Application Guidelines
Master's Program (Master in Engineering/Science) for International Students
Graduate School of Science and Engineering
Ehime University
Academic Year 2020 (September Entrance)

※Please be sure to read it

Depending on the situation such as new coronavirus, the contents of this guideline may be changed to prevent the spread of infectious diseases. If there are any changes, we will inform you on the Ehime University homepage (https://www.ehime-u.ac.jp/entrance/) at any time, so please check carefully.

<< About the academic ability test in the science system >>
Please note that due to the influence of the new coronavirus, the evaluation method will be different from the usual year. The content of each course is as follows.
Physics Course
The TOEIC L & R score conversion points or the English evaluation score during the interview (including oral test) will be the English score.
Earth's Evolution and Environment course
English tests will not be conducted.
Molecular Science Course
English tests will not be conducted. However, your English proficiency will be evaluated through interviews (including oral test).
Biology and Environmental Science Course
The TOEIC L & R or TOEFL iBT score conversion points or the English proficiency test scores will be used as the English scores.
In addition, the method of conducting the academic achievement test may be changed depending on the status of new coronavirus infection. The details will be announced if there is a change.

1. Number of seats available

	Major	Course	Field	Seats
School of Engineering	Engineering for Production and Environment	Mechanical Engineering	Mechanical Engineering	A few
		Civil and Environmental Engineering	Civil and Environmental Engineering	
	Materials Science and Biotechnology	Materials Science and Engineering	Materials Science and Engineering	A few
		Applied Chemistry	Applied Chemistry	
	Electrical and Electronic Engineering and Computer Science	Electrical and Electronic Engineering	Electrical and Electronic Engineering	A few
		Computer Science	Computer Science	
School of Science	Mathematics, Physics, and Earth Sciences	Mathematical Sciences	Mathematical Sciences	A few
		Physics	Physics	A few
		Earth's Evolution and Environment	Earth's Evolution and Environment	A few
	Chemistry and Biology	Molecular Science	Molecular Science	A few
		Biology and Environmental Science	Biology and Environmental Science	A few

2. Application Period and Selection Test

Application period:	**16** (Thu) **– 27** (Mon) **July 2020** ※ Must be either submitted in person from 9:00AM to 5:00PM in this period (except for Saturday, Sunday) or received via mail (postal service) by **27**(Mon)**July 2020**.
Selection test date:	**Engineering**: **20** (Thu) **August 2020** **Science**: **19** (Wed) **– 20** (Thu) **August 2020**
Result notification:	**1 September 2020** (Tue), 10:00AM The results will be published in terms of registration number and put on the notice boards of Main Buildings of the Faculty of Engineering and Faculty of Science on the above date and time. At the same time, a 'Letter of Notification' will be sent to the successful candidates. However, telephone or email inquiries will not be entertained.
Admission formalities:	The admission formalities for the successful candidates will take place on 2(Wed) **– 8**(Tue) **September 2020**.
The application documents must be submitted/sent to:	**Engineering**: Education Support Division (Engineering Team) Ehime University 3 Bunkyo-cho, Matsuyama, 790-8577, Japan Tel.: 089-927 9697 E-mail:kougakum@stu.ehime-u.ac.jp **Science**: Education Support Division (Science Team) Ehime University 3 Bunkyo-cho, Matsuyama, 790-8577, Japan Tel.: 089-927 9546 E-mail:scigakum@stu.ehime-u.ac.jp

Notice

〈Civil and Environmental Engineering , Applied Chemistry, Electrical and Electronic Engineering〉

An applicant who lives in a foreign country at the time of applying and wish to take an examination using internet-based interview has to make contact with Education Support Division (Engineering Team, e-mail: kougakum@stu.ehimeu-u.ac.jp) in advance (until 12 June(Fri) 2020).

An applicant who meets one of the following requirements will be able to take an examination utilizing internet-based interview.

・A graduate and/or prospective graduate of a college or university that has an official academic exchange agreement with Ehime University.

・ A graduate and/or prospective graduate of a college or university that has collaborative research program/s with the faculty member/s of the Graduate School of Science and Engineering, Ehime University can apply.

3. Application Eligibility

An applicant to this program must be a non-Japanese national eligible to stay in Japan as a student under the state regulations of immigration and refugee control, and must meet one of the following requirements.

(1) Must have acquired or should be expecting to acquire by **September 2020** a bachelor degree.
(2) An applicant, who has had formal education outside Japan, must have completed or should be expecting to complete 16 years of formal education by **September 2020**.
(3) Those who have earned or expect to earn by **September 2020**, a bachelor's degree or equivalent by completing an academic program of 3 years or more at a foreign university or foreign educational institution (limited to the institutions whose overall quality of education and research has been evaluated by an external body certified by the country's government or its related agency, or the institutions designated as equivalent by the Minister of *

MEXT).

(4) An applicant, who has had formal education outside Japan, must have completed 15 years of course-based education with excellent grades and must be recognized by the Graduate School as eligible to apply for the program.

(5) Recognized by the Graduate School through a separate evaluation for admission eligibility as being in possession of academic abilities equivalent to or greater than those of a bachelor degree holder, and must be 22 years old or above at the time of admission.

*MEXT＝Ministry of Education, Culture, Sports, Science and Technology

(***Note:*** If you meet one of the above conditions, applicant to School of Engineering please contact with the each Department Chair or Education Support Division (Engineering Team), applicant to School of Science please contact with Education Support Division (Science Team), until **16(Thu) July 2020**. (if you meet either requirement (3) (4) or (5), please contact the Graduate School Office by **12(Fri) June 2020**) before sending us your application documents.)

（Contact address）
Mechanical Engineering：shibata.satoru.mg@ehime-u.ac.jp
Civil and Environmental Engineering：nakahata.kazuyuki.mk@ehime-u.ac.jp
Materials Science and Engineering：itagaki.yshiteru.mj@ehime-u.ac.jp
Applied Chemistry：matusguchi.masanobu.mm@ehime-u.ac.jp
Electrical and Electronic Engineering：jinno.masafumi.mh@ehime-u.ac.jp
Computer Science：ninomiya.takashi.mk@ehime-u.ac.jp
Engineering team：kougakum@stu.ehime-u.ac.jp

Mathematical Sciences
Physics
Earth's Evolution and Environment
Molecular Science
Biology and Environmental Science
} scigakum@stu.ehime-u.ac.jp

In addition, those who apply to the above (4) (5), please submit the following documents by the deadline.

〈*Pre-application Admission Eligibility Assessment for* Requirement (4) ***above*〉**

An applicant willing to apply to this program under the Application Eligibility requirement (4) above must also submit/send the following documents in addition to the documents listed on page 4 of this 'Application Guidelines' to the address given on page 1 by the application deadline.

① Documents to be submitted/sent:

Letter of Recommendation	Officially sealed Letter of Recommendation prepared by the college/university attended (*provided with the application material; **Form#2***)
Grade Sheet/s or Transcript	Officially sealed copies of grade sheets or transcripts of courses attended, issued by the university or college of affiliation; with clear indication of compulsory subjects as well as all other subjects attended up until 3rd year or 6th semester of the course and the corresponding credit hours
Course curriculum of the college/university attended	The course curriculum details of the subjects attended at the college/university of the applicant's affiliation

② Submission deadline: **12 June 2020** (Fri)
Must be either submitted in person from 9:00AM to 5:00PM on weekdays, or received via mail (postal service) by 12 June 2020 (Fri).

〈*Pre-application Admission Eligibility Assessment for* Requirement(5) ***above*〉**
An applicant willing to apply to this program under the Application Eligibility requirement (5) above must submit/send the following documents to the address given on page 1 of this 'Application Guidelines' by the deadline below.

① Documents to be submitted/sent:
1) Admission eligibility assessment sheet (*provided with the application material;* ***Form#3***)
2) Reason for admission eligibility assessment request (*provided with the application material;* ***Form#4***)
3) Graduation Certificate obtained from the last-attended educational institution.
4) Other reference materials for evaluation (such as, research paper/s, patent certificate/s, etc.)
5) Self-addressed return envelope affixed with an 84-yen stamp (for notifying the result of application eligibility assessment)

② Submission deadline: **12 June 2020** (Fri)
Must be either submitted in person from 9:00AM to 5:00PM on weekdays, or received via mail (postal service) by 12 June 2020 (Fri).

③ Admission eligibility assessment:
The admission eligibility assessment will be conducted on the basis of the submitted/sent documents, and the applicant will be notified of the result by **16 July 2020** (Thu). Please note that the submitted/sent documents will not be returned in any case, but if the admission eligibility is accepted, the applicant will have to submit all required documents listed on page 4 of this 'Application Guidelines.' Moreover, the result of this particular admission eligibility assessment will only remain valid for an application to **2020** Selection Program.

4. Selection Procedure

The selection for admission will be made on the basis of assessment of submitted documents and performance in interview (including an oral test). Applicants for the School of Science (except Mathematical Science and Molecular Science) must also complete a written examination. The details of the interview and written test are given in the following table.

<table>
<tr><th></th><th>Date (day)</th><th>Interview and written test subjects</th><th>Course</th><th>Time</th></tr>
<tr><td rowspan="2">School of Engineering</td><td></td><td></td><td>・ Mechanical Engineering</td><td>9:00～</td></tr>
<tr><td>20 August
(Thu)</td><td>Interview (including Oral Test) only</td><td>・ Civil and Environmental Engineering*
・ Materials Science and Engineering
・ Applied Chemistry*
・ Electrical and Electronic Engineering*
・ Computer Science</td><td>13:00 ~</td></tr>
<tr><td></td><td>Place</td><td colspan="3">Faculty of Engineering, Ehime University
3 Bunkyo-cho, Matsuyama City</td></tr>
<tr><td colspan="5">*After preliminary consultation, we conduct remote entry examination for approved applicants by Internet interview.</td></tr>
</table>

(**Note**: The details of the interview will be explained on the day of the entrance test.)

<table>
<tr><th></th><th>Date (day)</th><th colspan="2">Interview and written test subjects</th><th>Course</th><th>Time</th></tr>
<tr><td rowspan="6">School of Science</td><td rowspan="4">19 August
(Wed)</td><td rowspan="3">Specialized subjects*</td><td>Physics</td><td>・ Physics</td><td rowspan="2">09:00~12:00</td></tr>
<tr><td>Earth Science</td><td>・ Earth’s Evolution and Environment</td></tr>
<tr><td>Biology</td><td>・ Biology and Environmental Science</td><td>09:00~11:00</td></tr>
<tr><td colspan="2" rowspan="2">English</td><td>・ Physics**</td><td>—</td></tr>
<tr><td>・ Biology and Environmental Science***</td><td>13:00~14:00</td></tr>
<tr><td>20 August
(Thu)</td><td colspan="2">Interview
(including Oral Test)</td><td>・ Mathematical Sciences
・ Physics
・ Earth’s Evolution and Environment
・ Molecular Science
・ Biology and Environmental Science</td><td>13:00~</td></tr>
<tr><td>Place</td><td colspan="4">Faculty of Science, Ehime University
2-5 Bunkyo-cho, Matsuyama City</td></tr>
</table>

*The extent of questions in specialized subjects of each course is given on Page 7 of this guideline.

** There is no English examination in the’ Physics’ course, as we use converted scores of the TOEIC L&R or English evaluation points during interviews (including oral test).

*** The TOEIC L & R or TOEFL iBT score conversion points or the English proficiency test scores will be used as the English scores in the Biology and Environmental Science Course

(**Note**: The details of the interview will be explained on the day of the entrance test.)

5. **Application Material and Documents to be Submitted**
   (1) Application form (including Personal Identification Card and Admission Card) (*provided with the application material; **Form#1***)
   (2) Officially sealed copies of Grade Sheet/s or Transcript/s of Bachelor Degree course officially issued by the graduating university or college
   (3) Bachelor Degree Certificate or Certificate of expected date of graduation officially issued by the graduating university or college
   (4) A 30-mm wide and 40-mm high (30mm×40mm) photograph: It must show the applicant’s upper body and face, and have been taken within 3 months of the date of application; applicants should be facing the camera with no hat/cap; to be affixed on the Personal Identification Card
   (5) An application processing fee of 30,000 yen will have to be paid through the Post Office or Postal Bank (Note: it cannot be paid through any other banks or financial institutions, and an ATM may also not be used for transferring the amount), and the payment slip (with the date of payment) must be pasted on ‘Application Processing Fee Payment Certificate’ provided with the application forms. Please note that except for the condition stated on page 8 under ‘9 (3) Return of Application Processing Fee’, the application processing fee will not be returned.
   (6) Admission Card return-mailing envelop (If you wish your Admission Card to be mailed to your address, please paste a **374-yen** postal stamp and self-address the envelope provided with the application material.)
   (7) A copy of Residence Card (If an applicant is in Japan at the time of application, such a

certificate is issued by the city or town of residence.)

(8) Physics course

If you wish to replace the converted points from the TOEIC L & R score with English scores, please submit the original transcript of TOEIC L&R and a copy (A4 size) of it. Please prepare an Official Score Certificate of TOEIC L&R that was issued in or after **September 2018**. You cannot use the transcript of Institutional Program, for example TOEIC IP.

(9) Biology and Environmental Science course

If you wish to replace the converted points from the TOEIC L & R or TOEFL iBT score with English scores, please submit the original transcript of TOEIC L&R or TOEFL iBT and a copy (A4 size) of it. We will take it as your English score after conversion. Please prepare an Official Score Certificate of TOEIC L&R or Official Score Report of TOEFL iBT that was issued in or after September 2018. You cannot use the transcript of Institutional Program, for example TOEIC IP.

6. Marks Distribution, Marking, Evaluation Criteria, and Selection Criteria

(1) Marks Distribution:

<School of Engineering>

Course	Interview (including Oral Test)	Total
・ Mechanical Engineering ・ Civil and Environmental Engineering ・ Materials Science and Engineering ・ Applied Chemistry ・ Electrical and Electronic Engineering ・ Computer Science	100	100

※ The submitted grade sheet/s or transcript/s will be evaluated in A, B, or C level, and will be considered in final selection.

<School of Science>

Course	Interview (including Oral Test)	Total
・ Mathematical Sciences	100	100

※ The submitted grade sheet/s or transcript/s will be evaluated at A, B, or C levels, and will be considered in final selection.

Course	Specialized Subjects	English	Interview (including Oral Test)	Total
・ Physics ・ Biology and Environmental Science	200	100	100	400

※ The English of the Physics course will be evaluated during an interview (including an oral test). For those who have submitted the TOEIC L & R transcripts, the one with the highest score will be used, which is the English score in the interview (including the oral test) and the conversion score from the TOEIC L & R score.The following is the way of conversion. Your English score is 100 if the score is more than 100 after conversion by these ways.

[English score after conversion] = [scores on the TOEIC L&R] ／7

※ The English of the Biology and Environmental Science course will be evaluated by the TOEIC L & R or TOEFL iBT score conversion points or the English proficiency test scores. For those who have submitted the TOEIC L & R or TOEFL iBT score transcripts, the one with the highest score will be used, which is the English proficiency test score and the conversion score from the
TOEIC L & R or TOEFL iBT score. The following is the two ways of conversion. Your English score is 100 if the score is more than 100 after conversion by these ways.

[English score after conversion] = [scores on the TOEIC L&R] ／7
[English score after conversion] = 100×[scores on the TOEFL iBT]／120＋20

Course	Specialized Subjects	Interview (including Oral Test)	Total
・Earth's Evolution and Environment	200	100	300

Course	Grade sheet/s or transcript/s	Interview (including Oral Test)	Total
・Molecular Science	100	100	200

(2) Marking and Evaluation Criteria:

	Course	Basis for evaluation	Marking, Evaluation Criteria (General Criteria)
School of Engineering	・ Mechanical Engineering ・ Civil and Environmental Engineering ・ Materials Science and Engineering ・ Applied Chemistry ・ Electrical and Electronic Engineering ・ Computer Science	Grade sheet/s or transcript/s	Only the performance in specialized subjects will be considered.
		Interview (including Oral Test)	Fundamental understanding, aims and objectives, study motivation, self appeal and presentation, etc. will be considered.
School of Science	・ Mathematical Sciences	Grade sheet/s or transcript/s	Only the performance in specialized subjects will be considered.
		Interview (including Oral Test)	Aims and objectives, study motivation, self appeal and presentation, etc. will be considered in the interview, while fundamental understanding will be examined through the oral test.
	・ Physics ・ Biology and Environmental Science	Specialized subjects	Understanding of specialized subjects will be considered.
		English	General English ability will be considered.
		Interview (including Oral Test)	Aims and objectives, study motivation, self appeal and presentation, etc. will be

			considered in the interview, while fundamental understanding will be examined through the oral test.
	・Earth's Evolution and Environment	Specialized subjects	General English ability will be considered.
		Interview (including Oral Test)	Aims and objectives, study motivation, self appeal and presentation, etc. will be considered in the interview, while fundamental understanding will be examined through the oral test.
	・ Molecular Science	Grade sheet/s or transcript/s	Only the performance in specialized subjects will be considered.
		Interview (including Oral Test)	Aims and objectives, study motivation, self appeal and presentation, etc. will be considered in the interview, while fundamental understanding will be examined through the oral test.
	* We will confirm your English proficiency during the Interviews (including oral test) in the Molecular Science Course.		

(3) Selection Criteria:

	Course	Decision criteria	Method of ordering applicants who are awarded the same score
School of Engineering	・ Mechanical Engineering ・ Civil and Environmental Engineering ・ Materials Science and Engineering ・ Applied Chemistry ・ Electrical and Electronic Engineering ・ Computer Science	Will be based on the interview (including oral test) score and grade sheet/s or transcript/s. However, if one of the following conditions arises, the applicant will be considered disqualified. (1) The interview (including the oral test) score is less than 1/3rd, (2) The level of evaluation of grade sheet/s or transcript/s is 'C'	A tie will occur between applicants who are awarded the same score.
School of Science	・ Mathematical Sciences	Will be based on the interview (including oral test) score. However, if one of the following conditions arises, the applicant will be considered disqualified. (1) The interview (including the oral test) score is less than 1/3rd, (2) The level of evaluation of grade sheet/s or transcript/s is 'C'	A tie will occur between applicants who are awarded the same score.

	・ Physics ・ Earth's Evolution and Environment ・ Molecular Science ・ Biology and Environmental Science	Will be based on the total marks acquired in the evaluation process.	A tie will occur between applicants who are awarded the same score.

Separate Table for Extent of Questions (School of Science) in Specialized subjects for the written examination

Course Name	Subjects for examination	Remarks
Physics	・ Mechanics ・ Electromagnetism ・ Statistical and Thermal Physics ・ Quantum Mechanics	
Earth's Evolution and Environment	・ Petrology ・ Mineralogy ・ Geology - Paleontology ・ Geophysics ・ Physical properties of earth interior ・ Oceanography ・ Biology	A total of eight questions will be asked in the examination: two from petrology and mineralogy, two from geology, paleontology,-two from physical properties of earth interior and Geophysics, one from oceanography, and one from biology. Any 4 questions will have to be answered.
Biology and Environmental Science	・ Biology (Molecular Biology, Cell Biology, Morphology, Physiology, Developmental Biology, Genetics, Ecology, Environmental Biology) and Related Sciences, such as Biochemistry and Earth Science	A total of 6 questions will be presented: one each from chemistry and earth science, four from the chapter specified in the reference book on biology (for the questions range, please refer to the following website. http://www.sci.ehime-u.ac.jp/news_info/1427/) Choose two from above them and answer. In addition, as a third question, it is to write about the topics that you would like to study after enrollment, its background, how to approach to the problem, the expected outcome and significance.

7. Admission Formalities

(1) Admission Date and Entrance Ceremony: The entrance ceremony will take place on 24(Thu) September 2020. However, according to the academic rules of this university for those whose admission eligibility is valid only after 24 (Thu) until 30 (Wed) September 2020, the admission date will be 1 (Thu) October 2020.

(2) The following are necessary at the time of admission.

1) Admission Fee of **282,000 yen**

2) Graduate school-specified admission forms/papers

(3) Admission Formality Period: The admission formalities will take place on 2(Wed) to 4(Tue) **September 2020** from 9:00AM to 5:00PM(except for Saturday, Sunday).

8. Admission Fee, Tuition Fee, and Miscellaneous Charges for the First Year

(1) Admission Fee and Tuition Fee:

Admission Fee: 282,000 yen (to be paid at the time of admission formality)

Tuition Fee: First Semester 267,900 yen; Second Semester 267,900 yen (Annual amount: 535,800 yen)

(2) Miscellaneous Charges:

A few thousand yen will have to be paid for miscellaneous purposes.

Notes: 1. The Tuition Fee has to be paid after admission, so successful applicants will be notified of the payment period at a later date.

2. If a current student's tuition is revised, a new recalculated fee will be applicable.

3 . A system to waive the Admission Fee as well as Tuition Fee is available, but it is only available to those who have excellent academic records and face economic hardship to pay these amounts or come across some special conditions such as a severe impact of natural disasters. Depending on the extent of economic hardship or impact of disasters, partial or full waiver of the above fees through necessary selection procedure is possible. Additionally, a system of late payment of the above fees is available.

9. Miscellaneous

(1) The 'Application Guidelines' (including the Application Forms) can be obtained through postal service. Please send a self addressed and stamped (390 yen, within Japan) envelope (33 cm x 24 cm) to the Graduate School Office (given on page 1). You must indicate on the envelope by red-inked pen that 'Request for Application Material for September 2020 Entrance.'

(2) After receiving the application documents, no changes will be allowed in the application information or submitted documents under any conditions. The submitted documents and application forms cannot be returned.

(3) Return of Application Processing Fee: It can be returned only if one of the following is true.

① Application Processing Fee was paid but the application documents were not sent/submitted

② Mistakenly paid the Application Processing Fee two or more times, or paid an amount greater than the required amount of 30,000 yen

③ Sent/submitted the application documents, but the application was rejected

〈Requesting for the return of the Application Processing Fee〉

In case of **condition①or** ②above, please contact us at the address below. We will send you a 'Request for Return of the Application Processing Fee' form, which you will have to fill out and send back to us by post. In case of **condition** ③, however, we will send you the 'Request for Return of the Application Processing Fee' form along with your application documents, which you will have to fill out and send back to us by post.

Communication Address:

The External Payment Affairs Team
Financial Planning Division
Finance Department, Ehime University
10-13 Dogo-Himata, Matsuyama 790-8577, Ehime, JAPAN
Tel: +81-(0)89-927 9074

(4) If the information in the application forms or application documents is found to be wrong,

the permission to enter the Graduate School will be cancelled and the admission will be denied even after the certificate of permission to enter has been already issued.

(5) Privacy Policy (Use of personal information): Any personal information provided in application forms such as names and addresses is solely for processing applications, contacting applicants if an application document is incomplete, conducting entrance examination, notifying successful applicants, and sending admission procedure documents.
If an application document is incomplete, Ehime University may notify the applicant's guardians or school to request the document be promptly amended and resubmitted. It is also used for academic affairs after enrollment (student registration, educational guidance), student support services (health-care management, scholarship applications), tuition administration, and to conduct surveys and research (improve entrance examinations, study and analyze application trends). The personal information will not be used for any other purpose and will not be provided to third parties

10.Outline and staffs

Engineering for Production and Environment
Mechanical Engineering

Course	Field	Research outline	Staffs and Research Fields
Mechanical Engineering	Mechanical Systems	This division consists of three education and research fields : dynamics of machinery, control engineering, and robotics. The major subjects of our research area contain the followings : dynamics of solids and structures, shape optimization, intelligent control, ergonomics, mechatronics, and intelligent systems.	Shingo Okamoto Robotics Dynamics, Vibration and Control, Computational Mechanics Satoru Shibata Control systems of intelligent machines for coexisting with Humans JaeHoon Lee Robotics, mechatronics and intelligent sensing Tomonori Yamamoto Robotics, Mechatronics, Human-machine interface, Welfare Engineering ※Yutaka Arimitsu Micromechanics in solids and its applications to material science Takayuki Tamaogi Evaluation of Dynamic properties for viscoelastic materials

	Energy Conversion Engineering	This division consists of four education and research groups : thermal engineering, fluids engineering, heat and mass transfer engineering, and mathematical engineering. The staff members engage in instruction and research on thermal engineering, aerothermodynamics, fluids engineering, rheology, sustainable energy, zero emission process, partial differential equations, and numerical analysis.	Shinfuku Nomura Plasma process and sono-process Kazunori Yasuda Non-Newtonian fluid mechanics and its application Masaya Nakahara Smart control of combustion for hydrogen and hydrocarbon Energy Kazuo Matsuura Turbulence simulation of thermofluid flows, hydrogen safety simulation Shinobu Mukasa Electric discharges in a high-density medium and heat and mass transfer phenomena Yukiharu Iwamoto Fluid transport and its application to engineering Masaki Kawamoto Functional Analysis
	Production Systems and Materials for Machinery	This division is composed of several research groups of material engineering, mechanics of materials, production processing and innovate materials processing etc. The object of this division is to conduct academic research on various problems concerning solid-state physics and strength evaluation of advanced materials, creation of new materials, innovative materials processing, advanced plastic forming of metals, and fabrication and machining of CFRPs.	Keiji Ogi Mechanical modeling and strength reliability of composite materials, Processing and machining of CFRPs. Manabu Takahashi Strength and damage evaluation of advanced structural materials Hiromichi Toyota High-rate material synthesis using in-liquid plasma Susumu Tanaka Research on ship performance and ship equipment Mitsuyoshi Tsutsumi Estimation of mechanical properties of industrial materials. Xia Zhu Material and structural design through special processing Technology Masafumi Matsushita Materials synthesis through extreme condition

※Scheduled to retire in March, 2021

Engineering for Production and Environment
Civil and Environmental Engineering

Course	Field	Research outline	Staffs and Research Fields
Civil and Environmental Engineering	Infrastructure Technology and Design	In this field, the research work and course curriculum include a large variety of topics related to construction materials, design and construction methods, and seismic behaviors of infrastructures such as bridges, dams, roads, underground facilities, etc.	Isao Ujike Studies on mass transport properties of concrete and at cracking and on time-dependent behavior of deformation and cracking in reinforced concrete member. Mitsu Okamura Seismic stability of foundations and earth structures as well as development of countermeasure technique and design methodology. Netra Prakash Bhandary Landslides and creeping displacement mechanism, Development of landslide preventive techniques, and GIS for landslide, slope instability, and earthquake hazard assessments. Kazuyuki Nakahata Large scale numerical computing of elastodynamic wave, and electromagnetic have for nondestructive evaluation of structural components, Health monitoring with wireless sensor manufactured by MEMS technique Hideaki Yasuhara Mechanical and hydrolical behavior of fractured rock masses under coupled thermo-hydro-mechano-chemo fields ※※Shinichiro Mori Seismic responses of structures in the aspect of structural/geotechnical earthquake engineering. Research topics are categorized as follows ; nonlinear dynamic soil-structure interaction, liquefaction effects on pile foundations, analysis and modeling of strong ground motion, earthquake damage investigation, and their applications for disaster mitigation. Naoki Kinoshita Thermally induced mechanical and hydraulic properties of rocks and behavior of openings in rock mass Keiyu Kawaai Electro-chemical techniques for assessing durability performances, structural integrity of reinforced concrete and effect of repair used for cracking in concrete Taizo Maruyama Numerical simulation of elastic wave scattering problem for nondestructive evaluation of structures Kohei Ono Liquefaction countermeasure, stability of buried pipeline, rain-induced slope failure, and seismic behavior of earth structures

	Urban Planning and Management	Towards building a highly convenient urban environment of the 21st century, the research work in this field of study includes a variety of topics related to urban life, industrial environment, disaster management, traffic / transportation systems, operations and maintenance.	Toshio Yoshii Urban transportation systems, Traffic management strategies, Measures for improving traffic safety, Dynamic traffic simulation Nobuhiko Matsumura Regional resource management, Social network analysis Tohru Futagami Urban disaster preventive planning under a great earthquake and development of urban information system Shinya Kurauchi Analysis and modeling on travel decision-making processes, Travel demand forecasting and evaluation of transport policies Tsuyoshi Hatori Consensus formation around a public project, Social dilemmas, Regional governance Takahiro Tsubota Safety performance evaluation of road and traffic flow, traffic flow monitoring Hirotoshi Shirayanagi Visual Qualities of Cities, Design for Territory and Landscape, Analysis of pedestrian and driver behavior
	Watershed and Coastal Environmental Engineering	Scientific researches in the fields of river, watershed, and coastal environment are indispensable for the sustainable development of infrastructures. Interdisciplinary educational programs and researches from physical, chemical, and ecological aspects, are provided for a better understanding and elucidation of the natural environment in river, urban/natural watershed, and coastal/ nearshore areas as well as for exploring solutions against natural disasters.	Hirofumi Hinata Development of tsunami disaster mitigation technique based on oceanographic redar and numerical simulation. Research on marine pollution caused by plastics in terms of physical oceanography. Ryo Moriwaki Urban climate formation process, Water circulation in the basin, Utilization technology of renewable energy. Kozo Watanabe DNA taxonomy for biodiversity evaluation, Evaluation of genetic diversity of aquatic organisms, Application of DNA-based analysis in river management Akihiro Kadota Turbulent flow structure in rivers and flow visualization Yo Miyake Impacts of human activity on stream organisms, Conservation of stream ecosystem, Evaluation of stream environmental condition by stream organisms. ※※※Yoshio Hatada Ocean weather environment, Estimation of ocean wave climate, design wave height and storm surge height.

※※Scheduled to retire in March, 2022
※※※Scheduled to retire in March, 2023

Materials Science and Biotechnology
Materials Science and Engineering

Course	Field	Research outline	Staffs and Research Fields
Materials Science and Engineering	Materials Properties Engineering	This educational and research field consists of 5 subjects : The “Quantum Materials Group” studies semiconductors, magnetic materials and ceramics, nano materials ; the “Solid State Physics Group” studies condensed matter physics with an atomic scale ; the “Materials Control Engineering Group” studies the fine structures closely related to material properties and its control through an atomic scale ; the “Electrical and Electronic Materials Group” studies electrical and electronic properties of dielectric materials and conductive polymers ; the “Materials Processing Engineering” studies the processing, the properties and the structure of glasses and ceramics for new functionality.	※Toshiro Tanaka Research on the magnetic and transport properties of Ceramics, and development of the new advanced ceramics. ※※※Koichi Hiraoka Solid state physics of magnetic materials (such as transition-metal compounds and rare-earth compounds) and strongly correlated electron systems. Hiromichi Takebe Research on processing, properties and structure of new photonic glasses and ceramics. Sengo Kobayashi Researches on phase transformation in various materials such as biomaterials and structural materials and on microstructures at/ around interface in composite materials. Haruo Ihori Research of electro optical measurement of electric field vector distributions in dielectric liquids, and reuse of used papers by laser. Akira Saitoh Present research areas covering characterization and structure of transparent amorphous materials. Saeki Yamamuro Size-and shape-controlled synthesis of nanoparticles and their functionalities. Tatsuaki Sakamoto Researches on strengthening and toughening of structural materials at room and elevated temperatures by microstructural control through phase transformation Hyeon-Gu Jeon Fabrication of nanoparticle colloids of organic semiconductors by laser ablation method and application to organic electronics. Hideaki Sasaki Research on production technology and recycling of metallic materials, including base metals (such as iron and copper) and rare metals. Keisuke Matsumoto Researches on magneto caloric materials, magnetic regenerator materials, and thermoelectric materials

	Materials Development and Engineering	The “Environment and Energy Materials Group” studies the preparation of new functional nano particulates, composite materials, porous materials, etc. used for medical treatments, fuel cells, chemical sensors, catalysts, radioactive Cs decontamination, etc. The “Medical and Biomaterials Engineering Group” studies the development of biocompatible ceramics and magnetic materials. The “Materials Evaluation Group” studies mechanical properties of welding joint and advanced welding processes in structural metal materials.	Hiromichi Aono Studies of materials such as nano-sized particles, poly-metallic oxides, porous materials for application of medical care, fuel cell, chemical sensor, catalyst, and decontamination Tomoki Yabutani Development of paper-based sensor chips for clinical and environmental analysis, and production process of cellulose nanofibers and their applications. Yoshiteru Itagaki Development of solid oxide catalysts and their application for chemical sensors and solid oxide fuel cells Takashi Mizuguchi Development of thermo-mechanical, alloying techniques and welding processes for improvement of mechanical properties of welding joint in structural metal materials

※Scheduled to retire in March, 2021
※※※Scheduled to retire in March, 2023

Materials Science and Biotechnology
Applied Chemistry

Course	Field	Research outline	Staffs and Research Fields
Applied Chemistry	Organic and Macromolecular Chemistry	The Organic and Macromolecular Chemistry field is trying to contribute to the progress of the modern society by devising novel processes for material synthesis and creating new functional materials, based on the profound understanding and precise control of a variety of chemical reactions. Research groups in this field are attempting to newly develop such objectives as methodologies for organic and polymer synthesis, heteroatom- and transition-metal-catalyzed reactions, environmental friendly chemical processes, redox-active organic molecular materials, organic（super）conductors and materials derived from their multi-functionalization, functional materials based on organic polymers and Catalytic conversion of biomass into chemicals.	Yohji Misaki Development of organic molecular materials utilizing redox systems Eiji Ihara Development of new method for polymer synthesis Minoru Hayashi Development of new synthetic methodologies using heteroatoms and transition metals Takashi Shirahata Development of new organic conductors and multi-functional materials Tomomichi Itoh Development of polymer materials with well-controlled nanostructures Hiroaki Shimomoto Development of novel functional polymers Hidetoshi Ota Catalytic conversion of biomass into chemicals
	Physical and Inorganic Chemistry	The Physical and Inorganic Chemistry field is focusing to functional solid materials having nano- and mesostructures of inorganic and organic compounds, polymer, and their hybrid systems from the viewpoints of their fundamental physiochemical properties as well as their applications to catalysts, sensors, electronic devices, and so on. The subjects include the synthesis of mesoporous materials and the applications to catalysts and gas sensors, photoelectron spectroscopy of nanocarabons and organic-inorganic hybrid materials, development of polymer-based chemical sensors, preparation of noble organic nanoparticles and their applications, and liquid extraction techniques of rare earth elements.	Hidenori Yahiro Syntheses and applications of meso- and microporous materials Tsuyoshi Asahi Laser fabrication and spectroscopy of noble organic nano-materials Masanobu Matsuguchi Design of functional polymers and its application to a chemical sensor Hiroshi Yamashita Study on separation technology of rare metals Syuhei Yamaguchi Development of environment-friendly catalysts with transition metal complexes Hiroyuki Yamaura Development of gas sensors and catalysts using metal oxides Yukihide Ishibashi Ultrafast time-resolved spectroscopy of photo-functional materials

	Biotechnology and Chemical Engineering	There are research groups focusing on structure function relationships in biomolecules such as proteins and nucleic acids, methods for separation and wastewater treatment, plant biotechnology, protein engineering, and applications of protein production methods to synthetic biology and medicine.	※Takafumi Tsuboi Malaria vaccine development Hiroyuki Hori Structures and functions of nucleic acids and proteins related to expression of genetic information Kazuyuki Takai Reconstitution of protein synthesis Tatsuya Sawasaki Functional proteomics using wheat cell-free system ※※※Kenji Kawasaki Wastewater treatment, excess sludge disposal and solid liquid separation Eizo Takashima Structural and functional analysis of plasmodial proteins Hiroyuki Takeda Technological Development for Antibody therapeutics Akira Nozawa Functional analysis of membrane proteins Akira Hirata Structural life sciences study of nucleic acid related proteins Chie Tomikawa Functions of RNAs and RNA-related proteins

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Electrical and Electronic Engineering and Computer Science
Electrical and Electronic Engineering

Course	Field	Research outline	Staffs and Research Fields
Electrical and Electronic Engineering	Electrical Energy Engineering	Research activities cover the development of plasma electronics, plasma diagnostics and plasma medicine, studies on high field conduction and breakdown in dielectrics, mathematical analysis of chaotic dynamical systems, and liquid crystal applications, soft matter science and numerical simulation of electromagnetics.	Masafumi Jinno Plasma electronics. Plasma gene transfection, bio-medical application and environmental preservation. Numerical modelling of plasma. Lighting. Hideki Motomura Generation and control of plasmas and their diagnostics for industrial applications Yoshihisa Ikeda Lighting and visual effect, Visibility enhancement, effective luminance enhancement, color rendering property enhancement, and glare reduction Kazunori Kadowaki Degradation diagnosis of electrical insulation materials and application of streamer discharges for control of air and water pollution Ryotaro Ozaki Research on optical properties of nano-structured liquid crystals or polymers. Numerical simulation of light propagation in nano-structured materials Tomoki Inoue Ergodic theory on dynamical systems with chaos, Mathematical foundations towards application of chaos and fractals
	Electronic Materials and Devices Engineering	Research activities cover the development of crystal growth, optical characterization and application of compound semiconductors, preparation of rare-earth activated phosphor materials, and fabrication of semiconductor nano structures.	Sho Shirakata Preparation and characterization of thin film compound solar cells, and crystal growth and characterization of GaN, GaInNAs and ZnO semiconductor. Optical properties and device applications of III-V semiconductors doped with transition-metal and rare-earth impurities. Satoshi Shimomura Fabrication of semiconductor nano structures by molecular beam epitaxy and application to optical and electronic devices. Tomoaki Terasako Growth and characterization of metal oxide films and nanostructures for opto-electronic devices. ※※※Fumitaro Ishikawa Exploration of new functional materials and structures based on compound semiconductor epitaxial growth.

	Communication Systems Engineering	The research activities cover the signal processing for high-density digital magnetic and optical recording systems, investigation of fundamental properties of subwavelength optical elements including holograms, media processing algorithms related to motion, neural networks applications to signal and image processing, sequence design and signal processing for baseband spread-spectrum communications, fractional topological invariants and topological self-similarity.	Yoshihiro Okamoto Research on channel coding and signal processing techniques to achieve high density recording in digital information storage systems Shinji Tsuzuki （1） Research on sequence design and signal processing for baseband spread-spectrum communications, and its application to power-line communication （2） Analysis of CDMA based protocols （3） Developing high-definition video transmission systems over IP network Hiroyuki Ichikawa Investigation of fundamental properties of subwavelength optical elements including holography and their application and electromagnetic analysis of light wave propagation. Yasuaki Nakamura Research on error correction coding and iterative decoding systems for information storage

※※※Scheduled to retire in March, 2023

Electrical and Electronic Engineering and Computer Science
Computer Science

Course	Field	Research outline	Staffs and Research Fields
Computer Science	Computer Systems	Research fields of the Division of Computer Systems include dependable systems, software for high performance computing, software quality management, distributed and parallel processing systems, and system optimization. Research aims at improving reliability, functionality, and performance of computer systems.	Shin-ya Kobayashi Distributed processing, parallel processing and cooperative processing. : Secure processing for distributed processing. Service and application on distributed environment. Distributed transaction processing. Hiroshi Takahashi Design and Test of Computers, Dependable system design, Digital Systems Testing and Diagnosis, Design of Digital Systems using Hardware Description Language Yoshinobu Higami Design, Test and Diagnosis of VLSI Circuits：Test Pattern Generation, Design for Testability, CAD System for VLSI Design Hiroshi Kai Researches on systems and algorithms of Computer Algebra, especially symbolic-numeric hybrid computations, middleware and network security. Keiichi Endo Ad-hoc networks, peer-to-peer networks, sensor networks. Senling Wang Field Testing for the Functional Safety and High-Dependability of Advanced Automation Systems Tsutomu Inamoto System optimization, Mathematical programming, Meta-heuristics, Rule-based system

	Artificial Intelligence	We are working on the following areas : Knowledge representation and inference systems on computers ; pattern recognition and clustering by neural networks ; image processing ; watermarking technology of images for copyright protection ; encoding methods for information security ; virtual reality ; natural language processing ; and machine learning.	※※Yoshio Yanagihara Time-sequenced 3-D image processing, GPU computing, refactoring, GUI and virtual reality. Takashi Ninomiya Natural Language Processing and Machine Learning : part-of speech tagging, parsing for linguistically sophisticated grammars, machine translation, online learning and feature selection. Toshiyuki Uto Multimedia Signal Processing : image compression, wavelets, filter banks, and 3-D graphics processing Shun Ido Virtual Reality, Human Computer Interaction, Image Coding, Computer Vision, Image Processing. Koji Kinoshita Application of neural networks to control. Detection and tracking of moving object Masaharu Isshiki Research and application of image processing and neural networks
	Applied Computer Science	1. Applied mathematics, and basic theory and algorithms of computations in science and engineering : partial differential equations, their numerical solutions and numerical conformal mappings. 2. Scientific computer simulations for natural sciences : parallel computing, high-performance computing, grid computing, performance estimation model and performance evaluation. 3. Information network and data processing for science and engineering. Applications of information network, software technique, distributed database. 4. Cognitive science : pattern cognition, human information processing. 5. Applications of multimedia information, contents production, coding, processing and service systems.	※※※Hiroshi Ito Mathematical Physics : Mathematical scattering theory, Inverse scattering problem Kazuto Noguchi Optical communication systems and applications : optical devices, optical transmission systems, telemedicine. Minoru Kawahara Informatics : information networks, information and communication system, data mining, information and communication supports. Dai Okano Numerical Analysis : Numerical method for partial differential equations, optimizations, the method of fundamental solutions. Hirohisa Aman Empirical software engineering : software quality quantification using software metrics, and statistical model for quality assessment/prediction. Kazunori Ando Mathematical Physics : Scattering theory and inverse scattering problems for discrete Schrödinger operators on graphs Hisashi Morioka Mathematical Physics: Spectral theory, Scattering theory, Inverse problem, Quantum walk

※※Scheduled to retire in March, 2022

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Electrical and Electronic Engineering and Computer Science

Advanced Course for Information and Communication Technology Specialists

Course	outline	Staffs and Research Fields
Advanced Course for Information and Communication Technology Specialists	Commercialization of the Internet and cellular services made revolutionary changes in lifestyle. Information and communication engineers have been in great demand since then. Companies are now required to act in compliance with laws and regulations and to protect intellectual property as well as to maximize their productivity and benefits. Responding to the social demand, we not only teach Knowledge on ICT and also give business-related lessons such as 'Lecture in Information and Communication Technology', 'Project Management', 'Engineering Ethics', and 'Intellectual Property' and also give project-based learning such as 'ICT System Design' and 'Practical Work Experience in Industry', which enhances business potential of students. In classes 'Practice in Information and Communication Technology', the students will develop their own information system as group work and acquire communication and presentation skills during the classes.	Shin-ya Kobayashi Course Director of advanced course for information and communication The following professors are responsible for the classes of this Course. Yoshihiro Okamoto Hiroshi Takahashi Kazuto Noguchi Toshiyuki Uto Hiroshi Kai Hisayasu Kuroda Shinji Tsuzuki Yoshinobu Higami Koji Kinoshita Keiichi Endo

Major	Field	Research outline	Staffs and Research Fields
Mathematics	Mathematical Sciences	We research on various aspects of mathematical sciences. Main subjects are algebra such as number theory and representation theory, theory of topological groups and topological spaces, geometry of discrete groups, dynamical systems, theory of differential equations, probability theory with applications to finance, applied mathematics such as numerical analysis, time series analysis, parallel processes and pattern recognition.	Dmitri B. Shakhmatov Investigation of topological structure of topological groups and fields
			Yuji Nakagawa Recognition of moving objects and 3-dimensional shape in computer vision, Software development for high energy physics, Web based distance learning system
			Takuya Tsuchiya Numerical analysis for elliptic partial differential equations
			Miki Hirano Number Theory (Automorphic Forms, Automorphic Representations, and their L-functions)
			Masaya Matsuura Time series analysis
			※ Koichi Hiraide Studies of discrete dynamical systems
			Yasushi Ishikawa Probability and stochastic analysis
			Shigenori Yanagi Studies on nonlinear partial differential equations and its application to compressible Navier-Stokes equations
			Hiroshi Ohtsuka Algebraic approach to parallel processes and their communications
			Yoshinori Yamasaki Analytic number theory
			Takamitsu Yamauchi General Topology
			Hiroshi Fujita Descriptive set theory

※Scheduled to retire in March, 2021

Major	Field	Research outline	Staffs and Research Fields
Physics	Fundamental Physics	Theoretical and experimental researches on fundamental problems in physics are performed. The following branches are covered in the activities : foundations of quantum theory, quantum field theory, gauge theories, investigations of the structure and the evolution of the universe theoretically and by the observation of X-rays,visible radiation.	Hiroto So Challenge for particle physics, by field theory, lattice gauge theory, higher-dimensional theory, supersymmetry and high power computers.
			Hisamitsu Awaki Study of structure and evolution of the Universe. In particular, study of active Universe through cosmic X-ray emission, and development of instruments for X-ray observatory.
			Yuichi Terashima Study of high energy phenomena in the Universe.In particular, observational study of black holes and the structure and evolution of the Universe.
			Tohru Nagao Observational studies on the formation and evolution of galaxies and supermassive black holes. Studies on the chemical evolution of the Universe.
			Takeshi Iizuka Theoretical studies on nonlinear waves. Gap solitons in optical fiber. Coupled mode theory in photonic cristal.
			Masaru Kajisawa Observational studies of galaxy formation and evolution. History of star formation and mass assembly of galaxies.
			Yoshiki Matsuoka Observational research on the evolution of galaxies,supermassive black holes, and the Universe.
			Koji Kondoh Study of magnetic reconnection in space plasma using magnetohydrodynamic simulation and spacecraft observation.
	Condensed Matter and Plasma Physics	Various phenomena concerning condensed matters are studied theoretically and experimentally. Special interests are taken in (1) dynamical theory of phase transition and pattern formation in nonequilibrium open systems, (2) theoretical study of self-assemblies in solution, (3) theoretical study of strongly correlated electron systems,(4) experimental studies of magnetic, thermoelectric and optical materials, and (5) plasma physics in liquid.	Kazuhiro Fuchizaki Theoretical treatment on chemical physics of phase equilibria and relaxation kinetics.
			Tsunehiro Maehara Experimental study of plasma in liquid
			Kensuke Konishi Low temperature physics and statisticalmechanics on magnetic materials. Experimental studies of magnetism ; Fundamentals and Applications.
			Tohru Shimizu Space plasma physics, fast magnetic reconnection based on MHD and kinetic theory and numerical studies.
			Masaaki Nakamura Theoretical study for strongly correlated quantum systems and topological materials, such as Tomonaga-Luttinger liquid, low-dimensional magnet, quantum Hall effect, graphene, and topological insulator.
			Hisao Kondo Study of physics on photo-excited states of solids. In particular, experimental studies of cavity-polaritons in microcavities.
			Tatsuhiko Miyata Liquid state theory on structure and thermodynamics ; Theoretical study of self-assemblies in solution such as micelle and protein.

Major	Field	Research outline	Staffs and Research Fields
Earth Sciences	Earth's Evolution and Environment	The main research subjects of this division are to elucidate the history and the law of changes and evolution of the Earth, and to analyze the dynamic properties of the Earth. Our current interests concern the structural and evolutional process of the Earth, evolution of vertebrate animals, crustal movements, the petrologic and rectonic structures of the island arc mobile belt, the crust-mantle interactions, the environmental changes of the Earth, and the physical and dynamic properties of the deepearth materials.	Taku Tsuchiya Theoretical and computational study of minerals and modeling the Earth and planetary interiors.
			Masanori Kameyama Mantle Dynamics ; Studies on flows, deformations, and evolutions of the Earth's interior based on the computational fluid dynamics.
			Jun Tsuchiya Computational study of the existence and its effects of volatile elements in the Earth's interior.
			Yu Nishihara Experimental study on transport properties (such as rheology) of deep Earth materials.
			Yoshio Kono Experimental study of magmas under pressure using high-pressure synchrotron X-ray techniques
			Takeshi Sakai Study of equations of state of terrestrial planet materials using laser heated diamond anvil cell
			Tomohiro Ohuchi Rheological properties of rocks under high pressures (e.g., creep and fracture strength, seismological properties) and processes of microstructure formation
			Haruhiko Dekura Theoretical condensed-matter and computational physics on electronic-structural, dynamical, and transport properties of deep Earth and planetary materials
			Masayuki Nishi Mechanism and kinetics of high-pressure transitions in mantle minerals.
			Masayuki Sakakibara Based on the viewpoint of interactions and feedbacks among biosphere, hydrosphere, atmosphere, and lithosphere, (a) interaction between microbial activity in the crust, (b) igneous petrology of tephra, and (c) technological development of phytoremediation.
			Satoshi Saito Petrology and geochemistry. Granite petrogenesis. Evolution of arc and continental crust in convergent margin.
			Takashi Okamoto Evolution and paleoecology of fossil mollusks, especially in the theoretical modeling of ammonoid shell morphology and morphogenesis during the Cretaceous period.
			Rie S. Hori Geological and paleontological studies on deep-sea sediments and paleoenvironment.

			Takehisa Tsubamoto Evolution, paleobiogeography, and paleoecology of land mammals during the Cenozoic. Excavation, description, and paleontological study of vertebrate fossils.
			Nao Kusuhashi Vertebrate paleontology focusing on the evolution and early history of mammals during the Mesozoic.
			Xinyu Guo Shimulation of the Kuroshio, Interaction of the Kuroshio and coastal water, Marine environmental prediction of Seto Inland Sea
			Akihiko Morimoto Studies on variability in ocean currents using remote sensing and hydrographic observation, and material cycle in coastal seas.
			Michinobu Kuwae Long-term variability of ocean-atmosphere-ecosystem : regime shift and fisheries productivity dynamics. Late Holocene climate dynamics on centennial timescales in the North Pacific. Impacts of transboundary pollution and global warming on marine and lake ecosystems.
			Naoki Yoshie Studies on marine lower-trophic level ecosystem and biogeochemical cycle using field observation and ecosystem modeling
			Abrazhevich Aleksandra Paleomagnetism and rock magnetism applied to tectonic and paleoenvironmental problems. Rock magnetic record of climatic events. Biogenic magnetic minerals and their contribution to natural remanent magnetization of sedimentary rocks. Diagenetic modification of magnetic mineral assemblage.
			Steeve Gréaux Elastic and thermal properties of rocks and minerals applied to the study of the Earth and planetary interiors. Chemical and physical transformations of materials under high pressures and temperatures. Sound wave propagation velocity measurements. Physical property analyses by synchrotron radiation X-rays.

Major	Field	Research outline	Staffs and Research Fields
Molecular Science	Functional Material Science	Elementary steps in physical processes and chemical reactions in many substance systems, such as dissociation, ionization, association, and so on, are investigated under various conditions, that is, at very low temperature, at high pressure, and upon photoexcitation. Profiles and interactions of the reaction products, electrons, ions, atoms, radicals, and crystals, are analyzed at the atomic and molecular levels. Based on these researches on fundamental chemistry, synthesis of new functional materials are conducted.	Ryoji Takahashi Synthesis of novel porous metal oxides and design of their functionalities in adsorption and catalysis ※ Shin-ichi Nagaoka Properties of excited molecules. Interaction between light and molecules. Hisako Sato Studies on the functionalization of chiral metal complexes Toshio Naito Physical properties of low-dimensional solids and their novel functions Keishi Ohara Properties, reaction processes, and spin-dynamics of excited state molecules and short-lived radicals Takashi Yamamoto Studies on the interactions in molecular functional solids Takuhiro Kakiuchi Dynamics of core-excited molecules and surfaces Fumiya Sato Morphology-controlled synthesis of metal oxides and its application to heterogeneous catalytic reaction
	Life Material Science	The research projects in this division are aiming to understand the natural phenomena in molecular level, particularly the functions of organic and biological materials, by the collaboration of researchers in the fields of organic chemistry, biochemistry, analytical chemistry, and environmental chemistry. Some examples of the present research projects are; structural studies and creation of functional molecular materials, synthesis of functional organic materials, development of new analytical method of proteins, synthesis of artificial receptors for the signal transduction in organisms, synthesis of artificial metalloenzymes, analysis of the mechanism of biological adaptation to environment, and chemical analysis of trace substances in organisms.	Hidemitsu Uno Synthesis of bioactive compounds and highly functional materials of organic dyes. Tatsuya Kunisue Development of analytical methods for novel environmental contaminants with hormone-like activity and its application to ecotoxicology Tamotsu Zako Nano analysis of molecular properties and functions of proteins Hiroyuki Tani Investigation of novel functionalized organic compounds concerned with their syntheses, structures and physical properties. Yoji Shimazaki Comprehensive analysis of the activity and structure of biological enzymes Miwa Sugiura Studies on the molecular structure and function of Photosystem II Makoto Kuramoto Isolation and structural elucidation of bioactive compounds from marine organisms. Tetsuo Okujima Synthesis and properties of conjugation-expanded porphyrins and phthalocyanines aimed for the creation of functional materials Masayoshi Takase Synthesis and characterization of novel π-electron systems Shigeki Mori Synthesis and properties of unique metal complexes utilizing conjugation compounds Kei Nomiyama Metabolic disposition and risk assessment of organohalogen compounds in wildlife Atsushi Ogawa Development of new biotechnologies based on cell-free systems

※Scheduled to retire in March, 2021

Biology and Environmental Science

Major	Field	Research outline	Staffs and Research Fields
Biology and Environmental Science	Sciences of Biological Functions	Aiming at the comprehensive understanding of biological phenomena, we are trying to analyze a variety of structures and functions of living organisms at the molecular and cellular levels. Researches are focused especially on morphogenesis of plant cells and organs, adaptive responses of plants to environments, early development of animal embryos, evolution of brain morphology in vertebrates, and neural basis of animal behavior.	※※ Masahiro Inouhe Growth, adaptation, metabolisms and phytohormone actions in plants. Yasunori Murakami Evolution of the vertebrate brain : comparative and developmental analysis. Yasushi Sato Cell differentiation, morphogenesis, and environmental responses in higher plants. Yoh Sakuma Molecular response of higher plant to water and temperature stress. Hiromi Takata Morphogenesis and organogenesis of echinoderm embryos during early development. Tsuyoshi Kaneta Functions of cytoskeletons in plant cells. Mechanisms of plant growth regulation by phytohormones. Makiko Fukui Comparative embryological studies of arthropods, with special reference to the insects
	Ecology and Environmental Sciences	The major purposes of researches in this division are to analyze the interactions between living organisms and environments, and to elucidate the dynamic changes in the biosphere. The research field includes the following themes ; inter-specific or intra-specific interactions between aquatic organisms, ecology and evolution of microorganisms, material cycle in the aquatic ecosystem, and toxicity of chemical pollutants to organisms.	Hisato Iwata Ecotoxicology of wildlife and species-diversity of disruption of cellular signaling pathway by environmental chemicals Toshiyuki Nakajima Experimental analysis of relationships between evolutionary processes and ecological interactions using microbial model eco-systems. Mikio Inoue Analysis of habitat structure and biotic interactions in stream communities. Shin-ichi Kitamura Outbreak mechanisms of fish infectious diseases by marine environmental changes Kei Nakayama Analysis of biological responses to multiple environmental stressors Hiroki Hata Ecology of marine organisms, especially on species interaction and coevolution

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