, processing methods, or numerical analysis, are employed in fundamental and applied research.

◇ Fundamental Materials Division

◆ Fundamental Metallic Materials

Deep understanding of the fundamental phenomena involved in the fabrication and processing of metallic materials, and development of novel fabrication and processing techniques are critical for maintaining sustainable growth of society. Solutions for related environmental, resources, and energy issues are sought through methods based on the physical chemistry involved in the phenomena. In addition, dramatic improvement of mechanical properties of materials is sought through control at the microstructural level in melting, solidification, casting, and deformation processes.

◆ Fundamental Condensed Matter Science

The most fundamental properties of materials can be analyzed and elucidated in more detail if seen from a microscopic viewpoint. Researchers specialized in quantum mechanics, solid state physics, crystallography, statistical mechanics, and X-ray spectroscopy conduct fundamental research in this area. Concretely, quantum field theory under thermal situations, theoretical study on Bose-Einstein condensation, materials chemistry research through quantum chemical calculations, analysis of defect structures at the atomic level using synchrotron radiation, analysis of atomic arrangements by diffraction crystallography using transmission electron microscopes and mathematical methods based on topology are examples of research topics.

Guidelines for earning a Doctoral Degree

1. Five credits must be earned from the list of prescribed group courses.
2. One credit must be earned from the research ethics courses.
3. Four credits must be earned from the English courses, industrial society/liberal arts courses, self-competence development (business creation).

(I) Research guidance (Doctoral program)

Course Name	Supervisor
Research on Physical Chemistry of Materials	ITO, Kimihisa
Research on Materials Crystallogtaphy	KOYAMA, Yasumasa
Research on Quantum Materials Physics	YAMANAKA, Yoshiya
Research on Condesed Matter Science	YAMAMOTO, Tomoyuki
Research on Reaction Dynamics of Materials	KUNIOSHI, Nilson
Research on Physics of Amorphous Materials	HIRATA, Akihiko
Research on Computational Mathematics for Materials	OISHI, Shinichi
Research on Mathematics for Materials	MARUNO, Kenichi
Research on Mathematics for Materials	TAKAHASHI, Daisuke
Research on Materials Process Engineering	KAWAGISHI, Kyoko/SUZUKI, Shinsuke/ HIROMOTO, Sachiko
Research on Micro and Nano Engineering	IWASE, Eiji
Research on Composite Materials Engineering	KAWADA, Hiroyuki
Research on Mechanics of Materials	HOSOI, Atsushi
Research on Engineering of Controlled Crystalline Structures	KAWAGISHI, Kyoko/SUZUKI, Shinsuke
Research on Corrosion and Surface Chemistry	SUZUKI, Shinsuke/HIROMOTO, Sachiko

Department of Architecture

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 thesis 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). ※ EBSE of Architecture does not correspond to 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).

(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.

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.

(I) Research guidance (Master's program)

Course Name	Supervisor
Research on Urban and Environmental Design	ARIGA, Takashi
Research on Regenerative Design of the Built Environment	YAGUCHI, Tetsuya
Research on Architecture and Sociological Concepts	WATANABE, Taishi
Research on Architectural Environment	TANABE, Shinichi
Research on Safety Planning in Built Environments	TANABE, Shinichi
Research on Temporal Aspects of Architectural Construction and Expression	NAKATANI, Norihito
Research on Continuum Mechanics	MAEDA, Toshiro
Research on Architectural Design and Information	KOBAYASHI, Keigo
Research on Comparative Architectural History	KOIWA, Masaki
Research on Architectural Design Concepts	MIYAMOTO, Katsuhiro
Research on Architecture and Space Concepts	FUJII, Yuri/FURUYA, Nobuaki
Research on Environment Media	TAKAGUCHI, Hiroto
Research on Urban-tech	YOSHIMURA, Yasutaka
Research on Structural Design	HAYABE, Yasuhiro
Research on Community Planning and Urban Theory	ARIGA, Takashi
Research on Building Construction Engineering and Management	ISHIDA, Kosei
Research on Building Construction	YAMADA, Midori
Research on Shell Structure	YOSHINAKA, Susumu

(II) Lecture Courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Advanced Topics in Intellectual Property Rights, Technology, and Legal Affairs	2		○
Exercises in Architectural Design(D)	2	○	
Exercises in Architectural Design(E)	2		○
Exercises in Architectural Design(F)	2	○	
Exercises in Architectural Design(G)	2	○	
Advanced Theory: Urban and Environmental Design	2	spring quarter	
Advanced Theory: Regenerative Design of the Built Environment	2		fall quarter
Advanced Theory: Architecture and Sociological Concepts	2	○	
Advanced Building Environment	2		○
Advanced Safety Planning of Built Environments	2	○	
Field Survey for Architectural History	2		○
Advanced Theory of Architectural Expressions	2	○	
Advanced Continuum Mechanics	2	○	
Advanced Topics in Architectural Design and Engineering B	2		○
Advanced Theory: Architectural Design and Information	2		○
Advanced Comparative Architectural History	2		○
Advanced Digital Environmental Design	2	○	
Advanced Theory: Architectural Design Concepts	2	○	
Advanced Theory: Architectural Space Concepts	2		○
Advanced Environment Media	2	○	
Advanced Topics in Architectural Design and Engineering A	2	○	
Advanced Exercise of Architectural Design and Work A [Spring Semester]	*4	○	
Advanced Exercise of Architectural Design and Work A [Fall Semester]	*4		○
Advanced Structural Design	2	○	
Advanced Building Construction Management	2	○	
Advanced Building Construction Planning	2	○	
Advanced Shell Structures	2	○	

*Non-degree courses that are not counted toward the credits required for completion

(III) Seminar Courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Urban and Environmental Design A	3	○	
Seminar on Urban and Environmental Design B	3		○
Seminar on Urban and Environmental Design C	3	○	
Seminar on Urban and Environmental Design D	3		○
Seminar on Regenerative Design of the Built Environment A	3	○	
Seminar on Regenerative Design of the Built Environment B	3		○
Seminar on Regenerative Design of the Built Environment C	3	○	
Seminar on Regenerative Design of the Built Environment D	3		○
Seminar on Architecture and Sociological Concepts A	3	○	
Seminar on Architecture and Sociological Concepts B	3		○
Seminar on Architecture and Sociological Concepts C	3	○	
Seminar on Architecture and Sociological Concepts D	3		○
Seminar on Architectural Environments A	3	○	
Seminar on Architectural Environments B	3		○
Seminar on Architectural Environments C	3	○	
Seminar on Architectural Environments D	3		○
Seminar on Safety Planning in Built Environments A	3	○	
Seminar on Safety Planning in Built Environments B	3		○
Seminar on Safety Planning in Built Environments C	3	○	
Seminar on Safety Planning in Built Environments D	3		○
Seminar on History of Architecture A	3	○	
Seminar on History of Architecture B	3		○
Seminar on History of Architecture C	3	○	
Seminar on History of Architecture D	3		○
Seminar on Continuum Mechanics A	3	○	
Seminar on Continuum Mechanics B	3		○
Seminar on Continuum Mechanics C	3	○	
Seminar on Continuum Mechanics D	3		○
Seminar on Architectural Design and Information A	3	○	
Seminar on Architectural Design and Information B	3		○
Seminar on Architectural Design and Information C	3	○	
Seminar on Architectural Design and Information D	3		○
Seminar on Comparative Architectural History A	3	○	
Seminar on Comparative Architectural History B	3		○
Seminar on Comparative Architectural History C	3	○	
Seminar on Comparative Architectural History D	3		○
Seminar on Architectural Design Concepts A	3	○	
Seminar on Architectural Design Concepts B	3		○
Seminar on Architectural Design Concepts C	3	○	
Seminar on Architectural Design Concepts D	3		○
Seminar on Architectural Space Concepts A	3	○	
Seminar on Architectural Space Concepts B	3		○
Seminar on Architectural Space Concepts C	3	○	
Seminar on Architectural Space Concepts D	3		○
Seminar on Environment Media A	3	○	
Seminar on Environment Media B	3		○
Seminar on Environment Media C	3	○	
Seminar on Environment Media D	3		○
Seminar on Urban-tech A	3	○	
Seminar on Urban-tech B	3		○

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Urban-tech C	3	○	
Seminar on Urban-tech D	3		○
Seminar on Structural Design A	3	○	
Seminar on Structural Design B	3		○
Seminar on Structural Design C	3	○	
Seminar on Structural Design D	3		○
Seminar on Building Construction Engineering and Management A	3	○	
Seminar on Building Construction Engineering and Management B	3		○
Seminar on Building Construction Engineering and Management C	3	○	
Seminar on Building Construction Engineering and Management D	3		○
Seminar on Building Construction A	3	○	
Seminar on Building Construction B	3		○
Seminar on Building Construction C	3	○	
Seminar on Building Construction D	3		○
Seminar on Shell Structures A	3	○	
Seminar on Shell Structures B	3		○
Seminar on Shell Structures C	3	○	
Seminar on Shell Structures D	3		○

Guidelines for earning a Doctoral Degree

1. Five credits must be earned from the list of prescribed group courses.
2. One credit must be earned from the research ethics courses.
3. Four credits must be earned from the English courses, industrial society/liberal arts courses, self-competence development (business creation), or courses offered by the department.
4. In requirement 3. above, up to two credits from Master's courses offered by the department registered during doctoral program counted towards doctoral credits.
5. For research ethics courses, approved courses from programs outside the department can be taken for credit if the courses in question are condsidered appropriate for the department.

(I) Research guidance (Doctoral program)

Course Name	Supervisor
Research on Comparative Architectural History	KOIWA, Masaki
Research on Temporal Aspects of Architectural Construction and Expression	NAKATANI, Norihito
Research on Architecture and Sociological Concepts	WATANABE, Taishi
Research on Architectural Design Concepts	MIYAMOTO, Katsuhiro
Research on Architectural Design and Information	KOBAYASHI, Keigo
Research on Architecture and Space Concepts	FUJII, Yuri/FURUYA, Nobuaki
Research on Landscape and Regional Design	GOTO, Haruhiko
Research on Urban and Environmental Design	ARIGA, Takashi
Research on Safety Planning in Built Environments	TANABE, Shinichi
Research on Architectural Environment	TANABE, Shinichi
Research on Continuum Mechanics	MAEDA, Toshiro
Research on Building Construction Engineering and Management	ISHIDA, Kosei
Research on Building Construction	YAMADA, Midori
Research on Building Materials	KOSHIISHI, Naoyuki

Course Name	Supervisor
Research on Environment Media	TAKAGUCHI, Hiroto
Research on Regenerative Design of the Built Environment	YAGUCHI, Tetsuya
Research on Structural Design	HAYABE, Yasuhiro
Research on Urban-tech	YOSHIMURA, Yasutaka
Research on Shell Structures	YOSHINAKA, Susumu

(II) Courses offered by the Department

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Architectural special exercise for doctor degree A	1	○	
Architectural special exercise for doctor degree B	1		○

Department of Modern Mechanical Engineering

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.

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.

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.

(I) Research guidance (Master's program)

Course Name	Supervisor
Research on Design of Mechanical Systems	MIYASHITA, Tomoyuki
Research on Intelligent Machines	SUGANO, Shigeki
Research on Thermal Energy Reaction Engineering	KUSAKA, Jin
Research on Neuro Robotics	IWATA, Hiroyasu
Research on Transporters & Energy Plants Materials Science and Engineering	YOSHIDA, Makoto
Research on Medical Mechanical Engineering and its Application	IWASAKI, Kiyotaka/OKAZAKI, Ken/ NIINAMI, Hiroshi/YAGI, Takanobu
Research on Biorobotics	ISHII, Hiroyuki/COSENTINO, Sarah/ TAKANISHI, Atsuo/FUJIMOTO, Hiroshi
Research on Exergy Engineering	NAKAGAKI, Takao
Research on Co-creative Interface Design	UESUGI, Shigeru
Research on Image Engineering	OHYA, Jun
Research on Applied Mechanics of Fluid-Structure Interaction	TAKIZAWA, Kenji
Research on Technology on Micro/Nano Fabrication	UMEZU, Shinjiro
Research on Mechanical Interaction Design	ISHIMURA, Kosei
Research on Multiagent Systems	ISHIDA, Toru/SUGANO, Shigeki/ HISHIYAMA, Reiko
Research on Fluid Mechanics of Computational Analysis	TAKIZAWA, Kenji/TEZDUYAR, Tayfun E.
Research on Systems Mechanics	KANEKO, Shigehiko/KUSAKA, Jin
Research on Adaptive Robotics	ISHII, Hiroyuki
Research on Automotive Powertrain	KUSAKA, Jin/Noyori, Takahiro
Research on Design Generation	ISHIMURA, Kosei/HIGUCHI, Ken/ MIYASHITA, Tomoyuki
Research on Energy System Mechanics	UEMICHI, Akane/KUSAKA, Jin
Research on Measurement Techniques in Thermofluid Dynamics	MATSUDA, yu

(II) Lecture courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Advanced Topics in Intellectual Property Rights, Technology, and Legal Affairs	2		○
Advanced Topics in Architectural Design and Engineering A	2	○	
Advanced Topics in Architectural Design and Engineering B	2		○
Advanced Topics in Robots and Systems A	2	○	
Advanced Topics in Environmental Management	2	○	
Advanced Topics in Environment and Thermal Energy Conversion Engineering	2		○
Advanced Topics in Environment and Thermal Energy Reaction Engineering	2	○	
Analysis and Discussion of Papers on Advanced Robotics	4	○	○
Materials Science and Engineering for Space Craft	2	○	
Image Engineering Advanced	2		○
Advanced Topics in Robots and Systems B	2		○
Seminar on Sensing in Embodiment Informatics A	4	○	
Seminar on Sensing in Embodiment Informatics B	4		○
Advanced Topics in Applied Mechanics of Fluid-Structure Interactions (Solid Mechanics)	2		○
Astroparticle Physics	2	Int.	
Lunar and planetary exploration and its science	2	Int.	
Manufacturing of Space Structures	2	○	
Thermal Design of Space System	2		○
Fluid Mechanics of Computing	2	Int.	
Design and Control of Space Structures	2		Int.
Design Optimization of Space Structures	2		Int.
Computational Fluid Mechanics	2		○
Advanced Topics in Applied Mechanics of Fluid-Structure Interactions (Fluid Mechanics)	2		○

(III) Seminar courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Structural Design A	3	○	
Seminar on Structural Design B	3		○
Seminar on Structural Design C	3	○	
Seminar on Structural Design D	3		○
Seminar on Intelligent Biomechatronic Systems A	3	○	
Seminar on Intelligent Biomechatronic Systems B	3		○
Seminar on Intelligent Biomechatronic Systems C	3	○	
Seminar on Intelligent Biomechatronic Systems D	3		○
Advanced Seminar on Environment and Energy Engineering A	3	○	
Advanced Seminar on Environment and Energy Engineering B	3		○
Seminar on Thermal Energy Reaction Engineering A	3	○	
Seminar on Thermal Energy Reaction Engineering B	3		○
Seminar on Neuro Robotics A	3	○	
Seminar on Neuro Robotics B	3		○
Seminar on Neuro Robotics C	3	○	
Seminar on Neuro Robotics D	3		○
Seminar on Transporters & Energy Plants Materials A	3	○	

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Transporters & Energy Plants Materials B	3		○
Seminar on Transporters & Energy Plants Materials C	3	○	
Seminar on Transporters & Energy Plants Materials D	3		○
Seminar on Biorobotics A	3	○	
Seminar on Biorobotics B	3		○
Seminar on Biorobotics C	3	○	
Seminar on Biorobotics D	3		○
Seminar on Medical Mechanical Engineering A	3	○	
Seminar on Medical Mechanical Engineering B	3		○
Seminar on Medical Mechanical Engineering C	3	○	
Seminar on Medical Mechanical Engineering D	3		○
Seminar on Exergy Engineering A	3	○	
Seminar on Exergy Engineering B	3		○
Seminar on Human-being Design A	3	○	
Seminar on Human-being Design B	3		○
Seminar on Human-being Design C	3	○	
Seminar on Human-being Design D	3		○
Seminar on Image Engineering A	3	○	
Seminar on Image Engineering B	3		○
Seminar on Image Engineering C	3	○	
Seminar on Image Engineering D	3		○
Seminars on Applied Mechanics of Fluid-Structure Interactions A	3	○	
Seminars on Applied Mechanics of Fluid-Structure Interactions B	3		○
Seminars on Applied Mechanics of Fluid-Structure Interactions C	3	○	
Seminars on Applied Mechanics of Fluid-Structure Interactions D	3		○
Seminar on Technology on Micro/Nano Fabrication A	3	○	
Seminar on Technology on Micro/Nano Fabrication B	3		○
Seminar on Technology on Micro/Nano Fabrication C	3	○	
Seminar on Technology on Micro/Nano Fabrication D	3		○
Seminar on Mechanical Interaction Design A	3	○	
Seminar on Mechanical Interaction Design B	3		○
Seminar on Mechanical Interaction Design C	3	○	
Seminar on Mechanical Interaction Design D	3		○
Seminar on Multiagent Systems A	3	○	
Seminar on Multiagent Systems B	3		○
Seminar on Multiagent Systems C	3	○	
Seminar on Multiagent Systems D	3		○
Seminar on Fluid Mechanics of Computational Analysis A	3	○	
Seminar on Fluid Mechanics of Computational Analysis B	3		○
Seminar on Fluid Mechanics of Computational Analysis C	3	○	
Seminar on Fluid Mechanics of Computational Analysis D	3		○
Seminar on Systems Mechanics A	3	○	
Seminar on Systems Mechanics B	3		○
Seminar on Systems Mechanics C	3	○	
Seminar on Systems Mechanics D	3		○
Seminar on Adaptive Robotics A	3	○	
Seminar on Adaptive Robotics B	3		○
Seminar on Adaptive Robotics C	3	○	
Seminar on Adaptive Robotics D	3		○
Seminar on Automotive Powertrain A	3	○	
Seminar on Automotive Powertrain B	3		○

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Automotive Powertrain C	3	○	
Seminar on Automotive Powertrain D	3		○
Seminar on Design Theory A	3	○	
Seminar on Design Theory B	3		○
Seminar on Design Theory C	3	○	
Seminar on Design Theory D	3		○
Seminar on Energy System Mechanics A	3	○	
Seminar on Energy System Mechanics B	3		○
Seminar on Energy System Mechanics C	3	○	
Seminar on Energy System Mechanics D	3		○
Seminar on Measurement Techniques in Thermofluid Dynamics A	3	○	
Seminar on Measurement Techniques in Thermofluid Dynamics B	3		○
Seminar on Measurement Techniques in Thermofluid Dynamics C	3	○	
Seminar on Measurement Techniques in Thermofluid Dynamics D	3		○

Guidelines for earning a Doctoral Degree

1. Five credits must be earned from the list of prescribed group courses.
2. One credit must be earned from the research ethics courses.
3. Four credits must be earned from the English courses, industrial society/liberal arts courses, self-competence development (business creation), courses offered by the department, or Master's courses. However, courses taken for credit during or before the master's program cannot be registered.

(I) Research guidance (Doctoral program)

Course Name	Supervisor
Research on Transporters & Energy Plants Materials Science and Engineering	YOSHIDA, Makoto
Research on Design of Mechanical Systems	MIYASHITA, Tomoyuki
Research on Intelligent Machines	SUGANO, Shigeki
Research on Medical Applications of Mechanical Engineering	IWASAKI, Kiyotaka/OKAZAKI, Ken/NIINAMI, Hiroshi/ YAGI, Takanobu
Research on Biorobotics	ISHII, Hiroyuki/COSENTINO, Sarah/TAKANISHI, Atsuo/ FUJIMOTO, Hiroshi
Research on Exergy Engineering	NAKAGAKI, Takao
Research on Thermal Energy Reaction Engineering	KUSAKA, Jin
Research on Environment-Conscious System and Machine	SEKIYA, Hiroshi
Research on Co-creative Interface Design	UESUGI, Shigeru
Research on Neuro Robotics	IWATA, Hiroyasu
Research on Transporters Production Technologies	OKANE, Toshimitsu/YOSHIDA, Makoto
Research on Bio-Mechanical System	SUGANO, Shigeki
Research on Field Robotics	SUGANO, Shigeki/MIYASHITA, Tomoyuki/ YOKOI, Kazuhito
Research on Human-Robot Interface	IWATA, Hiroyasu/UESUGI, Shigeru/ SCHMITZ, Alexander/SUGANO, Shigeki
Research on Image Engineering	OHYA, Jun
Research on Micro / Nano Fabrication	UMEZU, Shinjiro
Research on Applied Mechanics of Fluid-Structure Interaction	TAKIZAWA, Kenji
Research on Mechanical Interaction Design	ISHIMURA, Kosei
Research on Sophisticated Heat Protection	UMEZU, Shinjiro/SUZUKI, Toshiyuki
Research on Fluid Mechanics of Computational Analysis	TAKIZAWA, Kenji/TEZDUYAR, Tayfun E.
Research on Adaptive Robotics	ISHII, Hiroyuki
Research on Systems Mechanics	KANEKO, Shigehiko/KUSAKA, Jin
Research on Energy System Mechanics	UEMICHI, Akane/KUSAKA, Jin
Research on Measurement Techniques in Thermofluid Dynamics	MATSUDA, yu

(II) Course offered by the Department

Course Name	Credits	Term	
		Spring Semester	Fall Semester
体系的ロボット工学特論(Conducted in Japanese)	2		○
流体構造連成系応用力学特論（流体編）	2		○
流体構造連成系応用力学特論（構造力学編）	2		○
Computational Fluid Mechanics	2		○

Department of Industrial and Management Systems Engineering

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

Guidelines for earning a Doctoral Degree

1. Five credits must be earned from the list of prescribed group courses.
2. One credit must be earned from the research ethics courses.
3. Four credits must be earned from the English courses, industrial society/liberal arts courses, self-competence development (business creation), or courses offered by the department.

(I) Research guidance (Doctoral program)

Course Name	Supervisor
Research on Software Engineering	KISHI, Tomoji
Research on Manufacturing Systems Engineering	TANIMIZU, Yoshitaka
Research on Human Life Engineering	KOMATSUBARA, Akinori
Research on Systems Theory	TAKAHASHI, Shingo
Research on Statistical Science	EGUCHI, Shinto/NAGATA, Yasushi
Research on Applied Information Science	GOTO, Masayuki
Research on Operations Research	SHIINA, Takayuki
Research on Knowledge Information Processing	HISHIYAMA, Reiko
Research on Mathematical Decision Making	HASUIKE, Takashi
Research on Multiagent Systems	ISHIDA, Toru/SUGANO, Shigeki/ HISHIYAMA, Reiko

(II) Course offered by the Department

Course Name	Credits	Term	
		Spring Semester	Fall Semester
グローバル経営システム工学	1	○	○

Department of Business Design & Management

This program involves developing new businesses based on advanced technologies and their management there of, 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.”

Guidelines for earning a Doctoral Degree

1. Five credits must be earned from the list of prescribed group courses.
2. One credit must be earned from the research ethics courses.
3. One credit must be earned from the English course “Doctoral Student Technical Writing”.
4. Three credits must be earned from the English courses (excluding the course named in 3. above), industrial society/liberal arts courses, self-competence development (business creation), or courses offered by the department.
5. For joint courses with the master’s program, credits earned during the master’s program cannot be registered.

(I) Research guidance (Doctoral program)

Course Name	Supervisor
Research on Life Cycle Engineering	KOJIMA, Fumio/FUKUSHIGE, Shinichi
Research on Profit Engineering	OHNO, Takahiro
Research on Quality Management	MUNECHIKA, Masahiko
Research on Human Factors Management	KOMATSUBARA, Akinori/ MUNECHIKA, Masahiko
Research on Management Information	OHNO, Takahiro/GOTO, Masayuki
Research on Manufacturing Systems Engineering	KITO, Tomomi/KOJIMA, Fumio
Research on Complex Production Systems	KITO, Tomomi
Research on Production and Supply Chain Management	OHMORI, Shunichi
Research on Product- Service Systems	MIHARA, Koji
Research on Digital Disruption	IKEDA, Kazuaki/OHNO, Takahiro
Research on Innovation Management	KITO, Tomomi/HORII, Hideyuki
Research on Organizational Behavior Management	ZEMBA, Yuriko

(II) Courses offered by the Department

Course Name	Credits	Term	
		Spring Semester	Fall Semester
技術系経営幹部講話	1	spring quarter	
経営課題対応事例研究	1		fall quarter
経営工学の歴史と体系	1		fall quarter

Department of Civil and Environmental Engineering

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 of expertise and engineering judgement, they are expected to combine the use of advanced technologies and a deep knowledge of how society operates to improve the sustainability of human socio-economic systems. In this Department, education and research are conducted with the aim to foster the development of 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. One of the characteristics of the Department of Civil and Environmental Engineering is that each research area is significantly different from the others. Therefore, students need to carefully consider their aptitude and desired specialization, in order to decide their own area of research and study.

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 Mechanics and Foundation Engineering, 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

Given the various changes in the socio-economic environment of urban areas in recent years, the study of 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.

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.

(I) Research guidance (Master's program)

Course Name	Supervisor
Research on Transportation Studies and Planning	MORIMOTO, Akinori
Research on City and Regional Planning	SASAKI, Kuniaki
Research on Landscape and Aesthetics of Infrastructure	SASAKI, Yo
Research on Structural Mechanics	ONO, Kiyoshi
Research on Structural Engineering	IWANAMI, Motoi
Research on Structural Design	SATO, Yasuhiko
Research on Geotechnical Engineering	KOMINE, Hideo
Research on Soil Mechanics	AKAKI, Hirokazu
Research on Coastal Engineering and Management	SHIBAYAMA, Tomoya
Research on River Engineering	SEKINE, Masato
Research on Water and Environmental Engineering	SAKAKIBARA, Yutaka
Research on Concrete Structure	AKIYAMA, Mitsuyoshi
Research on Tunnel Engineering	IWANAMI, Motoi/TSUNO, Kiwamu

(II) Lecture courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Advanced Topics in Intellectual Property Rights, Technology, and Legal Affairs	2		○
Advanced Topics in Architectural Design and Engineering A	2	○	
Advanced Topics in Architectural Design and Engineering B	2		○
Urban Studies and Planning A	2		○
Advanced Structures and Materials	2		○
Advanced Soil Mechanics A	2	○	
Coastal Disaster Prevention	2	○	
Infrastructure Management	2		○
Advanced River Engineering	2	○	
Advanced Topics in Water and Environmental Engineering	2		○
Advanced Topics in Civil Engineering A	2		Int.
Advanced Soil Mechanics B	2		○
Advanced Topics in Civil Engineering B	2	Int.	

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Energy Geotechnics	2		Int.
Advanced Coastal Engineering	2	○	
Advanced Topics in Civil Engineering D	1	Int.	
Advanced Topics in Civil Engineering E	1		Int.
Steel Material and Structure	2	○	
International Development and Planning	2	○	
Practical City Planning and Design A	3	○	
Practical City Planning and Design B	3		○
Traffic and Safety Sciences	2		○
Sustainable Development Goals (SDGs)	2		○

(III) Seminar courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Transportation Studies and Planning A	3	○	
Seminar on Transportation Studies and Planning B	3		○
Seminar on Transportation Studies and Planning C	3	○	
Seminar on Transportation Studies and Planning D	3		○
Seminar on City and Regional Planning A	3	○	
Seminar on City and Regional Planning B	3		○
Seminar on City and Regional Planning C	3	○	
Seminar on City and Regional Planning D	3		○
Seminar on Landscape and Aesthetics of Infrastructure A	3	○	
Seminar on Landscape and Aesthetics of Infrastructure B	3		○
Seminar on Landscape and Aesthetics of Infrastructure C	3	○	
Seminar on Landscape and Aesthetics of Infrastructure D	3		○
Seminar on Structural Mechanics A	3	○	
Seminar on Structural Mechanics B	3		○
Seminar on Structural Mechanics C	3	○	
Seminar on Structural Mechanics D	3		○
Seminar on Structural Engineering A	3	○	
Seminar on Structural Engineering B	3		○
Seminar on Structural Engineering C	3	○	
Seminar on Structural Engineering D	3		○
Seminar on Structural Design A	3	○	
Seminar on Structural Design B	3		○
Seminar on Structural Design C	3	○	
Seminar on Structural Design D	3		○
Seminar on Geotechnical Engineering A	3	○	
Seminar on Geotechnical Engineering B	3		○
Seminar on Geotechnical Engineering C	3	○	
Seminar on Geotechnical Engineering D	3		○
Seminar on Soil Mechanics A	3	○	
Seminar on Soil Mechanics B	3		○
Seminar on Soil Mechanics C	3	○	
Seminar on Soil Mechanics D	3		○
Seminar on Coastal Engineering and Management A	3	○	
Seminar on Coastal Engineering and Management B	3		○
Seminar on Coastal Engineering and Management C	3	○	
Seminar on Coastal Engineering and Management D	3		○

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on River Engineering A	3	○	
Seminar on River Engineering B	3		○
Seminar on River Engineering C	3	○	
Seminar on River Engineering D	3		○
Seminar on Water Quality Engineering A	3	○	
Seminar on Water Quality Engineering B	3		○
Seminar on Water Quality Engineering C	3	○	
Seminar on Water Quality Engineering D	3		○
Seminar on Concrete Structure A	3	○	
Seminar on Concrete Structure B	3		○
Seminar on Concrete Structure C	3	○	
Seminar on Concrete Structure D	3		○

Guidelines for earning a Doctoral Degree

1. Five credits must be earned from the list of prescribed group courses.
2. One credit must be earned from the research ethics courses.
3. Four credits must be earned from the English courses, industrial society/liberal arts courses, self-competence development (business creation), or courses offered by the department.

(I) Research guidance (Doctoral program)

Course Name	Supervisor
Research on Structural Engineering	IWANAMI, Motoi
Research on Structural Design	SATO, Yasuhiko
Research on Structural Mechanics	ONO, Kiyoshi
Research on Water and Environmental Engineering	SAKAKIBARA, Yutaka
Research on River Engineering	SEKINE, Masato
Research on Soil Mechanics	AKAKI, Hirokazu
Research on Geotechnical Engineering	KOMINE, Hideo
Research on City and Regional Planning	SASAKI, Kuniaki
Research on Transportation Studies and Planning	MORIMOTO, Akinori
Research on Landscape and Aesthetics of Infrastructure	SASAKI, Yo
Research on Tunnel Engineering	IWANAMI, Motoi/TSUNO, Kiwamu
Research on Coastal Engineering and Management	SHIBAYAMA, Tomoya
Research on Concrete Structure	AKIYAMA, Mitsuyoshi

(II) Courses offered by the Department

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Exercise A of civil & environmental engineering	2	○	
Exercise B of civil & environmental engineering	2		○

Department of Earth Sciences, Resources and Environmental Engineering

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, Recourses Processing and Recycling Division, Materials Processing Engineering Division, and Environmental Protection Engineering Division.

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 subsurface storage 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.

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.

(I) Research guidance (Master's program)

Course Name	Supervisor
Research on Geo-Environmental Science	Not Determined
Research on Petroleum Engineering	KURIHARA, Masanori
Research on Resources Recycling Engineering	OWADA, Shuji
Research on Environmental Purification and Resources Processing	TOKORO, Chiharu
Research on Atmospheric and Aquatic Chemistry	OKOCHI, Hiroshi/HAYAMI, Hiroshi
Research on Geomechanics and Petroleum Production Engineering	FURUI, Kenji
Research on Exploration Geophysics	UEDA, Takumi
Research on Environmental and Occupational Hygiene	MURATA, Masaru
Research on Planetary Science	FAGAN, Timothy Jay
Research on Extractive Metallurgy and Materials Process Engineering	KUNIOSHI, Nilson/YAMAGUCHI, Katsunori

(II) Lecture courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Advanced Topics in Intellectual Property Rights, Technology, and Legal Affairs	2		○
Advanced Topics in Architectural Design and Engineering A	2	○	
Advanced Topics in Architectural Design and Engineering B	2		○
Advanced Environmental Interface Engineering	2		○
Resources and Environment	2	○	
Material Flow Analysis for Social System Design	2	○	
Resources Processing Technology	2	○	
Advanced Topics in Aquatic Chemistry	2		○
Advanced Reservoir Engineering	2	○	
Introduction to Geostatistics	2	○	
Applied Reservoir Simulation	2	○	
Enhanced Oil Recovery	2		○
Advanced Petroleum Production Engineering	2	○	
Advanced Numerical Rock Mechanics	2	○	
Physical Chemistry of Separation Technology	2		○
Advanced Topics on Resources Recycling	2		○
Advanced Topics on Geo-Environmental Science	2	○	
Advanced Topics in Atmospheric Science	2	○	
Advanced Topics in Occupational Hygiene	2		○
Complex Analysis for Engineering	2		Int.
Isotope geochemistry	2		○
Meteorites and Planetary Science	2		○

(III) Seminar courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Geo-Environmental Science A	3	○	
Seminar on Geo-Environmental Science B	3		○
Seminar on Geo-Environmental Science C	3	○	
Seminar on Geo-Environmental Science D	3		○
Seminar on Petroleum Engineering A	3	○	
Seminar on Petroleum Engineering B	3		○
Seminar on Petroleum Engineering C	3	○	
Seminar on Petroleum Engineering D	3		○
Seminar on Resources Recycling Engineering A	3	○	
Seminar on Resources Recycling Engineering B	3		○
Seminar on Resources Recycling Engineering C	3	○	
Seminar on Resources Recycling Engineering D	3		○
Seminar on Environmental Purification and Resources Processing A	3	○	
Seminar on Environmental Purification and Resources Processing B	3		○
Seminar on Environmental Purification and Resources Processing C	3	○	
Seminar on Environmental Purification and Resources Processing D	3		○
Seminar on Atmospheric and Aquatic Chemistry A	3	○	
Seminar on Atmospheric and Aquatic Chemistry B	3		○
Seminar on Atmospheric and Aquatic Chemistry C	3	○	
Seminar on Atmospheric and Aquatic Chemistry D	3		○
Seminar on Geomechanics and Petroleum Production Engineering A	3	○	
Seminar on Geomechanics and Petroleum Production Engineering B	3		○
Seminar on Geomechanics and Petroleum Production Engineering C	3	○	
Seminar on Geomechanics and Petroleum Production Engineering D	3		○
Seminar on Exploration Geophysics A	3	○	
Seminar on Exploration Geophysics B	3		○
Seminar on Exploration Geophysics C	3	○	
Seminar on Exploration Geophysics D	3		○
Seminar on Environmental and Occupational Hygiene A	3	○	
Seminar on Environmental and Occupational Hygiene B	3		○
Seminar on Environmental and Occupational Hygiene C	3	○	
Seminar on Environmental and Occupational Hygiene D	3		○
Seminar on Planetary Science A	3	○	
Seminar on Planetary Science B	3		○
Seminar on Planetary Science C	3	○	
Seminar on Planetary Science D	3		○
Seminar on Extractive Metallurgy and Materials Processing Engineering A	3	○	
Seminar on Extractive Metallurgy and Materials Processing Engineering B	3		○
Seminar on Extractive Metallurgy and Materials Processing Engineering C	3	○	
Seminar on Extractive Metallurgy and Materials Processing Engineering D	3		○

Guidelines for earning a Doctoral Degree

1. Five credits must be earned from the list of prescribed group courses.
2. One credit must be earned from the research ethics courses.
3. Four credits must be earned from the English courses, industrial society/liberal arts courses, self-competence development (business creation), or courses offered by the department.
4. For requirement 3. above, up to two credits from Master's courses offered by the department registered during doctoral program may be counted towards doctoral credits.

(I) Research guidance (Doctoral program)

Course Name	Supervisor
Research on Environmental and Occupational Hygiene	MURATA, Masaru
Research on Atmospheric and Aquatic Chemistry	OKOCHI, Hiroshi/HAYAMI, Hiroshi
Research on Resources Recycling Engineering	OWADA, Shuji
Research on Extractive Metallurgy and Materials Process Engineering	KUNIOSHI, Nilson/YAMAGUCHI, Katsunori
Research on Geomechanics and Petroleum Production Engineering	FURUI, Kenji
Research on Geo-Environmental Science	Not Determined
Research on Geochemistry of Mineral Resources	UCHIDA, Etsuo
Research on Applied Mineralogy	YAMAZAKI, Atsushi
Research on Planetary Science	FAGAN, Timothy Jay
Research on Structural Petrology	TAKAGI, Hideo
Research on Environmental Purification and Resources Processing	TOKORO, Chiharu
Research on Exploration Geophysics	UEDA, Takumi
Research on Petroleum Engineering	KURIHARA, Masanori
Research on Sedimentology	OHTA, Tohru
Research on Paleobiology	MORIYA, Kazuyoshi
Research on Volcanology	SUZUKI, Yuki
Research on Geochemistry	Not Determined

(II) Courses offered by the Department

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Special seminar on Mineral Resources	2	○	○
Special seminar on Petrology	2	○	○
Special seminar on Geology	2	○	○
Special seminar on Geoexploration Engineering	2	○	○
Special seminar on Development and Environmental Engineering	2	○	○
Special seminar on Resources Recycling Engineering	2	○	○
Special seminar on Materials Processing	2	○	○
Special seminar on Environmental Protection	2	○	○

Department of Pure and Applied Physics

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.

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 its application to astrophysics. In the study of nuclear structure, emphasis is placed on the study of infinitely-large hypothetical nuclei using quantum-mechanical many-body techniques. In relation to the above, structures of hot and cold neutron stars are also studied. 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 fundamental issues of quantum theory related to such topics as quantum coherence/ decoherence and quantum dynamics, as well as field quantization method itself, 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, inflationary cosmology, cosmic microwave background, dark matter and structure formation, and dark energy. 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 group is working mainly in the fields of observational cosmology, galaxy astrophysics, interstellar physics and planetary science by using panchromatic astronomical data. With the world cutting-edge observational facilities such as Subaru telescope and Atacama Large Millimeter/submillimeter Array (ALMA), we study formation and evolution of galaxies, super-massive black-holes, proto-clusters of galaxies and the large-scale structure of the Universe, cosmic reionization, and the intergalactic medium. We also study the interstellar dust and formation/evolution of planetary systems. We also make new proposals of large survey projects with next generation facilities and preparation studies for development of future space telescopes.

◆ 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.
(5) Theoretical studies on emergent phenomena and device functionalities of magnets, ferroelectrics and strongly correlated materials.

◆ 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 soft matter physics, laser physics, surface and interface physics, strongly correlated electron physics, optical process in solids, and low-dimensional 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) 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.

(6) Studies on the atomic arrangement, electronic structures, superconductivity, and magnetic properties in low-dimensional systems such as thin films, surface superstructures, graphene, and topological insulators.

◆ Biophysics

All of the biological phenomena are based on the physical properties of the constituent biomolecules, and the hierarchical organization and dynamic interactions between 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 is a wide variety of biophysical subjects to be studied, 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 keywords and the three research topics:

Keywords:

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 is 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 handling ultrafast phenomena of semiconductors and device applications,” 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

Take core courses and recommended courses, if they are specified, according to the instructions given by individual research areas.

Mathematical Physics

Core courses

Earn 2 credits from the following core course

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

Astrophysics

Core courses Earn 6 or more credits from the following core courses:	Recommended courses It is recommended that you take about 8 credits from the following recommended courses:
General Relativity and Gravitation	Advanced Quantum Mechanics A
Advanced Cosmology	Advanced Quantum Mechanics B
Elementary Processes in Astrophysical Phenomena A	Advanced Elementary Particle Physics A
Elementary Processes in Astrophysical Phenomena B	Advanced Elementary Particle Physics B
Formation and Evolution of Astronomical Objects A	Nuclear Physics A
Formation and Evolution of Astronomical Objects B	Nuclear Physics B
	Nuclear Astrophysics
	Experimental High Energy Particle Physics A
	Experimental High Energy Particle Physics B
	Experimental High Energy Particle Physics C
	Experimental High Energy Particle Physics D
	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

Theory of Condensed Matter Physics

Core courses

Earn 2 or more courses from the following core courses:.

Quantum Physics of Matter A	There are no recommended courses.
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	
Optical Processes in Solids	
Soft Condensed Matter Physics (Experiment)	
Intense Laser Physics	
Surface and Interface Physics	
Strongly Correlated Electron Physics	
Semiconductor Quantum Physics	

Condensed Matter Physics

Core courses

Earn 4 or more courses from the following core courses:.

Optical Processes in Solids	There are no recommended courses.
Soft Condensed Matter Physics (Experiment)	
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	
Low-Dimensional Physics	

Particle and Applied Radiation Physics

Core courses Earn 4 or more credits from the following core courses	Recommended courses Taking your supervisor's courses is required.
Particle Accelerator Applications	Soft Condensed Matter Physics (Experiment)
Advanced Radiation Measurements	Soft Condensed Matter Physics (Theory & Simulation)
Experimental High Energy Particle Physics A, D	Elementary Processes in Astrophysical Phenomena A, B
	Formation and Evolution of Astronomical Objects A, B

Physics-Based Engineering: Informatics, Photonics and Image Science

Core courses

Earn 6 or more credits from the following core courses:.

Advanced Quantum Optics
Semiconductor Quantum Physics
Image Processing
Integrated and Guided Optics
Measurement and Information Technology

There are no recommended courses.

Biophysics

Core courses	Recommended courses
Computational Biophysics	Soft Condensed Matter Physics (Experiment)
Molecular Biophysics	Soft Condensed Matter Physics (Theory & Simulation)
Experimental Biophysics	Physics of Non-Equilibrium Systems A
	Physics of Non-Equilibrium Systems B
	Advanced Statistical Physics
	Surface and Interface Physics

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. Unless there are special circumstances, it is assumed that you take the seminar courses provided by your supervisor in each academic year. 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 pay attention to "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.

(I) Research guidance (Master's program)

Course Name	Supervisor
Research on Mathematical Physics	OZAWA, Tohru/ GUEORGUIEV, Vladimir Simeonov
Research on Mathematical Physics	KOIKE, Shigeaki
Research on Theoretical Particle Physics	ABE, Hiroyuki
Research on Theoretical Nuclear Physics	TAKANO, Masatoshi
Research on Theoretical Foundations of Quantum Mechanics	NAKAZATO, Hiromichi
Research on Theoretical Astrophysics and Cosmology	TSUJIKAWA, Shinji
Research on Theoretical Astrophysics	YAMADA, Shoichi
Research on Observational Astrophysics	KATAOKA, Jun/MOTZ, Holger Martin
Research on Observational Astrophysics	INOUE, Akio
Research on Emergent Materials Physics	MOCHIZUKI, Masahito
Research on Physics of Nonequilibrium Systems	YAMAZAKI, Yoshihiro
Research on Quantum Physics of Complex Systems	KATSUFUJI, Takuro
Research on Soft Matter Physics	TABE, Yuka
Research on Experimental Biophysics	YASUDA, Kenji
Research on Molecular Biophysics	UEDA, Taro
Research on Theoretical Biophysics	TAKANO, Mitsunori
Research on Beam Applications	YORITA, Kohei/WASHIO, Masakazu
Research on Semiconductor Devices	TAKEUCHI, Atsushi
Research on Integrated Optical Devices	KITA, Tomohiro
Research on Measurement and Information Technology	SAWADA, Hideyuki
Research on Image Processing	MORISHIMA, Shigeo
Research on Applied Radiation Physics	KATAOKA, Jun
Research on Experimental Particle Physics	YORITA, Kohei
Research on Theoretical Quantum Physics	YUASA, Kazuya
Research on Quantum and Laser Physics	NIIKURA, Hiromichi
Research on Quantum Optics	AOKI, Takao
Research on Nonlinear Physics	HARAYAMA, Takahisa
Research on Electronic Correlation Physics	MIZOKAWA, Takashi
Research on Surface and Interface Non-equilibrium Physics	HASEGAWA, Tsuyoshi
Research on Low-Dimensional Physics	TAKAYAMA, Akari

(II) Lecture courses

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

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Mathematical Physics A	2	○	
Advanced Quantum Mechanics A	2	○	
Advanced Elementary Particle Physics A	2	○	
Nuclear Physics A	2	○	
Nuclear Astrophysics	2	○	
Quantum Physics of Matter A	2	○	
Quantum Physics of Matter B	2	○	
Optical Processes in Solids	2	○	
Soft Condensed Matter Physics (Experiment)	2	○	
Soft Condensed Matter Physics (Theory & Simulation)	2	○	
Measurement and Information Technology	2	○	
Advanced Quantum Optics	2	○	
Advanced Theoretical Quantum Physics A	2	○	
Advanced Theoretical Quantum Physics B	2	○	
Formation and Evolution of Astronomical Objects A	2	○	
Formation and Evolution of Astronomical Objects B	2	○	
Molecular Biophysics	2	○	
Experimental Biophysics	2	○	
Image Processing	2	Int.	
General Relativity and Gravitation	2	spring quarter	
Advanced Cosmology	2	spring quarter	
Advanced Quantum Mechanics B	2		○
Advanced Elementary Particle Physics B	2		○
Nuclear Physics B	2		○
Elementary Processes in Astrophysical Phenomena A	2		○
Elementary Processes in Astrophysical Phenomena B	2		○
Experimental High Energy Particle Physics A	2		○
Advanced Statistical Physics	2		○
Particle Accelerator Applications	2		○
Integrated and Guided Optics	2		○
Semiconductor Quantum Physics	2		○
Intense Laser Physics	2		○
Physics of Non-Equilibrium Systems A	2		○
Physics of Non-Equilibrium Systems B	2		○
Strongly Correlated Electron Physics	2		○
Surface and Interface Physics	2		○
Advanced radiation measurements	2		○
Advanced Theory of Partial Differential Equations	2		○
Low-Dimensional Physics	2		○
Computational Biophysics	2		○
Experimental High Energy Particle Physics D	2		Int.

(III) Seminar courses

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

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Mathematical Physics A	3	○	
Seminar on Mathematical Physics B	3		○
Seminar on Mathematical Physics C	3	○	
Seminar on Mathematical Physics D	3		○
Seminar on Theoretical Particle Physics A	3	○	
Seminar on Theoretical Particle Physics B	3		○
Seminar on Theoretical Particle Physics C	3	○	
Seminar on Theoretical Particle Physics D	3		○
Seminar on Theoretical Nuclear Physics A	3	○	
Seminar on Theoretical Nuclear Physics B	3		○
Seminar on Theoretical Nuclear Physics C	3	○	
Seminar on Theoretical Nuclear Physics D	3		○
Seminar on Theoretical Foundations of Quantum Mechanics A	3	○	
Seminar on Theoretical Foundations of Quantum Mechanics B	3		○
Seminar on Theoretical Foundations of Quantum Mechanics C	3	○	
Seminar on Theoretical Foundations of Quantum Mechanics D	3		○
Seminar on Theoretical Astrophysics and Cosmology A	3	○	
Seminar on Theoretical Astrophysics and Cosmology B	3		○
Seminar on Theoretical Astrophysics and Cosmology C	3	○	
Seminar on Theoretical Astrophysics and Cosmology D	3		○
Seminar on High Energy Astrophysics A	3	○	
Seminar on High Energy Astrophysics B	3		○
Seminar on Gravitational Physics A	3	○	
Seminar on Gravitational Physics B	3		○
Seminar on Mathematics of Pattern Formation A	3	○	
Seminar on Mathematics of Pattern Formation B	3		○
Seminar on Physics of Pattern Formation A	3	○	
Seminar on Physics of Pattern Formation B	3		○
Seminar on Quantum Physics of Complex Systems A	3	○	
Seminar on Quantum Physics of Complex Systems B	3		○
Seminar on Quantum Physics of Complex Systems C	3	○	
Seminar on Quantum Physics of Complex Systems D	3		○
Seminar on Soft Matter Physics A	3	○	
Seminar on Soft Matter Physics B	3		○
Seminar on Soft Matter Physics C	3	○	
Seminar on Soft Matter Physics D	3		○
Seminar on Experimental Biophysics A	3	○	
Seminar on Experimental Biophysics B	3		○
Seminar on Experimental Biophysics C	3	○	
Seminar on Experimental Biophysics D	3		○
Seminar on Molecular Biophysics A	3	○	
Seminar on Molecular Biophysics B	3		○
Seminar on Molecular Biophysics C	3	○	
Seminar on Molecular Biophysics D	3		○
Seminar on Theoretical Biophysics A	3	○	
Seminar on Theoretical Biophysics B	3		○
Seminar on Simulations in Biophysics A	3	○	

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Simulations in Biophysics B	3		○
Seminar on Accelerator Applications A	3	○	
Seminar on Accelerator Applications B	3		○
Seminar on Accelerator Applications C	3	○	
Seminar on Accelerator Applications D	3		○
Seminar on Semiconductor Devices A	3	○	
Seminar on Semiconductor Devices B	3		○
Seminar on Semiconductor Devices C	3	○	
Seminar on Semiconductor Devices D	3		○
Seminar on Measurement and Information Technology A	3	○	
Seminar on Measurement and Information Technology B	3		○
Seminar on Measurement and Information Technology C	3	○	
Seminar on Measurement and Information Technology D	3		○
Seminar on Image Processing A	3	○	
Seminar on Image Processing B	3		○
Seminar on Image Processing C	3	○	
Seminar on Image Processing D	3		○
Seminar on Applied Radiation Physics A	3	○	
Seminar on Applied Radiation Physics B	3		○
Seminar on Applied Radiation Physics C	3	○	
Seminar on Applied Radiation Physics D	3		○
Seminar on Experimental Particle Physics A	3	○	
Seminar on Experimental Particle Physics B	3		○
Seminar on Experimental Particle Physics C	3	○	
Seminar on Experimental Particle Physics D	3		○
Seminar on Theoretical Quantum Physics A	3	○	
Seminar on Theoretical Quantum Physics B	3		○
Seminar on Theoretical Quantum Physics C	3	○	
Seminar on Theoretical Quantum Physics D	3		○
Seminar on Atomic, Molecular and Optical Physics A	3	○	
Seminar on Atomic, Molecular and Optical Physics B	3		○
Seminar on Atomic, Molecular and Optical Physics C	3	○	
Seminar on Atomic, Molecular and Optical Physics D	3		○
Seminar on Quantum Optics A	3	○	
Seminar on Quantum Optics B	3		○
Seminar on Quantum Optics C	3	○	
Seminar on Quantum Optics D	3		○
Seminar on Nonlinear Physics A	3	○	
Seminar on Nonlinear Physics B	3		○
Seminar on Nonlinear Physics C	3	○	
Seminar on Nonlinear Physics D	3		○
Seminar on Electronic Correlation Physics A	3	○	
Seminar on Electronic Correlation Physics B	3		○
Seminar on Electronic Correlation Physics C	3	○	
Seminar on Electronic Correlation Physics D	3		○
Seminar on Surface and Interface Non-equilibrium Physics A	3	○	
Seminar on Surface and Interface Non-equilibrium Physics B	3		○
Seminar on Surface and Interface Non-equilibrium Physics C	3	○	
Seminar on Surface and Interface Non-equilibrium Physics D	3		○
Seminar on Emergent Materials Physics A	3	○	
Seminar on Emergent Materials Physics B	3		○

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Emergent Materials Physics C	3	○	
Seminar on Emergent Materials Physics D	3		○
Seminar on Integrated Optical Devices A	3	○	
Seminar on Integrated Optical Devices B	3		○
Seminar on Integrated Optical Devices C	3	○	
Seminar on Integrated Optical Devices D	3		○
Seminar on Observational Astrophysics A	3	○	
Seminar on Observational Astrophysics B	3		○
Seminar on Observational Astrophysics C	3	○	
Seminar on Observational Astrophysics D	3		○
Seminar on Mathematical Physics A	3	○	
Seminar on Mathematical Physics B	3		○
Seminar on Mathematical Physics C	3	○	
Seminar on Mathematical Physics D	3		○
Seminar on Low-Dimensional Physics A	3	○	
Seminar on Low-Dimensional Physics B	3		○
Seminar on Low-Dimensional Physics C	3	○	
Seminar on Low-Dimensional Physics D	3		○

Guidelines for earning a Doctoral Degree

1. Five credits must be earned from the list of prescribed group courses.
2. One credit must be earned from the research ethics courses.
3. Four credits must be earned from the English courses, industrial society/liberal arts courses, self-competence development (business creation), or courses offered by the department.

(I) Research guidance (Doctoral program)

Course Name	Supervisor
Research on Mathematical Physics	OZAWA, Tohru/ GUEORGUIEV, Vladimir Simeonov
Research on Mathematical Physics	KOIKE, Shigeaki
Research on Theoretical Particle Physics	ABE, Hiroyuki
Research on Theoretical Nuclear Physics	TAKANO, Masatoshi
Research on Theoretical Foundations of Quantum Mechanics	NAKAZATO, Hiromichi
Research on Theoretical Astrophysics and Cosmology	TSUJIKAWA, Shinji
Research on Theoretical Astrophysics	YAMADA, Shoichi
Research on Observational Astrophysics	KATAOKA, Jun/MOTZ, Holger Martin
Research on Observational Astrophysics	INOUE, Akio
Research on Emergent materials physics	MOCHIZUKI, Masahito
Research on Physics of Nonequilibrium Systems	YAMAZAKI, Yoshihiro
Research on Quantum Physics of Complex Systems	KATSUFUJI, Takuro
Research on Soft Matter Physics	TABE, Yuka
Research on Experimental Biophysics	YASUDA, Kenji
Research on Molecular Biophysics	UEDA, Taro
Research on Theoretical Biophysics	TAKANO, Mitsunori
Research on Beam Applications	YORITA, Kohei/WASHIO, Masakazu
Research on Semiconductor Devices	TAKEUCHI, Atsushi
Research on Integrated Optical Devices	KITA, Tomohiro

Course Name	Supervisor
Research on Measurement and Information Technology	SAWADA, Hideyuki
Research on Image Processing	MORISHIMA, Shigeo
Research on Applied Radiation Physics	KATAOKA, Jun
Research on Experimental Particle Physics	YORITA, Kohei
Research on Theoretical Quantum Physics	YUASA, Kazuya
Research on Quantum and Laser Physics	NIIKURA, Hiromichi
Research on Quantum Optics	AOKI, Takao
Research on Nonlinear Physics	HARAYAMA, Takahisa
Research on Electronic Correlation Physics	MIZOKAWA, Takashi
Research on Surface and Interface Non-equilibrium Physics	HASEGAWA, Tsuyoshi
Research on Low-Dimensional Physics	TAKAYAMA, Akari

(II) Courses offered by the Department

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Study Abroad in Physics and Applied Physics A	1	○	○
Study Abroad in Physics and Applied Physics B	1	○	○
Study Abroad in Physics and Applied Physics C	1	○	○
Study Abroad in Physics and Applied Physics D	1	○	○

Department of Chemistry and Biochemistry

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.

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 synthetic organic 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 to create 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 Synthetic Chemistry	
Advanced Reaction Organic Chemistry	

Physical Chemistry

Core courses	Recommended courses
Advanced Electronic State Theory	
Advanced Structural Chemistry	
Advanced Photo Physical Chemistry	

Inorganic and Analytical Chemistry

Core courses	Recommended courses
Advanced Inorganic Reaction Chemistry	
Advanced Coordination Chemistry	

Biochemistry

Core courses	Recommended courses
Advanced Chemical Biology	
Advanced Biomolecular Chemistry	
Advanced Molecular Biology	

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.

(I) Research guidance (Master's program)

Course Name	Supervisor
Research on Structural Chemistry	FURUKAWA, Yukio
Research on Electronic State Theory	NAKAI, Hiromi
Research on Chemical Synthesis Method	NAKADA, Masahisa
Research on Functional Organic Chemistry	KANOMATA, Nobuhiro
Research on Reaction Organic Chemistry	SHIBATA, Takanori
Research on Inorganic Reaction Chemistry	ISHIHARA, Koji
Research on Coordination Chemistry	YAMAGUCHI, Tadashi
Research on Biomolecular Chemistry	KOIDE, Takaki
Research on Chemical Biology	NAKAO, Youichi
Research on Molecular Biology	TERADA, Yasuhiko
Research on Photo-Physical Chemistry	IMURA, Kohei
Research on Chem-Informatics	SEINO, Junji
Research on Advanced Photo-Physical Chemistry	IMURA, Kohei/OKAMOTO, Hiromi
Research on Methods in Synthetic Organic Chemistry	YAMAMOTO, Kana

(II) Lecture courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Experiments in Chemistry and Biochemistry	2	○	○
Advanced Structural Chemistry	2	○	
Advanced Reaction Organic Chemistry	2	○	
Advanced Coordination Chemistry	2	○	
Advanced Chemical Biology	2	○	
Advanced Molecular Biology	2	○	
Advanced Photo Physical Chemistry	2	○	
Assessment and Design of Chemical Technologies II	2	Int.	
Advanced Electronic State Theory	2		○
Advanced Synthetic Chemistry	2		○
Advanced Functional Organic Chemistry	2		○
Advanced Inorganic Reaction Chemistry	2		○
Advanced Biomolecular Chemistry	2		○
Advanced Chem-Informatics	2		○
Advanced Nano-Photonic Chemistry	2	Int.	
Assessment and Design of Chemical Technologies I	2		Int.

(III) Seminar courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Structural Chemistry A	3	○	
Seminar on Structural Chemistry B	3		○
Seminar on Structural Chemistry C	3	○	
Seminar on Structural Chemistry D	3		○
Seminar on Electronic State Theory A	3	○	
Seminar on Electronic State Theory B	3		○
Seminar on Electronic State Theory C	3	○	
Seminar on Electronic State Theory D	3		○
Seminar on Chemical Synthesis Methods A	3	○	
Seminar on Chemical Synthesis Methods B	3		○
Seminar on Chemical Synthesis Methods C	3	○	
Seminar on Chemical Synthesis Methods D	3		○
Seminar on Functional Organic Chemistry A	3	○	
Seminar on Functional Organic Chemistry B	3		○
Seminar on Functional Organic Chemistry C	3	○	
Seminar on Functional Organic Chemistry D	3		○
Seminar on Reaction Organic Chemistry A	3	○	
Seminar on Reaction Organic Chemistry B	3		○
Seminar on Reaction Organic Chemistry C	3	○	
Seminar on Reaction Organic Chemistry D	3		○
Seminar on Inorganic Reaction Chemistry A	3	○	
Seminar on Inorganic Reaction Chemistry B	3		○
Seminar on Inorganic Reaction Chemistry C	3	○	
Seminar on Inorganic Reaction Chemistry D	3		○
Seminar on Coordination Chemistry A	3	○	
Seminar on Coordination Chemistry B	3		○
Seminar on Coordination Chemistry C	3	○	
Seminar on Coordination Chemistry D	3		○

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Biomolecular Chemistry A	3	○	
Seminar on Biomolecular Chemistry B	3		○
Seminar on Biomolecular Chemistry C	3	○	
Seminar on Biomolecular Chemistry D	3		○
Seminar on Chemical Biology A	3	○	
Seminar on Chemical Biology B	3		○
Seminar on Chemical Biology C	3	○	
Seminar on Chemical Biology D	3		○
Seminar on Molecular Biology A	3	○	
Seminar on Molecular Biology B	3		○
Seminar on Molecular Biology C	3	○	
Seminar on Molecular Biology D	3		○
Seminar on Photo-Physical Chemistry A	3	○	
Seminar on Photo-Physical Chemistry B	3		○
Seminar on Photo-Physical Chemistry C	3	○	
Seminar on Photo-Physical Chemistry D	3		○
Seminar on Chem-Informatics A	3	○	
Seminar on Chem-Informatics B	3		○
Seminar on Chem-Informatics C	3	○	
Seminar on Chem-Informatics D	3		○
Seminar on Methods in Synthetic Organic Chemistry A	3	○	
Seminar on Methods in Synthetic Organic Chemistry B	3		○
Seminar on Methods in Synthetic Organic Chemistry C	3	○	
Seminar on Methods in Synthetic Organic Chemistry D	3		○
Seminar on Advanced Photo-Physical Chemistry A	3	○	
Semnar on Advanced Photo-Physical Chemistry B	3		○
Seminar on Advanced Photo-Physical Chemistry C	3	○	
Seminar on Advanced Photo-Physical Chemistry D	3		○

Guidelines for earning a Doctoral Degree

1. Five credits must be earned from the list of prescribed group courses.
2. One credit must be earned from the research ethics courses.
3. One credit must be earned from the English course “Doctoral Student Technical Writing”.
4. Three credits must be earned from the English courses (excluding the course named in 3. above), industrial society/liberal arts courses, self-competence development (business creation), or courses offered by the department.

(I) Research guidance (Doctoral program)

Course Name	Supervisor
Research on Structural Chemistry	FURUKAWA, Yukio
Research on Electronic State Theory	NAKAI, Hiromi
Research on Chemical Synthesis Method	NAKADA, Masahisa
Research on Functional Organic Chemistry	KANOMATA, Nobuhiro
Research on Reaction Organic Chemistry	SHIBATA, Takanori
Research on Inorganic Reaction Chemistry	ISHIHARA, Koji
Research on Coordination Chemistry	YAMAGUCHI, Tadashi

Course Name	Supervisor
Research on Biomolecular Chemistry	KOIDE, Takaki
Research on Chemical Biology	NAKAO, Youichi
Research on Molecular Biology	TERADA, Yasuhiko
Research on Photo-Physical Chemistry	IMURA, Kohei
Research on Chem-Informatics	SEINO, Junji
Research on Advanced Photo-Physical Chemistry	IMURA, Kohei/OKAMOTO, Hiromi
Research on Methods in Synthetic Organic Chemistry	YAMAMOTO, Kana

(II) Courses offered by the Department

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Special Seminar on Chemistry and Biochemistry A	1	○	
Special Seminar on Chemistry and Biochemistry B	1		○
Special Seminar Abroad on Chemistry and Biochemistry	1	○	○

Department of Applied Chemistry

In 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 transformation of energy and materials while integrating interdisciplinary fields based on chemistry. In the master’s program, through education and studies in research and development of the advanced chemical fields in response to deepened and refined specialized fields, students are educated with research abilities (planning, implementation, evaluation) putting emphasis on practical sciences and engineering. Students are also supposed to develop broad knowledge and practical skills by taking courses which strengthen their basic scholastic ability, deal with profound fields of study, and provide high-level literacy including technologist ethics. In the doctoral program, through the world-class study activities, students will become professional researchers who have the ability to plan original and creative research projects, possess leadership qualities, and can develop practical chemistry as solutions for sustainable society.

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 metals and ceramics. Since polymers are macromolecules, it is possible to discover various new functions related to electronics, biotechnology, etc. depending on the chemical structure and sequence of units, combination methods and the degree of polymerization, and the assembly and

arrangement of macromolecules. 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 energy-storage and -conversion, super engineering plastics synthesis, precision polymerization, and controlled nanostructures, 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.

◆ Applied Physical Chemistry

Physical chemistry includes the basic areas in chemistry such as thermodynamics, chemical equilibrium, reaction kinetics, quantum chemistry, and electrochemistry, and is an essential field for students in 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.

◆ 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.

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

	Recommended courses (common)
There are no recommended courses.	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
	Assessment and Design of Chemical Technologies I
	Assessment and Design of Chemical Technologies II

Inorganic Synthetic Chemistry

Core courses	
Advanced Inorganic Chemistry	There are no recommended courses.

Polymer Chemistry

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

Catalytic Chemistry

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

Applied Biochemistry

Core courses	
Advanced Biochemistry	There are no recommended courses.

Applied Physical Chemistry

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

Chemical Engineering

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

Synthetic Organic Chemistry

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

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.

(I) Research guidance (Master's program)

Course Name	Supervisor
Research on Inorganic Synthetic Chemistry	SHIMOJIMA, Atsushi
Research on Inorganic Synthetic Chemistry	SUGAHARA, Yoshiyuki/GUEGAN, Regis
Research on Polymer Chemistry	OYAIZU, Kenichi/MIYASAKA, Tsutomu
Research on Polymer Chemistry	SUGA, Takeo
Research on Catalytic Chemistry	SEKINE, Yasushi
Research on Catalytic Chemistry	MATSUKATA, Masahiko
Research on Applied Biochemistry	KINO, Kuniki/UMENO, Daisuke
Research on Applied Biochemistry	KIRIMURA, Kotaro
Research on Functional Surface Chemistry	HOMMA, Takayuki
Research on Applied Electrochemistry	MOMMA, Toshiyuki
Research on Chemical Engineering	HIRASAWA, Izumi/KOHORI, Fukashi
Research on Chemical Engineering	NODA, Suguru
Research on Synthetic Organic Chemistry	HOSOKAWA, Seijiro
Research on Synthetic Organic Chemistry	YAMAGUCHI, Junichiro
Research on Energy Materials	FUKUNAGA, Akihiko/MIYATAKE, Kenji

(II) Lecture courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Advanced Inorganic Chemistry	2	○	
Advanced Physical Chemistry A	2	○	
Advanced Physical Chemistry B	2	○	
Advanced Organic Chemistry A	2	○	
Advanced Organic Chemistry B	2	○	
Advanced Chemical Engineering A	2	○	
Advanced Chemical Engineering B	2	○	
Advanced Biochemistry	2	○	
Assessment and Design of Chemical Technologies II	2	Int.	
Assessment and Design of Chemical Technologies I	2		Int.
Advanced Energy Materials A	1		fall quarter
Advanced Energy Materials B	1		winter quarter

(III) Seminar courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Inorganic Solid State Chemistry A	3	○	
Seminar on Inorganic Solid State Chemistry B	3		○
Seminar on Inorganic Reaction Mechanisms A	3	○	
Seminar on Inorganic Reaction Mechanisms B	3		○
Seminar on Inorganic Materials Chemistry A	3	○	
Seminar on Inorganic Materials Chemistry B	3		○
Seminar on Hybrid Materials Chemistry A	3	○	
Seminar on Hybrid Materials Chemistry B	3		○
Seminar on Physical Chemistry of Polymers A	3	○	
Seminar on Physical Chemistry of Polymers B	3		○
Seminar on Polymer Materials A	3	○	
Seminar on Polymer Materials B	3		○
Seminar on Polymer Synthesis A	3	○	
Seminar on Polymer Synthesis B	3		○
Seminar on Biopolymers A	3	○	
Seminar on Biopolymers B	3		○
Seminar on Catalytic Processes A	3	○	
Seminar on Catalytic Processes B	3		○
Seminar on Energy and Fuel A	3	○	
Seminar on Energy and Fuel B	3		○
Seminar on Catalytic Chemistry A	3	○	
Seminar on Catalytic Chemistry B	3		○
Seminar on Organic Catalytic Reactions A	3	○	
Seminar on Organic Catalytic Reactions B	3		○
Seminar on Biochemical Mechanics A	3	○	
Seminar on Biochemical Mechanics B	3		○
Seminar on Applied Biochemistry A	3	○	
Seminar on Applied Biochemistry B	3		○
Seminar on Applied Bioscience A	3	○	
Seminar on Applied Bioscience B	3		○
Seminar on Genetic Engineering A	3	○	
Seminar on Genetic Engineering B	3		○
Seminar on Chemical Process Engineering A	3	○	

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Chemical Process Engineering B	3		○
Seminar on Separation Engineering A	3	○	
Seminar on Separation Engineering B	3		○
Seminar on Synthetic Organic Chemistry A	3	○	
Seminar on Synthetic Organic Chemistry B	3		○
Seminar on Bioactive Substances Science A	3	○	
Seminar on Bioactive Substances Science B	3		○
Seminar on Advanced Molecular Design A	3	○	
Seminar on Advanced Molecular Design B	3		○
Seminar on Advanced Molecular Synthesis A	3	○	
Seminar on Advanced Molecular Synthesis B	3		○
Seminar on Electronic Materials Chemistry A	3	○	
Seminar on Electronic Materials Chemistry B	3		○
Seminar on Applied Physical Chemistry A	3	○	
Seminar on Applied Physical Chemistry B	3		○
Seminar on Physical Electrochemistry A	3	○	
Seminar on Physical Electrochemistry B	3		○
Seminar on Functional Surface Chemistry A	3	○	
Seminar on Functional Surface Chemistry B	3		○
Seminar on Reaction Engineering A	3	○	
Seminar on Reaction Engineering B	3		○
Seminar on Material Process Engineering A	3	○	
Seminar on Material Process Engineering B	3		○
Seminar on Energy Materials A	3	○	
Seminar on Energy Materials B	3		○
Seminar on Energy Physical Chemistry A	3	○	
Seminar on Energy Physical Chemistry B	3		○

Guidelines for earning a Doctoral Degree

1. Five credits must be earned from the list of prescribed group courses.
2. One credit must be earned from the research ethics courses.
3. One credit must be earned from the English course “Doctoral Student Technical Writing”.
4. Three credits must be earned from the English courses (excluding the course named in 3. above), industrial society/liberal arts courses, self-competence development (business creation), or courses offered by the department.

(I) Research guidance (Doctoral program)

Course Name	Supervisor
Research on Inorganic Synthetic Chemistry	SHIMOJIMA, Atsushi
Research on Inorganic Synthetic Chemistry	SUGAHARA, Yoshiyuki/GUEGAN, Regis
Research on Polymer Chemistry	OYAIZU, Kenichi/MIYASAKA, Tsutomu
Research on Polymer Chemistry	SUGA, Takeo
Research on Catalytic Chemistry	SEKINE, Yasushi
Research on Catalytic Chemistry	MATSUKATA, Masahiko
Research on Applied Biochemistry	KINO, Kuniki/UMENO, Daisuke
Research on Applied Biochemistry	KIRIMURA, Kotaro
Research on Functional Surface Chemistry	HOMMA, Takayuki
Research on Applied Electrochemistry	MOMMA, Toshiyuki
Research on Chemical Engineering	HIRASAWA, Izumi
Research on Chemical Engineering	NODA, Suguru
Research on Synthetic Organic Chemistry	HOSOKAWA, Seijiro
Research on Synthetic Organic Chemistry	YAMAGUCHI, Junichiro
Research on Energy Materials	FUKUNAGA, Akihiko/MIYATAKE, Kenji

(II) Courses offered by the Department

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Practical Chemical Wisdom: Seminar I	1	○	○
Practical Chemical Wisdom: Seminar II	1	○	○

Department of Life Science and Medical Bioscience

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.

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-responsible 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.

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.

(I) Research guidance (Master's program)

Course Name	Supervisor
Research on Environmental Biotechnology	TSUNEDA, Satoshi/NODA, Nohiro
Research on Biomolecular Assembly	TAKEOKA, Shinji
Research on Solid State Bioscience	ASAHI, Toru
Research on Neurophysiology	INOUE, Takafumi/TANIFUJI, Manabu/ MCHUGH, Thomas John/MIYAWAKI, Atsushi
Research on Molecular Brain Science	OHSHIMA, Toshio/OKAMOTO, hitoshi/ SHIMOGORI, Satomi/NAGAI, Jun
Research on Molecular Medicine and Biochemistry	GODA, Nobuhito/TAKUBO, Keiyo/ TANAKA, Minoru
Research on Molecular Oncology	OHKI, Rieko/SEMBA, Kentaro
Research on Biomaterials Science and Engineering	TAKEDA, Naoya
Research on Biomolecular Science and Engineering	TAKEYAMA, Haruko/HOSOKAWA, Masahito/ YURA, Kei/SUZUKI, Tadaki/ TAKAHASHI, Yoshimasa
Research on Cytoskeletal Logistics	SATO, Masamitsu

(II) Lecture courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Advanced Neuroscience	2	○	
Advanced Solid State Bioscience	2	○	
Brain Science Lecture B	2	○	
Advanced Biomaterials Science and Engineering	2	○	
Advanced Molecular Oncology B	1	Int.	
Advanced Medical Biochemistry	1	Int.	
Advanced Topics on Biomolecular Assembly	2		○
Brain Science Lecture A	2		○
Cytoskeletal Regulation	2		○

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Advanced Molecular Biology and Bioscience	1		Int.
Advanced Bioengineering	1		fall quarter
Advanced Biomolecular Science and Engineering (Life Science and Medical Bioscience)	2		fall quarter
Introduction to Cognitive Neuroscience	1		winter quarter

(III) Seminar courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Environmental Biotechnology A	3	○	
Seminar on Environmental Biotechnology B	3		○
Seminar on Environmental Biotechnology C	3	○	
Seminar on Environmental Biotechnology D	3		○
Seminar on Biomolecular Assembly A	3	○	
Seminar on Biomolecular Assembly B	3		○
Seminar on Biomolecular Assembly C	3	○	
Seminar on Biomolecular Assembly D	3		○
Seminar on Solid State Bioscience A	3	○	
Seminar on Solid State Bioscience B	3		○
Seminar on Solid State Bioscience C	3	○	
Seminar on Solid State Bioscience D	3		○
Seminar on Neurophysiology A	3	○	
Seminar on Neurophysiology B	3		○
Seminar on Neurophysiology C	3	○	
Seminar on Neurophysiology D	3		○
Seminar on Molecular Brain Science A	3	○	
Seminar on Molecular Brain Science B	3		○
Seminar on Molecular Brain Science C	3	○	
Seminar on Molecular Brain Science D	3		○
Seminar on Molecular Medicine and Biochemistry A	3	○	
Seminar on Molecular Medicine and Biochemistry B	3		○
Seminar on Molecular Medicine and Biochemistry C	3	○	
Seminar on Molecular Medicine and Biochemistry D	3		○
Seminar on Molecular Oncology A	3	○	
Seminar on Molecular Oncology B	3		○
Seminar on Molecular Oncology C	3	○	
Seminar on Molecular Oncology D	3		○
Seminar on Biomaterials Science and Engineering A	3	○	
Seminar on Biomaterials Science and Engineering B	3		○
Seminar on Biomaterials Science and Engineering C	3	○	
Seminar on Biomaterials Science and Engineering D	3		○
Seminar on Biomolecular Science and Engineering A	3	○	
Seminar on Biomolecular Science and Engineering B	3		○
Seminar on Biomolecular Science and Engineering C	3	○	
Seminar on Biomolecular Science and Engineering D	3		○
Seminar on Cytoskeletal Logistics A	3	○	
Seminar on Cytoskeletal Logistics B	3		○
Seminar on Cytoskeletal Logistics C	3	○	
Seminar on Cytoskeletal Logistics D	3		○

Guidelines for earning a Doctoral Degree

1. Five credits must be earned from the list of prescribed group courses.
2. Either a course from the research ethics courses (for one credit) or “サイエンスコミュニケーションと研究倫理” (for two credits) must be taken. If credits for “サイエンスコミュニケーションと研究倫理” were earned during the master’s program, a course from the research ethics courses (for 1 credit) must be taken as the same course cannot be taken during the doctoral program.
3. One credit must be earned from the English course “Doctoral Student Technical Writing”.
4. Among the courses from the English courses (excluding the course named in 3. above), industrial society/liberal arts courses, self-competence development (business creation), or courses offered by the department, 3 credits must be earned if the research ethics course (for 1 credit) was taken and 2 credits must be earned if “サイエンスコミュニケーションと研究倫理” was taken during the doctoral program.
5. For requirement 4. above, up to two credits from Master’s courses offered by the department registered during the doctoral program may be counted towards doctoral credits.
6. For requirement 4. above, credits from other universities or organizations may be transferred.

(I) Research guidance (Doctoral program)

Course Name	Supervisor
Research on Environmental Biotechnology	TSUNEDA, Satoshi/NODA, Nohiro
Research on Biomolecular Assembly	TAKEOKA, Shinji/TAKAHASHI, Yoshimasa
Research on Solid State Bioscience	ASAHI, Toru
Research on Neurophysiology	INOUE, Takafumi/TANIFUJI, Manabu/ MCHUGH, Thomas John/MIYAWAKI, Atsushi
Research on Molecular Brain Science	OHSHIMA, Toshio/OKAMOTO, hitoshi/ SAIDO, Takaomi/SHIMOGORI, Satomi/ NAGAI, Jun
Research on Molecular Medicine and Biochemistry	GODA, Nobuhito/TAKUBO, Keiyo/ TANAKA, Minoru
Research on Molecular Oncology	OHKI, Rieko/SEMBA, Kentaro
Research on Biomaterials Science and Engineering	TAKEDA, Naoya
Research on Biomolecular Science and Engineering	TAKEYAMA, Haruko/YURA, Kei/ TAKAHASHI, Yoshimasa
Research on Cytoskeletal Logistics	SATO, Masamitsu

(II) Courses offered by the Department

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Practical Training for Career Building	1	○	○

Department of Electrical Engineering and Bioscience

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	Supervisor
Research on Applications of Superconductivity	ISHIYAMA, Atsushi
Research on Computer-Aided Electromagnetics	WAKAO, Shinji
Research on Advance Control	WATANABE, Ryo
Research on Information-based Learning Systems	MURATA, Noboru
Research on Optical Properties of Condensed Matter	SOTA, Takayuki
Research on Dynamics of Biological Systems	TAKAMATSU, Atsuko
Research on Molecular Networks in Cells	IWASAKI, Hideo
Research on Molecular and Cellular Biosciences	OKANO, Toshiyuki
Research on Probabilistic Information Processing	INOUE, Masato
Research on Electronic and Photonic Materials	KOBAYASHI, Masakazu
Research on Quantum Materials Science	TAKEDA, Kyozaburo
Research on Semiconductor Engineering	MAKIMOTO, Toshiki
Research on Next-Generation Electrical Energy Systems	HAYASHI, Yasuhiro
Research on Molecular Sensors and Devices	YANAGITANI, Takahiko
Research on Bioinformatics	HAMADA, Michiaki
Research on Synthetic Biology	KIGA, Daisuke
Research on Electromobility System	KONDO, Keiichiro
Research on Biophysics	BANNAI, Hiroko
Research on Charge Storage Device Engineering	OKUBO, Masashi

(II) Lecture courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Quantum Materials Science	2	○	
Control Systems	2	○	
Power Systems Engineering	2	○	
Thin Film Engineering	2	○	
Physics of Semiconductor devices 2	2	○	
Frontiers of Device Engineering	2	Int.	
Bioaesthetics	2		○
Electronic and Photonic Materials	2		○
Advanced Electric Power Devices and Machines	2		○
Smart Grid and Frontiers in Electric Energy Systems	2		○
Power System and Nuclear Power Generation Theory	2		○

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Advanced Vacuum Engineering	2		○
Practical Materials/Devices Characterization	2		○
Physics of Semiconductor devices 1	2		○
Advanced Biophysics	2		○
Charge Storage Device Engineering	2		○

(III) Seminar courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Advanced Seminar A	1	○	
Advanced Seminar B	1		○
Seminar on Applications of Superconductivity A	3	○	
Seminar on Applications of Superconductivity B	3		○
Seminar on Applications of Superconductivity C	3	○	
Seminar on Applications of Superconductivity D	3		○
Seminar on Computer-Aided Electromagnetics A	3	○	
Seminar on Computer-Aided Electromagnetics B	3		○
Seminar on Computer-Aided Electromagnetics C	3	○	
Seminar on Computer-Aided Electromagnetics D	3		○
Seminar on Advance Control A	3	○	
Seminar on Advance Control B	3		○
Seminar on Advance Control C	3	○	
Seminar on Advance Control D	3		○
Seminar on Information-Based Learning Systems A	3	○	
Seminar on Information-Based Learning Systems B	3		○
Seminar on Information-Based Learning Systems C	3	○	
Seminar on Information-Based Learning Systems D	3		○
Seminar on Optical Properties of Condensed Matter A	3	○	
Seminar on Optical Properties of Condensed Matter B	3		○
Seminar on Optical Properties of Condensed Matter C	3	○	
Seminar on Optical Properties of Condensed Matter D	3		○
Seminar on Dynamics of Biological Systems A	3	○	
Seminar on Dynamics of Biological Systems B	3		○
Seminar on Dynamics of Biological Systems C	3	○	
Seminar on Dynamics of Biological Systems D	3		○
Seminar on Molecular Networks in Cells A	3	○	
Seminar on Molecular Networks in Cells B	3		○
Seminar on Molecular Networks in Cells C	3	○	
Seminar on Molecular Networks in Cells D	3		○
Seminar on Molecular and Cellular Biosciences A	3	○	
Seminar on Molecular and Cellular Biosciences B	3		○
Seminar on Molecular and Cellular Biosciences C	3	○	
Seminar on Molecular and Cellular Biosciences D	3		○
Seminar on Probabilistic Information Processing A	3	○	
Seminar on Probabilistic Information Processing B	3		○
Seminar on Probabilistic Information Processing C	3	○	
Seminar on Probabilistic Information Processing D	3		○
Seminar on Electronic and Photonic Materials A	3	○	
Seminar on Electronic and Photonic Materials B	3		○
Seminar on Electronic and Photonic Materials C	3	○	

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Electronic and Photonic Materials D	3		○
Seminar on Quantum Materials Science A	3	○	
Seminar on Quantum Materials Science B	3		○
Seminar on Quantum Materials Science C	3	○	
Seminar on Quantum Materials Science D	3		○
Seminar on Semiconductor Engineering A	3	○	
Seminar on Semiconductor Engineering B	3		○
Seminar on Semiconductor Engineering C	3	○	
Seminar on Semiconductor Engineering D	3		○
Seminar on Next-Generation Electrical Energy Systems A	3	○	
Seminar on Next-Generation Electrical Energy Systems B	3		○
Seminar on Next-Generation Electrical Energy Systems C	3	○	
Seminar on Next-Generation Electrical Energy Systems D	3		○
Seminar on Molecular Sensors and Devices A	3	○	
Seminar on Molecular Sensors and Devices B	3		○
Seminar on Molecular Sensors and Devices C	3	○	
Seminar on Molecular Sensors and Devices D	3		○
Seminar on Bioinformatics A	3	○	
Seminar on Bioinformatics B	3		○
Seminar on Bioinformatics C	3	○	
Seminar on Bioinformatics D	3		○
Seminar on Synthetic Biology A	3	○	
Seminar on Synthetic Biology B	3		○
Seminar on Synthetic Biology C	3	○	
Seminar on Synthetic Biology D	3		○
Seminar on Electromobility system A	3	○	
Seminar on Electromobility system B	3		○
Seminar on Electromobility system C	3	○	
Seminar on Electromobility system D	3		○
Seminar on Biophysics A	3	○	
Seminar on Biophysics B	3		○
Seminar on Biophysics C	3	○	
Seminar on Biophysics D	3		○
Seminar on Charge Storage Device A	3	○	
Seminar on Charge Storage Device B	3		○
Seminar on Charge Storage Device C	3	○	
Seminar on Charge Storage Device D	3		○

Guidelines for earning a Doctoral Degree

1. Five credits must be earned from the list of prescribed group courses.
2. One credit must be earned from the research ethics courses.
3. One credit must be earned from the English course “Doctoral Student Technical Writing”. (Note: students who attended universities in English-speaking countries should take alternate courses.)
4. Three credits must be earned from the English courses (excluding the course named in 3. above), industrial society/liberal arts courses, self-competence development (business creation), or courses offered by the department.

(I) Research guidance (Doctoral program)

Course Name	Supervisor
Research on Applications of Superconductivity	ISHIYAMA, Atsushi
Research on Computer Aided Electromagnetics	WAKAO, Shinji
Research on Advance Control	WATANABE, Ryo
Research on Information-based Learning Systems	MURATA, Noboru
Research on Optical Properties of Condensed Matter	SOTA, Takayuki
Research on Dynamics of Biological Systems	TAKAMATSU, Atsuko
Research on Molecular Networks in Cells	IWASAKI, Hideo
Research on Molecular and Cellular Biosciences	OKANO, Toshiyuki
Research on Probabilistic Information Processing	INOUE, Masato
Research on Electronic and Photonic Materials	KOBAYASHI, Masakazu
Research on Quantum Materials Science	TAKEDA, Kyozaburo
Research on Semiconductor Engineering	MAKIMOTO, Toshiki
Research on Next-Generation Electrical Energy Systems	HAYASHI, Yasuhiro
Research on Bioinformatics	HAMADA, Michiaki
Research on Molecular Sensors and Devices	YANAGITANI, Takahiko
Research on Synthetic Biology	KIGA, Daisuke
Research on Electromobility system	KONDO, Keiichiro
Research on Biophysics	BANNAI, Hiroko
Research on Charge Storage Device	OKUBO, Masashi

Department of Integrative Bioscience and Biomedical Engineering

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.

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 mechanisms of emotion and memory, genomic DNA regulation, the system for blood production, plant ecology, photosynthesis, cell biology, developmental biology, and brain science.

◆ 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	
Bioethics Integrative Bioscience and Biomedical Engineering	There are no recommended courses

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 Integrative Bioscience and Biomedical Engineering A (Bioethics) and Integrative Bioscience and Biomedical Engineering B (Group discussion) 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.

(I) Research guidance (Master's program)

Course Name	Supervisor
Research on Medical Mechanical Engineering and its Application	IWASAKI, Kiyotaka/ OKAZAKI, Ken/ NIINAMI, Hiroshi/ YAGI, Takanobu
Research on Biorobotics	ISHII, Hiroyuki/COSENTINO, Sarah/ TAKANISHI, Atsuo/ FUJIMOTO, Hiroshi
Research on Biomolecular Engineering	IWASAKI, Kiyotaka/HOSOKAWA, Seijiro
Research on Molecular Biophysics	UEDA, Taro
Research on Developmental Biology	HANASHIMA, Carina

Course Name	Supervisor
Research on Molecular Genetics	OHYAMA, Takashi
Research on Cell Biology	TOMINAGA, Motoki
Research on Molecular Physiology	KATO, Takashi
Research on Plant Physiology and Biochemistry	SONOIKE, Kintake
Research on Physicobiology	ITO, Etsuro
Research on Biomedical Robotics Engineering and its Application	IWATA, Hiroyasu/MURAGAKI, Yoshihiro
Research on Medical Image Engineering and its Application	OHYA, Jun/MASAMUNE, Ken
Research on Regenerative Medical Engineering and its Application	UMEZU, Shinjiro/SAKAGUCHI, Katsuhisa/SHIMIZU, Tatsuya
Research on Synthetic Biology	UEDA, Takuya
Research on Environmental Ecology	YOSHITAKE, Shimpei
Research on Evolutional Biology	HOSO, Masaki
Research on Advanced Medical Device	IWASAKI, Kiyotaka/MIYATA, Toshio

(II) Lecture courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Integrative Bioscience and Biomedical Engineering A	2	○	
Science Communication I: Introduction to Science Communication Theory	2	○	
Communication III: Practical Science Communication Skills	2	○	
Practical Medical Engineering	2	○	
Molecular Physiology	2	○	
Evolutional Biology	2	○	
Lecture on Plant Physiology and Biochemistry	2	○	
Physicobiology	2	○	
Internal Organ Engineering	2		○
Integrative Bioscience and Biomedical Engineering B	2		○
Science Communication II: Advanced Science Communication Theory	2		○
Science Communication IV: Advanced Practical Science Communication Skills	2		○
Developmental Biology	2		○
Cell Biology	2		○
Environmental Ecology	2		○

(III) Seminar courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Medical Mechanical Engineering A	3	○	
Seminar on Medical Mechanical Engineering B	3		○
Seminar on Medical Mechanical Engineering C	3	○	
Seminar on Medical Mechanical Engineering D	3		○
Seminar on Biorobotics A	3	○	
Seminar on Biorobotics B	3		○
Seminar on Biorobotics C	3	○	
Seminar on Biorobotics D	3		○
Seminar on Molecular Biophysics A	3	○	
Seminar on Molecular Biophysics B	3		○
Seminar on Molecular Biophysics C	3	○	
Seminar on Molecular Biophysics D	3		○

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Developmental Biology A	3	○	
Seminar on Developmental Biology B	3		○
Seminar on Developmental Biology C	3	○	
Seminar on Developmental Biology D	3		○
Seminar on Cell Biology A	3	○	
Seminar on Cell Biology B	3		○
Seminar on Cell Biology C	3	○	
Seminar on Cell Biology D	3		○
Seminar on Molecular Functions and Physiology A	3	○	
Seminar on Molecular Functions and Physiology B	3		○
Seminar on Molecular Functions and Physiology C	3	○	
Seminar on Molecular Functions and Physiology D	3		○
Seminar on Evolutional Biology A	3	○	
Seminar on Evolutional Biology B	3		○
Seminar on Evolutional Biology C	3	○	
Seminar on Evolutional Biology D	3		○
Seminar on Genetic Information A	3	○	
Seminar on Genetic Information B	3		○
Seminar on Genetic Information C	3	○	
Seminar on Genetic Information D	3		○
Seminar on Plant Physiology and Biochemistry A	3	○	
Seminar on Plant Physiology and Biochemistry B	3		○
Seminar on Plant Physiology and Biochemistry C	3	○	
Seminar on Plant Physiology and Biochemistry D	3		○
Seminar on Physicobiology A	3	○	
Seminar on Physicobiology B	3		○
Seminar on Physicobiology C	3	○	
Seminar on Physicobiology D	3		○
Seminar on Biomedical Robotics Engineering A	3	○	
Seminar on Biomedical Robotics Engineering B	3		○
Seminar on Biomedical Robotics Engineering C	3	○	
Seminar on Biomedical Robotics Engineering D	3		○
Seminar on Medical Image Engineering A	3	○	
Seminar on Medical Image Engineering B	3		○
Seminar on Medical Image Engineering C	3	○	
Seminar on Medical Image Engineering D	3		○
Seminar on Regenerative Medical Engineering A	3	○	
Seminar on Regenerative Medical Engineering B	3		○
Seminar on Regenerative Medical Engineering C	3	○	
Seminar on Regenerative Medical Engineering D	3		○
Seminar on Synthetic Biology A	3	○	
Seminar on Synthetic Biology B	3		○
Seminar on Synthetic Biology C	3	○	
Seminar on Synthetic Biology D	3		○
Seminar on Environmental Ecology A	3	○	
Seminar on Environmental Ecology B	3		○
Seminar on Environmental Ecology C	3	○	
Seminar on Environmental Ecology D	3		○
Seminar on Advanced Medical Device A	3	○	
Seminar on Advanced Medical Device B	3		○
Seminar on Advanced Medical Device C	3	○	
Seminar on Advanced Medical Device D	3		○

Guidelines for earning a Doctoral Degree

1. Five credits must be earned from the list of prescribed group courses.
2. One credit must be earned from the research ethics courses.
3. One credit must be earned from the English course “Doctoral Student Technical Writing”.
4. Three credits must be earned from the English courses (excluding the course named in 3. above), industrial society/liberal arts courses, self-competence development (business creation), or courses offered by the department.
5. For requirement 4. above, up to two credits from Master’s courses offered by the department registered during the doctoral program may be counted towards doctoral credits.

(I) Research guidance (Doctoral program)

Course Name	Supervisor
Research on Medical Applications of Mechanical Engineering	IWASAKI, Kiyotaka/ OKAZAKI, Ken/ NIINAMI, Hiroshi/ YAGI, Takanobu
Research on Biorobotics	ISHII, Hiroyuki/COSENTINO, Sarah/ TAKANISHI, Atsuo/FUJIMOTO, Hiroshi
Research on Bio-electronic Measurements and Control	IWATA, Hiroyasu/MOMOSE, Keiko
Research on Molecular Genetics	OHYAMA, Takashi
Research on Theoretical Biophysics	TAKANO, Mitsunori
Research on Molecular Biophysics	UEDA, Taro
Research on Molecular Physiology	KATO, Takashi
Research on Plant Physiology and Biochemistry	SONOIKE, Kintake
Research on Physicobiology	ITO, Etsuro
Research on Cell Biology	TOMINAGA, Motoki
Research on Developmental Biology	HANASHIMA, Carina
Research on Biomedical Robotics Engineering and its Application	IWATA, Hiroyasu/MURAGAKI, Yoshihiro
Research on Medical Image Engineering and its Application	OHYA, Jun/MASAMUNE, Ken
Research on Regenerative Medical Engineering and its Application	UMEZU, Shinjiro/SAKAGUCHI, Katsuhisa/ SHIMIZU, Tatsuya
Research on Synthetic Biology	UEDA, Takuya
Research on Environmental Ecology	YOSHITAKE, Shimpei
Research on Evolutional Biology	HOSO, Masaki
Research on Advanced Medical Device	IWASAKI, Kiyotaka/MIYATA, Toshio

Department of Nanoscience and Nanoengineering

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.

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.

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.

(I) Research guidance (Master's program)

Course Name	Supervisor
Research on Nanodevices	KAWARADA, Hiroshi
Research on Microsystems	SHOJI, Shuichi
Research on Molecular Nanoengineering	TANII, Takashi
Research on Nanomaterials Informatics	WATANABE, Takanobu
Research on Surface Chemistry of Nanostructured Materials	HOMMA, Takayuki
Research on Electrochemical Nano-Systems	MOMMA, Toshiyuki
Research on Electrochemical Computing	HASEGAWA, Tsuyoshi
Research on Nano-Chiral Science	ASAHI, Toru
Research on Bioanalysis	NAKANISHI, Jun
Research on Nano-structure Control	SUZUKI, Tohru
Research on Physical Chemistry of Surfaces and Interfaces	MURAKAMI, Hideyuki
Research on Synthetic Chemistry of Nanomaterials	ASAHI, Toru/SUGAHARA, Yoshiyuki/ YAMAUCHI, Yusuke
Research on Nano-Magnetic Materials	TAKAHASHI, Yukiko

(II) Lecture courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Experiments in Nanoscience and Nanoengineering	2	○	○
Nanodevice Engineering	2	○	
Bioanalysis	2	summer quarter	
Nanobiotechnology Fusion Systems	2		○
Molecular Nanoengineering	2		○
Computational Experiments	2		○
Nanochemical Systems	1		fall quarter
Ceramics Microstructure Control Engineering	2		fall quarter
Special Lecture on Nano-Structured High Temperature Materials	2		fall quarter

(III) Seminar courses

Course Name	Credits	Term	
		Spring Semester	Fall Semester
Seminar on Nanoelectronics A	3	○	
Seminar on Nanoelectronics B	3		○
Seminar on Nanoelectronics C	3	○	
Seminar on Nanoelectronics D	3		○
Seminar on Microsystem Engineering A	3	○	
Seminar on Microsystem Engineering B	3		○
Seminar on Microsystem Engineering C	3	○	
Seminar on Microsystem Engineering D	3		○
Seminar on Molecular Nanoengineering A	3	○	
Seminar on Molecular Nanoengineering B	3		○
Seminar on Molecular Nanoengineering C	3	○	
Seminar on Molecular Nanoengineering D	3		○
Seminar on Nanomaterials for Informatics A	3	○	
Seminar on Nanomaterials for Informatics B	3		○
Seminar on Nanomaterials for Informatics C	3	○	
Seminar on Nanomaterials for Informatics D	3		○
Seminar on Nanofunctional Surface Chemistry A	3	○	
Seminar on Nanofunctional Surface Chemistry B	3		○
Seminar on Nanofunctional Surface Chemistry C	3	○	
Seminar on Nanofunctional Surface Chemistry D	3		○
Seminar on Electrochemical Computing A	3	○	
Seminar on Electrochemical Computing B	3		○
Seminar on Electrochemical Computing C	3	○	
Seminar on Electrochemical Computing D	3		○
Seminar on Nano-Chiral Science A	3	○	
Seminar on Nano-Chiral Science B	3		○
Seminar on Nano-Chiral Science C	3	○	
Seminar on Nano-Chiral Science D	3		○
Seminar on Nano-Electrochemistry A	3	○	
Seminar on Nano-Electrochemistry B	3		○
Seminar on Nano-Electrochemistry C	3	○	
Seminar on Nano-Electrochemistry D	3		○
Seminar on Bioanalysis A	3	○	
Seminar on Bioanalysis B	3		○
Seminar on Bioanalysis C	3	○	
Seminar on Bioanalysis D	3		○
Seminar on Nano-structure Control A	3	○	
Seminar on Nano-structure Control B	3		○
Seminar on Nano-structure Control C	3	○	
Seminar on Nano-structure Control D	3		○
Seminar on Physical Chemistry of Surfaces and Interfaces A	3	○	
Seminar on Physical Chemistry of Surfaces and Interfaces B	3		○
Seminar on Physical Chemistry of Surfaces and Interfaces C	3	○	
Seminar on Physical Chemistry of Surfaces and Interfaces D	3		○
Seminar on Synthetic Chemistry of Nanomaterials A	3	○	
Seminar on Synthetic Chemistry of Nanomaterials B	3		○
Seminar on Synthetic Chemistry of Nanomaterials C	3	○	
Seminar on Synthetic Chemistry of Nanomaterials D	3		○
Seminar on Nano-Magnetic Materials A	3	○	
Seminar on Nano-Magnetic Materials B	3		○
Seminar on Nano-Magnetic Materials C	3	○	
Seminar on Nano-Magnetic Materials D	3		○

Guidelines for earning a Doctoral Degree

1. Five credits must be earned from the list of prescribed group courses.
2. One credit must be earned from the research ethics courses.
3. One credit must be earned from the English course “Doctoral Student Technical Writing”.
4. Three credits must be earned from the English courses (excluding the course named in 3. above), industrial society/liberal arts courses, self-competence development (business creation), or courses offered by the department.
5. For requirement 4. above, up to two credits from Master’s courses offered by the department registered during the doctoral program may be counted towards doctoral credits.

(I) Research guidance (Doctoral program)

Course Name	Supervisor
Research on Nanodevices	KAWARADA, Hiroshi
Research on Microsystems	SHOJI, Shuichi
Research on Molecular Nanoengineering	TANII, Takashi
Research on Nanomaterials Informatics	WATANABE, Takanobu
Research on Surface Chemistry of Nanostructured Materials	HOMMA, Takayuki
Research on Electrochemical Nano-Systems	MOMMA, Toshiyuki
Research on Synthetic Chemistry of Nanomaterials	ASAHI, Toru/SUGAHARA, Yoshiyuki/ YAMAUCHI, Yusuke
Research on Semiconductor Quantum Physics	TAKEUCHI, Atsushi
Research on Nano-Chiral Science	ASAHI, Toru
Research on Nano-structured Crystal Chemistry	ASAHI, Toru/SHIMAMURA, Kiyoshi
Research on Electrochemical Computing	HASEGAWA, Tsuyoshi
Research on Materials Engineering for Nanostructure Control	SUZUKI, Tohru
Research on Bioanalysis	NAKANISHI, Jun
Research on Physical Chemistry of Surfaces and Interfaces	MURAKAMI, Hideyuki
Research on Nano-Magnetic Materials	TAKAHASHI, Yukiko
Research on Computational Electrochemistry	MOMMA, Toshiyuki/TATEYAMA, Yoshitaka
Research on Chemistry of Low-dimensional Nanomaterials	SUGAHARA, Yoshiyuki/MA, Renzhi
Research on Organic Nanomaterials	OYAIZU, Kenichi/SAMITSU, Sadaki

Cooperative Major in Nuclear Energy

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	Supervisor
Research on Nuclear System Engineering Lab., II	TAKAKI, Naoyuki
Research on Reactor Theory	YAMAJI, Akifumi
Research on Radiation Detection and Measurement Engineering Lab., II	KAWARABAYASHI, Jun/ HAGURA, Naoto
Research on Applied Radiation Engineering Lab., II	Not Determined
Research on Accelerator Application Science and Engineering A	WASHIO, Masakazu
Research on Accelerator Application Science and Engineering B	ISHIYAMA, Atsushi
Research on Nuclear Safety Engineering Lab., II	OHTORI, Yasuki/SATO, Isamu/SUZUKI, Tohru/NAKAMURA, Izumi/MUTA, Hitoshi
Research on Reactor Thermal-Hydraulics	FURUYA, Masahiro

9 How to Obtain a Teacher's License

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.

10 Class Time Slots

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

11 Notes on Preparing Reports or Theses/Dissertations

Using all or part of text written by others or materials from a book, a website, or other publications in a report, thesis/dissertation, etc. without mentioning the source constitutes fraudulent use or plagiarism, and will be punished.

The general rule in quoting or referring to others' sentences or materials when offering one's opinions is to indicate the quoted part with quotation marks or in other relevant 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. Please note that it may be necessary to request the auther's permission beforehand, when quoting a large portion of a book or website.

12 Posting of Grades

Grades are announced through MyWaseda by a date specified in each semester. Please check the date of grade announcement on the websites of the Center for Science and Engineering.

Grades of lecture courses, seminar courses, and the master's thesis are indicated by A^+, A, B, C, and F. The grades A^+ to C are passing grades, The grade 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. If you receive this mark, you will be given instructions by the instructor. If you do not follow these instructions, the grade F will automatically be applied when a given academic year ends.

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

Grade	A+	A	B	C	F	H
Score	100–90	89–80	79–70	69–60	59–	
Transcript	A+	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.)”, summing up the figures obtained for all of the 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>

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

*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.

13 Research Students

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 the enrollment as a research student, the student 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.

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.

Tuition

Graduate School of Fundamental Science and Engineering / Graduate School of Creative Science and Engineering

School Expenses	Tuition(per 1 credit) [Master’s Program/Doctor’s Program]	58,100 yen
	Research Instruction Fee [Master’s Program]	290,500 yen
	Research Instruction Fee [Doctor’s Program]	226,750 yen
	Seminar Fee	Required only if the student will be conducting experiments

Graduate School of Advanced Science and Engineering

School Expenses	Tuition(per 1 credit) [Master’s Program]	63,600 yen
	Tuition(per 1 credit) [Doctor’s Program]	58,100 yen
	Research Instruction Fee [Master’s Program]	317,750 yen
	Research Instruction Fee [Doctor’s Program]	226,750 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

Student Life

1 International Student Handbook

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: https://www.waseda.jp/cie/handbook/index.html

2 Faculty of Science and Engineering Website

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: https://www.waseda.jp/fsci/en/

3 Student Number

A specific student number is assigned to every student when they are 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 EBSE student.

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

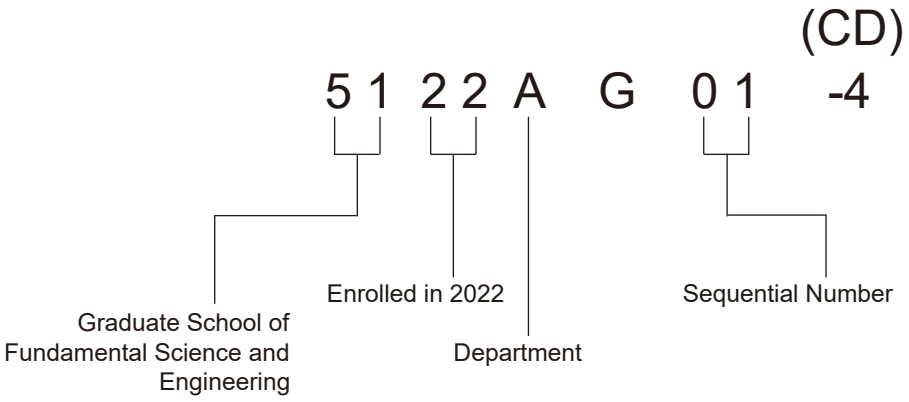
A check digit (CD) is added after each student number, which is used when it is entered into a computer. A CD is added to prevent errors during number entry into a computer.

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 and Aerospace Engineering
D	Department of Electronic and Physical Systems
E	Department of Intermedia Studies
F	Department of Computer Science and Communications Engineering
G	Department of Materials Science
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

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

Center for Science and Engineering

The Center, which is composed of a General Affairs Section and an 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, Shinjuku-ku, Tokyo 169-8555 (1st 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)
Website	https://www.waseda.jp/fsci/en/students/

Class academic advisor

A class academic advisor system has been established to allow a class academic advisor to provide advice or guidance to students on school life. Those who wish to communicate with faculty members or want to receive advice from them about their study or private life should use this system to have a more meaningful school life. For more details, refer to the Course Registration Guide and the websites of the Faculty of Science and Engineering (https://www.waseda.jp/fsci/students/counter/#anc_4). If you want to visit an advisor, make a reservation with the *kenkyushitsu* (faculty lab).

How to contact part-time lecturers

Contact information (such as addresses, telephone numbers, etc.) of part-time lecturers is not officially announced. If you wish to contact a part-time lecturer, please bring mail to the Kyoinshitsu (faculty room, Building 52, 2nd floor), in the form of an envelope (with stamp attached), a return envelope (addressed to yourself, with stamp attached), and a letter (with your message, your contact details, etc.).

* Students can check the room numbers of kenkyushitsu (faculty labs) or e-mail addresses of full-time faculty on the websites or at Building 51 1st floor bulletin board.

Center for International Education (CIE)

The Center for International Education (CIE) provides various types of 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 (4th floor, Building 22, Waseda campus)
Tel / Fax	03-3207-1454 / 03-3202-8638
E-mail	cie@list.waseda.jp
Website	https://www.waseda.jp/inst/cie/en
Telephone Service	from 9:00 to 17:00, Weekdays
Counter Service Hours	from 10:00 to 16:00, Weekdays

* Office will be closed on Saturdays, Sundays, and holidays with no classes.
* Please refer to CIE website for the latest office hours.

Student Diversity Center (SDC)

Within the Student Diversity Center the following three offices work together to support students and to ensure a rich campus environment that welcomes the diverse values and lifestyles of our students, regardless of nationality, ethnicity, gender (including the full spectrum of sexual diversity, not only male and female), sexual orientation, gender identity or disability.

More Information

Office for Students with Disabilities

The Office for Students with Disabilities provides essential academic support to students with disabilities (including hearing impairments, visual impairments, mobility impairments, developmental disorders, and other forms of disabilities such as aphasia or internal impediment). Students who wish to make use of the support or offer support to students with disabilities are requested to contact the OSD.

Support Department for Students with Physical Disabilities

Contact Information:	
Place	#110 Building No.3
Tel	03-5286-3747
E-mail	shienshitsu@list.waseda.jp
Office Hours	Weekdays 9:00 to 17:00 (Closed on weekends)
Website	https://www.waseda.jp/inst/dsso/en/

Support Department for Students with Developmental Disorders

Contact Information:	
Place	#502 5th Floor, Building No.27-10 (Waseda Sekiguchi Building)
Tel	03-3208-0587
E-mail	shien02@list.waseda.jp
Office Hours	Weekdays 9:00 to 17:00 (Closed on weekends)
Website	https://www.waseda.jp/inst/dsso/en/

Gender and Sexuality Center (GS Center)

The Gender and Sexuality Center (GS Center) is a safe space/resource center for LGBTQ+and allied students, as well as all students who are interested in issues related to gender and sexuality. You can get access to abundant learning materials (books, magazines, etc.) here and take part in the events related to gender and sexuality topics.

In addition, if you have any difficulties regarding gender or sexuality issues, please feel free to talk to our specialist staffs. We will, as much as possible, coordinate with places both inside and outside of the university if necessary. Confidentiality is assured.

Contact Information:	
Place	#213 Building No.10
E-mail	gscenter@list.waseda.jp
Office Hours	Weekdays 9:00 to 17:00 (Closed on weekends)
Website	https://www.waseda.jp/inst/gscenter/en/

Intercultural Communication Center (ICC)

Please see Chapter IV of this Handbook under “11 Extracurricular Activities”

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 via email.

Contact Information:	
E-mail	compliance@list.waseda.jp
Website	https://www.waseda.jp/inst/harassment/
Consultation Hours	Mon – Fri, 9:30-17:00

Waseda University external consultation desk [NEC VALWAY, Ltd. (Subcontractor)]

Contact Information:	
Tel	0120-123-393
Reception hours	Mon – Fri, 8:30-19:00 Sat, 8:30-17:00
Website	https://koueki-tsuhou.com/WFcxVtaEFdCd/en/

※ English, Chinese and Japanese are available.

5 Employment

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.

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 ("*Naitei*").

Waseda University Career Center

Waseda University Career Center provides a wide variety of career-related services ranging from job-hunting activity supports to changing of visa status to "designated activities visa." **Individual career consultation is one of the most recommended service;** students are able to consult any career-related matters for up to 40 minutes in English (and in Japanese). In order to use this service, a reservation via e-mail is necessary. Please see the website for detail. We are waiting for you to support your career!

Major services	
Career Events	Hold job seminars throughout a year. Check our website for event schedule.
Individual Career Consultation	**40-min of individual consultation** in English and Japanese available. Need reservation. **10-min quick concierge** available online (Zoom). No need for reservation. Check our website for specific schedule of the 10-min Quick Concerige.
Company and recruitment information	Access to "Career compass" of MyWaseda
Internship desk	Internship programs and credit transfer
Guidebooks	**Design your future guidebook** enriches your student life. **Job-hunting handbook** provides you the job-hunting information
E-news letter	Provide career events information via e-mail (2 times per month)
Visa status change support	College student visa→"designated activities" visa 特定活動（就 職 活動継続） とくていかつどう　しゅうしょくかつどうけいぞく

Contact Information:		**Website**
Location	3F, Student Union Bldg., Toyama campus	
E-mail address	career@list.waseda.jp	
TEL	03-3203-4332	
Website	https://www.waseda.jp/inst/career/en/	

Career Information room

Job-postings (cards) for science and engineering students, company profiles and other reference materials are available in the Career Information Room located in the Building 61 in the Nishi-Waseda Campus.

In the Career Information Room, students can get information on recruiting, various companies, and government and municipal offices, and find reference books to investigate industries or companies, information magazines, job hunting experience notes from senior schoolmates and other materials.

Report career path after graduation

When students graduate, they will need to report their career path such as employment, advancing to graduate schools, study abroad, self-employed, undecided, etc.

MyWaseda ⇒ Student Affairs ⇒ Career Compass ⇒ Report Preliminary Offers and Post Graduation Plans

6 Student Identification Card

Your student identification card can be used as an ID, and may have to be presented in various academic situations. Students should always carry their student identification card and be careful not to damage or lose it. The student identification card should not be rent or transferred to others.

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

Issuance

For new students, a student identification card is issued in exchange for his/her examination admission card. For second year students or seniors, 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 a new sticker.

If you want to change the photo on your student identification card while enrolled, you can change it free of charge only once. To do so, visit the Center for Science and Engineering and ask for change of it.

Lost card

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

Reissuance

To apply for reissuance of the lost card, submit the Application for Reissuance with a color photograph (4 cm vertical and 3 cm horizontal) of your face to the Center for Science and Engineering. Reissuance will cost 2,000 yen.

Presentation

Students must present their student identification card when taking examinations, using Waseda University Library or students' reading rooms, applying for issuance of various certificates or student discount cards ("*Gakuwari*"(学割)), receiving handouts, or if asked to by faculty or staff members of the university.

Invalidation

When your status as a student ends following graduation or withdrawal, your student identification card is invalidated. Please immediately return it to the Center for Science and Engineering. When students graduate from the university, they will be granted a diploma in exchange for their student identification card.

7 Issuance of Various Certificates

The Center for Science and Engineering issues certificates listed in the following table. Certificates are basically issued on the spot, but students should request the 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.

Fees

Issuance of certificates will incur a fee.
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 have withdrawn: 300 yen per copy

Method of issuance

(I) Through automatic certificate issuing machines:
To use the machines which are installed at several locations in campuses, students must have

their student identification card and their password for MyWaseda ID.

(II) Through application at a counter of the Center for Science and Engineering:
Fill in the specified Application for Certificate Issuance, affix stamps (these can be bought from a vending machine inside the Center) to 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
Certificate of Academic Transcript and Graduation
Certificate of Withdrawal

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

Student discount card (“*Gakuwari*”)

Students can get student discount cards (“*Gakuwari*”) from automatic certificate-issuing machines.

8 Changes in the School Register

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

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 permission from the dean of your School through the application procedures specified by the Faculty of Science and Engineering.
To apply for a leave of absence, students shall consult with their class academic advisor or supervisor first, and get his/her remark/comment on the application form. Once the application document is ready, then please complete the necessary procedures by the due date of each semester. Please note that leave of absence without the intention of returning to school (e.g. for the purpose of taking entrance examinations of other universities) is not allowed.

	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
Spring semester	May 31	September 20	September 21	0.5 years
Fall semester	November 30	March 31 of the following year	April 1 of the following year	0.5 years

(II) Period of leave of absence

Leaves of absence are either for the Fall Semester or for the Spring Semester. Under special circumstances, students 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 leaves of absence are taken are not counted into enrollment years. Students cannot take leaves 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	
If submitted by October 31 *1	Enrollment fee	50,000 yen
	Student Health Promotion Mutual Aid Association fee	1,500 yen
If submitted from November 1 through November 30	Full amount for that semester	

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

*1: 40,000 yen for the alumni association membership fee is required if you take leave of absence during the last semester of the standard 2-year master period (Those who have graduated from Waseda University Undergraduate School are exempted).

* 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.

Studying abroad

If students are to be engaged in educational or research activities at overseas universities or higher educational institutions for 1 semester or longer, their registration status can be changed to “studying abroad” with permission from the dean of their 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.

While students are enrolled in the School, they can study abroad for up to 1 year. Students can study abroad for longer if they have special reasons.

The period of study abroad is not basically included in the number of enrollment years, except for CS programs (see “13 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 was studied abroad is judged by the University to be equivalent to completion of part of the programs in the student’s School, in light of the number of credits earned at overseas universities, the period required for earning them and other conditions. For more details, contact the Center for Science and Engineering.

For more details about tuition and fees during periods of studying abroad, contact the Center for Science and Engineering. Contact the Center for International Education if you join one of their overseas study programs.

Returning to school

Students who want to get readmitted to the School after a leave of absence or studying abroad, will have to follow instructions and necessary documents which will be sent to the student and their guardian within an appropriate period of time by the Center for Science and Engineering.
Students are only allowed to return to the School at the beginning of a semester.

Withdrawal

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

Readmission

Students who withdraw from the university for a legitimate reason and apply for re-admission within 4 years of the academic year for Master's students, 5 years of the academic year for Doctoral students following their withdrawal may be re-admitted at the beginning of a School year. For more details, contact the Center for Science and Engineering.

Notice of change of name, address, Guardian, etc.

- In case of any changes in your address, phone number or other personal information, immediately register the new information via the Profile screen of MyWaseda. 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 mail address.
- In case of any changes in the addresses and/or phone numbers of your guardian or payer of tuition & fees, immediately go through specified procedures in the Center for Science and Engineering.
- 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.
- A change of your given and/or family name must be reported with a copy of your passport or other applicable relevant documents.
- In case of change of your guardian due to death or other reasons, a new guardian must be reported immediately to the Center for Science and Engineering.

9 Scholarships

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 the student's resident (VISA) status, there are two ways to apply for scholarships (Students can only register one of the following).

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

For students with resident (VISA) statuses other than the statuses 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 the Center for Science & Engineering (1st floor of Building 51) and the website below:
https://www.waseda.jp/fsci/students/tuition/#anc_11/

10 Rules on Use of Bulletin Boards

Standing signboards

As a rule, clubs or other student groups are not permitted to use standing signboards on the Nishi-Waseda Campus. However, the installation may be permitted if it is judged to be as a reasonable.
When the installation is approved, (1) it must be placed in a place where it is not obstruct traffic, (2) it must be fixed with wire or other means to prevent it from falling, and (3) it must not be fixed to trees for protection. In addition, only bulletin boards can be lent out. It is student's own responsibility for printing and pasting the bulletin board.

Notices and fliers

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

(i) Apply to the Center for Science and Engineering for approval for its use.

(ii) Specify the posting period on the notice.

(iii) Remove expired notices on your own.

(iv) Distributing fliers 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	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 changes
North Side Pathway of Building 51st, 60th, 61st	Bulletin board for each School	Information on individual departments
1st floor of Building 51 (Center for Science & Engineering)	International student support bulletin board	Scholarships for international students, Career Info. and Information from ICC
1st floor of Building 61	Career Information bulletin board	Career Information for Japanese and international students, Internship information for Japanese and international students
1st floor of Building 56	Laboratory work bulletin board	Information about Science and Engineering Laboratory, Applied Physics Laboratory, etc.
2nd floor of Building 57	Bulletin board for clubs recognized by the Faculty of Science and Engineering	Space for announcements from clubs recognized by the Faculty of Science and Engineering
Lounge in the 2nd floor of Building 57	Event bulletin board	Announcements of different events
Student lounge of Building 51	Bulletin board for student societies only	Space for announcements from student societies
3rd floor of Building 50	Bulletin board for the office of Building 50	TWIns information, seminar room timetable, lecture information

11 Extracurricular Activities

Intercultural Communication Center

The Intercultural Communication Center (ICC) provides a meeting point for international students and local students (who have lived in Japan) studying at Waseda University. It promotes mutual exchange between students across nationalities and cultures. Throughout the year, the ICC organizes a variety of events on and off campus including country festivals, talk sessions, language and cultural exchange, language lunches, field trips and sports events. Please see the ICC website or visit the office for more information.

Contact Information:		**Website**
Address	1st floor, Building 3, Waseda campus	
Tel	03 - 5286 - 3990	
E-mail	icc@list.waseda.jp	
Website	https://www.waseda.jp/inst/icc/en/	
Office hours	During Semester: Weekdays: 10:00 - 18:00 Saturday: 10:00 - 17:00 During Term Breaks: Weekdays: 10:00 - 17:00 Saturday: Closed	

Student club activities

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

Also, reference books on 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.

12 Safety Management

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.

- Take note of the special precautions for your field of research to ensure safety in experiments carried out as part of your graduation thesis. 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” (Waseda Moodle) 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 the technical staff of relevant laboratories, etc. if you have any questions (anzenrenraku@list.waseda.jp). The Safety Guide is available at the laboratories and the Technology Planning Section, or can be checked via the following website:

Nishi-Waseda Campus Safety Guide: http://www.sci.waseda.ac.jp/LABSafety/guidance
About Safety Management at TWIns:
https://www.waseda.jp/inst/twins/en/current/research/#anc_1

Science and Engineering School students must observe school rules as well as the relevant laws and regulations, and always be aware of the safety of themselves and their surroundings, and the safety and conservation of the global environment.

Response to emergencies

Injury / serious illness

If you are severely injured or become seriously ill, call the school emergency number (main gate security guard office: extension: 2000, 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: 2000, 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). Details for the seminars will be posted on the Technology Planning Section website or MyWaseda.

Fire

Use a nearby fire extinguisher to initially extinguish the fire, and immediately call the school emergency number (main gate security guard office: extension: 2000, 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 2000.

Earthquake

Secure 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” or the website below for more information:

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

13 Study Abroad

General information

Students who are considering studying abroad should participate in the Study Abroad Fair held by the Center for International Education (CIE) in April 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. Students should check the 1-year application procedure for overseas study and other detailed schedules, and other information on the website of the Center for International Education as needed.

When students 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 will be provided after the student’s host university is confirmed.

For more details about when to 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 HANDBOOK or other information prepared by the Center for International Education (https://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

Long-term study abroad (one semester / one year)

(I) Exchange Programs (EX)

These are programs where students 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, students will take ordinary courses with local students. However, there are some programs where they mainly focus on studying a foreign language. Usually, the number of students recruited is one to three per university. In principle, tuition is paid to Waseda, and students 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 students 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 students may take ordinary courses from the beginning. The other is the programs where, while mainly focusing on studying a foreign language, students will at the same time follow a curriculum prepared based on a certain theme if their 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, students will be exempted from paying tuition to Waseda, and will be paying a designated program fee to the host university.

(III) Double Degree Programs (DD)

These are programs where students go abroad to study at a university which provides a curriculum for a double degree while they are still enrolled at Waseda. If students satisfy certain requirements, they will be able to earn designated degrees from both Waseda and their host university upon graduation. In order to complete the double degree course at the host university, students will need to demonstrate high-level reading/listening comprehension skills and conversation skills in the foreign language. Therefore, especially rigorous examinations will be conducted regarding the student's language skills if they wish to participate. There are some programs where only students of certain Schools or Graduate Schools are eligible to apply. Furthermore, the study abroad period may vary depending on the program.

Short-term study abroad (several weeks)

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

Other study abroad programs

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

14 Nonsmoking Campus

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. Students should act with an awareness of being a student of Waseda University.

- 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.
- Smoking is prohibited in laboratories and other places where seminars or student guidance is given, which are considered as classrooms.
- Smoking while walking, and cigarette littering are strictly prohibited.

15 Ban on Commuting by Bicycle, Motorcycle or Car

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. Bicycles can be used only under special circumstances; inquire the General Affairs Section in the Center for Science and Engineering for details.

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.

16 Library

Waseda University Library consists of more than 20 libraries and reading rooms. Graduate students can check out books from 14 libraries. A complete explanation about the services can be found on the Library website: https://www.waseda.jp/library/en/. Please check the newest information on that website. Library materials can be searched through WINE: https://waseda.primo.exlibrisgroup.com/discovery/search?vid=81SOKEI_WUNI:WINE &lang=en. By using “My Library” function of WINE, students can check the status of 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 physical materials (books, journals, newspapers, audio-visual materials, etc.). Students can know how to use digital resources through Research NAVI: https://waseda-jp.libguides.com/research-navi/e-resources/en. If you want to access them from outside the university, please access via Off-Campus Access:
https://www.waseda.jp/library/en/search_find/off-campus-access/

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

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. It holds multiple copies for frequently used books.

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 have introduced online versions of journals and books as much as possible. Students can use online journals through WINE: https://waseda.primo.exlibrisgroup.com/discovery/search?vid=81SOKEI_WUNI:WINE&lang=en. Textbooks for EBSE courses are located in the IPSE/EBSE corner, and can be used inside the library.

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 library website.

(ii) Carry your student ID card at all times. If you forget it, you cannot use any library.

(iii) Learning Assistant Desk is located in the Students' Reading Room. LAs are graduate students, and they can assist your learning and answer your questions about library services. (Activities may be suspended due to university or library policies.)

(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 library materials are lost or damaged, students 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) In case that a borrower misses the due date to return library materials, he/she receives penalties. Please show the following page:
https://www.waseda.jp/library/en/services/borrowing/

(vii) Please observe the rules in "User instructions for databases, electronic journals, etc.": https://waseda-jp.libguides.com/c.php?g=916927&p=6610206#notice

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

(ix) When you have questions on how to use library, please search the library website first, then use an online reference or ask at library desks if it is still not clear.

MyWaseda → Research → Library Online Request → Online References

17 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 classes (classroom type)
Room G	48 people	○	○	○	—	
GroupWork Space	10 people	—	—	—	—	Wireless Presentation System

Others

Name	Capacity	Available OS	Location
Drafting/CAD room	222 people	Windows (Japanese)	1st floor of Building No. 57

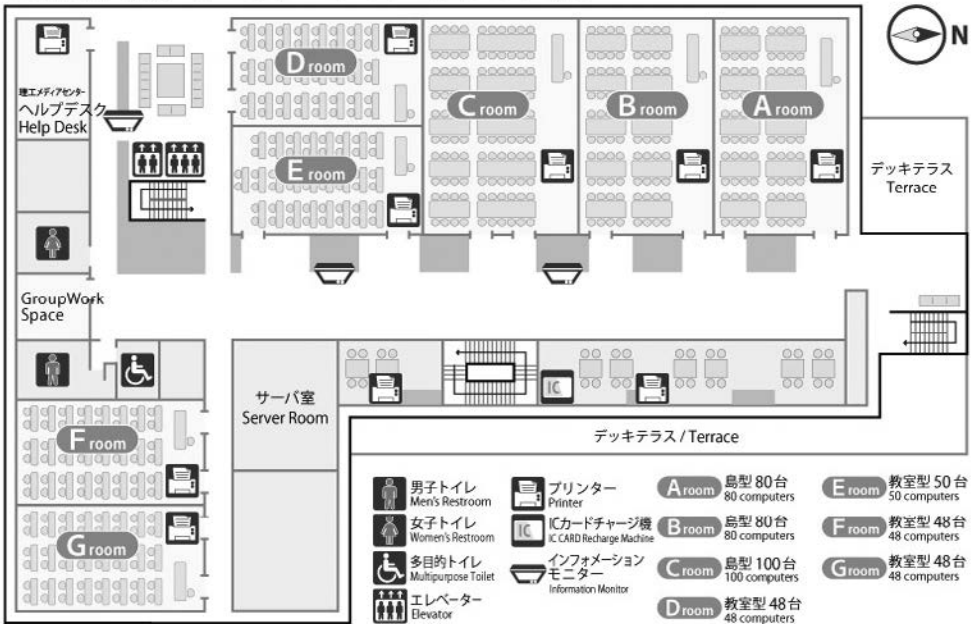
The availability of computer rooms can be checked in the information panels which are placed at 1st and 3rd floor of Building 63 and the website of the Media System Support Section.

https://www.waseda.jp/mse/web/en/pcroom/

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 of 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 rooms A, B, C, F and G. Linux environments are mainly used in classes in programming languages, algorithms, and numerical analysis. To use a Linux environment, students must apply for use through the Science and Engineering School Students website of MyWaseda.

○ Using MacOS X

MacOS X environment can be accessed from computer rooms D and E. Word, Excel, PowerPoint, Photoshop and Illustrator (Room E Only) are available.

○ Using computers with foreign language learning equipment

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

18 Experimental Facilities

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 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.

Laboratory for Science and Engineering	Laboratory for Science and Engineering are used for the “Science and Engineering Laboratory”, “Laboratory for Advanced Science and Engineering A/B (ASE only)”, and “Chemistry and Bioscience Laboratory (Major in Chemistry and Bioscience only)” courses. Laboratory for Science and Engineering consist of 4 different fields of academic study: physics, chemistry, life science, and engineering.
Laboratory for Science and Engineering (Physics): Building 56, 2F	This laboratory is used for the physics experiments of the “Science and Engineering Laboratory” and “Laboratory for Advanced Science and Engineering A/B” courses. Students can learn the basics of physics through creative and unique experiments based on production.
Laboratory for Science and Engineering (Chemistry): Building 56, 3F	This laboratory is used for the chemistry experiments of the “Science and Engineering Laboratory”, “Laboratory for Advanced Science and Engineering A/B”, and “Chemistry and Bioscience Laboratory” courses. Students can learn the basic knowledge and experimental methods for chemistry such as synthesis, extraction, and analysis.
Laboratory for Science and Engineering (Life science): Building 56, 3F	This laboratory is used for the life science experiments of the “Science and Engineering Laboratory” and “Laboratory for Advanced Science and Engineering A/B” courses. Students can learn the basics of bioscience through observation of cells and extraction of DNA.
Laboratory for Science and Engineering: Building 63, B1F east side	This laboratory is used for the basic engineering experiments of the “Science and Engineering Laboratory 2” courses. Students 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. Students can receive guidance on machining and machines 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. Students 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 the 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, equipment, and instruments to synthesis, separation and purification of organic compounds. They 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 genes and proteins and a wide range of bioscience techniques by conducting morphological/physiological experiments using microbes, mammalian cells and animals.

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. Students can use a large color printer to prepare posters for conference presentations.
Center for Advanced Biomedical Sciences Shared Instruments Room: Building 50 (TWIns)	This room provides equipments for bioscience processing and analysis, such as centrifuge, MS, FACS, DNA sequencer, real-time PCR, X-ray analysis apparatus, and gas chromatograph. It is available for use under the management of Research Support Center.

19 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 healthy school life. The Health Support Center has branches in each campus. For more details, refer to the website below:

Contact Information:	
Address	1st floor of Building 51, Nishi-Waseda Campus
Tel	03-5286-3021, 03-5286-3082 (direct line for consultation)
Website	http://www.waseda.jp/hoken/english
Office hours	Monday through Saturday 9:00 – 17:00

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 Saturday 9:00-12:30, 13:30-17:00
(v) Clinical examination by physician
Monday through Friday 13:30-15:40
(vi) First-aid treatment and care of sick persons
*Monday through Saturday 9:00-12:30, 13:30-17:00
*In an emergency, the Health Support Center will open during the lunch break.
(vii) Mental health consultation by special counselor for students (1st and 9th floor of Building 51)
Monday through Friday 9:00-12:00, 13:00-17:00 (by appointment only)
(viii) Other consultation

20 Special Consideration for Leave of Absence

The University has systems in place to prevent students who are on a leave of absence due to the circumstances listed below from being unfairly disadvantaged in terms of assessment. Students who fail to meet coursework requirements such as class attendance (including that for online courses), submission of assignments, and exam-taking should consult the office of their affiliated department (school or graduate school) in order to request special academic consideration from their course instructors. Please note that the final decision on a student's absences is left to the discretion of the instructor.

Bereavement Leave

Scope

This policy applies to all full-time students currently in the Waseda University system.

Immediate Family

Students are eligible for up to seven consecutive class-meeting days for the death of a first-degree family member (parent, child), second-degree family member (sibling, grandparent, grandchild), or spouse (if international travel is involved, extra days may be granted).

Procedure

1) Obtain a “Notification of Absence due to Bereavement” from the office of your affiliated department within ten days of the end of the period for which consideration is sought.
2) Promptly fill out and submit the completed “Notification of Absence due to Bereavement,” along with appropriate documentation, such as a funeral acknowledgment card, to the office of your affiliated department.
   *In the event the deceased is your guardian, it will also be necessary to follow the procedure to change guardians.
3) Obtain a “Special Consideration Request for Absence due to Bereavement” from the office of your affiliated department.
4) Submit the “Request for Special Consideration due to Bereavement” to your course instructor and seek special consideration for academic work missed during your bereavement leave (if you are taking an online course, submit this request to the office offering the course or your instructor via email, the LMS, etc.).

Jury Duty

Scope

This policy applies to all full-time students and students from Doshisha University currently in the Waseda University system (students of e-learning courses in the School of Human Sciences are not included).
N.B. College students may use their right to refuse such duty (under the right of civil law).

Procedure

1) Notify the office of your affiliated department and submit the “Notice of Term of Service (Summons)” you received.
2) Submit a “Request for Consideration” to your course instructor and seek special consideration for academic work missed during your jury duty leave (if you are taking an online course, submit this request to the office offering the course or your instructor via email, the LMS, etc).

Infectious Disease

In order to prevent the spread of highly infectious diseases, students who have contracted any of the specified diseases will not be allowed to attend class, based on the authority of the School Health and Safety Act (the length of the suspension period is based on Mandatory Suspension Guidelines).

Scope

See the information available on the Health Support Center homepage for details regarding preventing the spread of infectious diseases on campus.
*For information pertaining to COVID-19, follow the link below.
https://www.waseda.jp/inst/hsc/en/information/healthcare/infection

Procedure

1) If you contract an infectious disease, notify the office of your affiliated department.
2) Once you have recovered from your illness, ask your physician to fill out the designated *Certificate of Recovery from Infectious Disease Form* (学校における感染症治癒証明書) and submit it to the office of your affiliated department.
3) Obtain, fill out, and submit a “Notification of Absence due to Quarantine for Infectious Diseases” to the office of your affiliated department and follow all instructions given by the office. Contact your course instructor and seek special consideration for academic work missed during your illness.

   *For absences related to COVID-19, be sure to check the latest updates on the Health Support Center’s website as information regarding who will be instructed to halt class attendance and related procedures are subject to change. Please note, it is possible to request special consideration for COVID-19-related absences in circumstances other than infection, such as for absences due to side effects from the vaccine and university-directed suspension of attendance. For details, please inquire at the office of your affiliated faculty.

Nursing Experience and Teaching Practice

Scope

This policy applies to all students who are taking nursing experience or teacher-training education courses currently in the Waseda University system.

Number of days

In accordance with the training period.
*Please note that special consideration will not be given if you have registered for a quarterly course, so please refrain from taking quarterly courses during the training period.

Procedure

Information on how to request special consideration for absences during a training period will be available on the Teacher Education Center's website and Waseda Moodle. You can request special consideration by following the procedures indicated, however the final decision on a student's absences will be left to the discretion of the instructor in each course.

21 Class Cancellation Policy during Term

In general, during severe and dangerous weather conditions, the University will issue a directive to cancel classes (except classes on public holidays or during vacation time) and postpone examinations, etc. Directives involving such contingency measures on any campus will apply to all courses and examinations taking place in person on the designated campus.

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 classes are taking place) are under any severe-weather warning issued by the Meteorological Agency or a "J-Alert" warning concerning a potential ballistic missile attack, and they feel that commuting will endanger their safety. In such cases, students should submit a completed "Notification of Absence" to the office of their affiliated department for approval and show the approved form to their course instructors when requesting consideration for that absence.

Special Exemptions to Cancellation of Classes and Postponement of Examinations

Regarding online classes, there may be cases in which it is difficult due to adverse weather conditions, etc. for students to participate online. Students should determine for themselves if they are unable to participate in that day's classes, and in such cases, they can request consideration for the absence the following day through the office of their affiliated department (school or graduate school).

Class Cancellation due to Severe Weather

Any decision to cancel classes, postpone examinations, or enact other contingency measures due to severe weather is the responsibility of the University and will 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, faculty, and staff, the University will enact contingency measures such as the cancellation of classes and postponement of examinations, etc. Please be aware, if there is no special directive issued by the University, classes and examinations will typically not be

cancelled or postponed.

1) If the University decides to enact contingency measures such as the cancellation of classes, postponement of examinations, etc., the University will inform all students of the decision at least 60 minutes prior to the start of each affected class period or examination via the emergency communication channels shown below. Whenever possible, the University will make efforts to inform students, faculty, and staff of cancellations and postponements, etc. at least two hours prior to their scheduled time.
2) Based on the prevailing weather conditions during a typhoon, heavy snow, etc., where forecasts with reasonable accuracy can be made, the University may issue an emergency bulletin a day in advance to cancel classes, postpone examinations, etc. In such cases, a decision will be made by 7 p.m. and a notification posted for students via the emergency communication channels shown below.

Class Cancellation due to the Occurrence of a Severe Earthquake

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

1) If a decision is made to cancel or postpone classes or examinations, students, faculty, and staff will be immediately notified via the communication channels listed below.
2) If a decision is made during instructional hours, an immediate announcement will be made over the campus public address system.

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

In the event of a large-scale power outage occurring unpredictably in the wake of overwhelming demand for electricity, the University will cancel classes as follows. Classes will be resumed in the first period of the day following the restoration of electric power.

1) If a large-scale power outage occurs during a class period (Periods 1 – 7):
   Remain calm and stay 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 a class period:
   All classes scheduled for the day will be cancelled.

Class Cancellation due to Transport Strikes

Waseda, Toyama, Nishi-Waseda Campus should refer to items 1), 2), 3), and 4), below. Tokorozawa Campus should refer to items 1), 2), 3), and 5), below

1) If JR or any other public transport company goes on strike (a general strike or a JR strike), the following arrangements will apply:
   A. If the strike ends by 12 midnight of the previous day, classes will proceed as normal.
   B. If the strike ends by 8 a.m. on the day in question, classes will start from Period 3 (1 p.m.).

C. If the strike does not end by 8 a.m., all classes will be cancelled.

It should be noted that the above does not apply to work-to-rule action at JR or to strikes affecting private railway companies.

2) If JR in the Tokyo Metropolitan area goes on a limited (local) strike, classes will proceed as normal.
3) If JR in the Tokyo Metropolitan area goes on a full-scale time-limited strike, the following arrangements will apply:
   A. If the strike ends by 8 a.m., classes will start from Period 3 (1 p.m.).
   B. If the strike ends by 12 noon, classes will start from Period 6 (6:15 p.m.).
   C. If the strike continues past 12 noon, all classes will be cancelled.
4) If only private railways excluding JR, or the Metropolitan Transport Authority, go on strike, classes will proceed as normal.
5) If either the Seibu Railway Shinjuku Line or Seibu Railway Ikebukuro Line goes on strike, or even if neither of the Seibu Railway lines are on strike but both Seibu Bus and Seibu Motors go on strike, then the following arrangements will apply:
   A. If the strike ends by 8 a.m., classes will start from Period 3 (1 p.m.).
   B. If the strike continues past 8 a.m., all classes will be cancelled.

22 Method of Contact in Case of an Emergency

Waseda University will make emergency announcements through the Emergency Communication System, as outlined below.

1) Waseda University Emergency Bulletin Website: https://emergency-notice.waseda.jp/
2) “Announcements” in MyWaseda
3) Waseda Mail

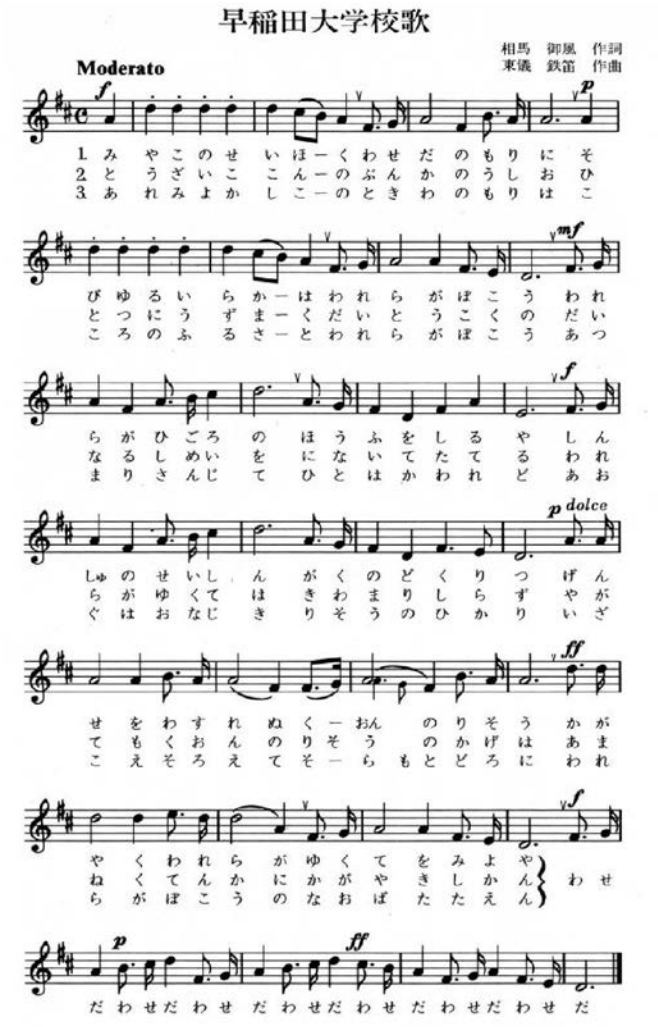
The same information can be accessed via the following channels.

1) MyWaseda: https://my.waseda.jp/
2) Waseda University Website: http://www.waseda.jp/
3) Waseda University official Twitter: https://twitter.com/waseda_univ
4) Waseda University official Facebook: https://www.facebook.com/WasedaU

V

Appendix

1 Alma Mater



1.都の西北　早稲田の森に
　聳ゆる甍は　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
　わせだ　わせだ　わせだ　わせだ
　わせだ　わせだ　わせだ

1.Northwest of City great and fair,
　In the wood of Waseda,
　Rise proudly high up in the air
　Our old college dome and tower.
　Our high-aspiring, cherished plan,
　Fond ambitions, know ye not?
　The torch of Progress in the van,
　Glaring fire of freest thought;
　The infinite Eternal Aim,
　Careful, too, of present need.
　How brightly onward, at its name,
　See our steady ranks proceed!
　Waseda, Waseda, Waseda, Waseda,
　Waseda, Waseda, Waseda

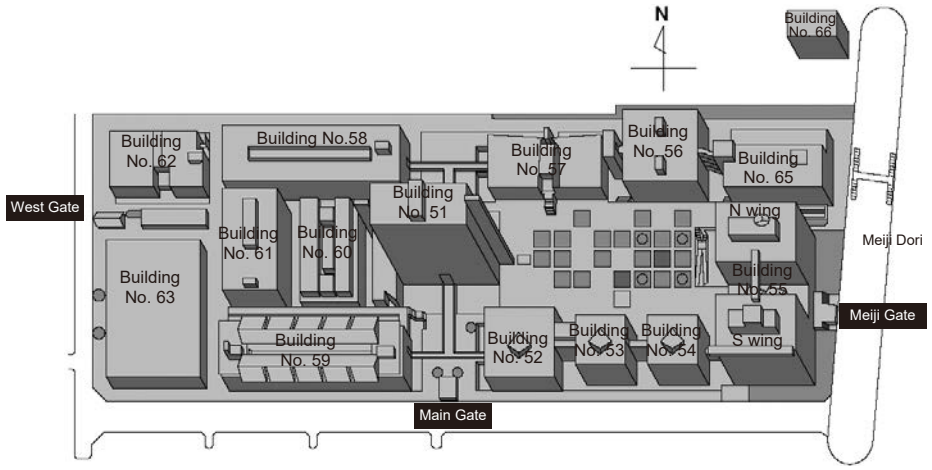
2.東西古今の　文化のうしほ
　一つに渦巻く　大島国の
　大なる使命を　担ひて立てる
　われらが行手は　窮り知らず
　やがても久遠の　理想の影は
　あまねく天下に　輝き布かん
　わせだ　わせだ　わせだ　わせだ
　わせだ　わせだ　わせだ

2.From east and west, from age to age,
　All tides of civilization
　In one huge whirlpool ever surge
　Round this great island Nation.
　Whose lofty mission are we not
　Carrying on our shoulders strong,
　Through hardships of the vast untrod,
　Endless as we march along?
　Yet soon our hoped Eternal Goal
　May its gleaming shadow cast
　And with its all-embracing soul
　Illumine the World at last!
　Waseda, Waseda, Waseda, Waseda,
　Waseda, Waseda, Waseda

3.あれ見よかしこの　常磐の森は
　心のふるさと　われらが母校
　集り散じて　人は変れど
　仰ぐは同じき　理想の光
　いざ声そろへて　空もとどろに
　われらが母校の　名をばたたへん
　わせだ　わせだ　わせだ　わせだ
　わせだ　わせだ　わせだ

3.And look on yonder wooded hill
　Decked with evergreen, for there
　We have our home for heart and will,
　School, with kind maternal care!
　Her students change from year to year,
　Meet and part with youth's delight,
　Yet all alike we seek to share
　These ideals and their light.
　Come, let us sing in all accord,
　And with raptures ring the air,
　To praise the honored name aloud
　of our Alma Mater dear!
　Waseda, Waseda, Waseda, Waseda,
　Waseda, Waseda, Waseda

2 Campus Map

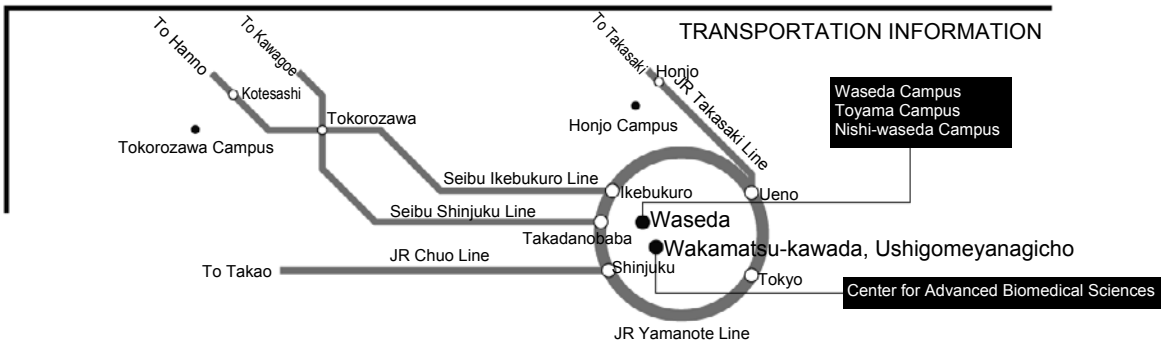


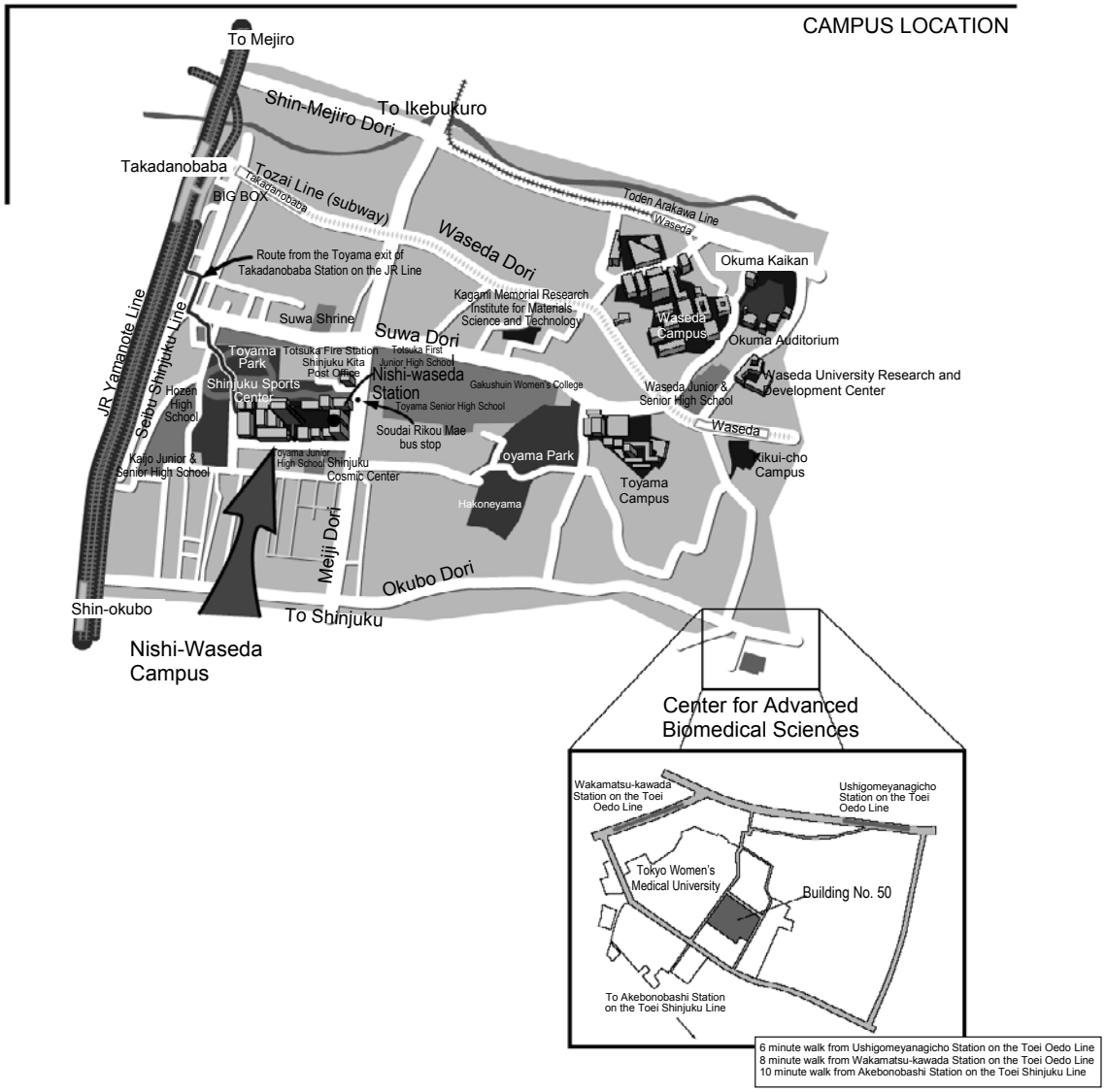
Media System Support Section Help Desk 3rd floor of Building No. 63	WASEDA Monodukuri koubou1st floor of Building No.61	Laboratory for basic experiments in science and engineering (Chemistry, Bioscience) Building No. 56	Office of the Faculty of Science and Engineering 1st floor of Building No. 51
Computer Rooms A to G 454 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 Mathematics Room 01, 1st floor of Building No. 63	Department of Architecture Room 03, 2nd floor of N wing of Building No. 55	Department of Physics Room 03, 2nd floor of N wing of Building No. 55
Department of Applied Mathematics Room 01, 1st floor of Building No. 63	Department of Modern Mechanical Engineering Room 08, 2nd floor of Building No. 60	Department of Applied Physics Room 03, 2nd floor of N wing of Building No. 55
Department of Applied Mechanics and Aerospace Engineering Room 08, 2nd floor of Building No. 60	Department of Industrial and Management Systems Engineering Room 00, 13th floor of Building No. 51	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 Computer Science and Engineering Room 01, 1st floor of Building No. 63	Department of Civil and Environmental Engineering Room 07B, 2nd floor of Building No. 51	Department of Applied Chemistry Room 03, 2nd floor of N wing of Building No. 55
Department of Communications and Computer Engineering Room 01, 1st floor of Building No. 63	Department of Resources and Environmental Engineering 13th floor of 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, 162-8480
Department of Intermedia Studies Room 01, 1st floor of Building No. 63		
Department of Materials Science Room 01, 1st floor of Building No. 63		Department of Electrical Engineering and Bioscience Room 03, 2nd floor of N wing of Building No. 55
		Cooperative Major in Nuclear Energy Room 01, 1st floor of Building No.63
	Center for English Language Education in Science and Engineering 2nd floor of Building No. 51	
	International Center for Science and Engineering 2nd floor of Building No. 51	

NISHI-WASEDA CAMPUS





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