Application Guidelines
Doctoral Program (Doctor in Engineering/Science) for International Students
Graduate School of Science and Engineering
Ehime University
Academic Year 2021 (April Entrance)

1. Number of seats available

	Major	Course	Field	Seats
School of Engineering	Engineering for Production and Environment	Mechanical Engineering	・Mechanical Systems, Synthesis and Control ・Energy Conversion Engineering ・Production Systems and Materials for Machinery	A few
		Civil and Environmental Engineering	・Infrastructure Engineering ・Urban Management ・Hydrosphere and Environmental Engineering	
	Materials Science and Biotechnology	Materials Science and Engineering	・Materials Physics and Engineering ・Material Development and Engineering	A few
		Applied Chemistry	・Organic and Macromolecular Chemistry ・Physical and Inorganic Chemistry ・Biotechnology and Chemical Engineering	
	Electrical and Electronic Engineering and Computer Science	Electrical and Electronic Engineering	・Electrical Energy Engineering ・Electronic Materials and Devices Engineering ・Communication Systems Engineering	A few
		Computer Science	・Computer Systems ・Artificial Intelligence ・Applied Computer Science	
School of Science	Mathematics, Physics, and Earth Sciences	Mathematical Sciences	・Mathematical Sciences	A few
		Physics	・Fundamental Physics ・Condensed Matter and Plasma Physics	
		Earth's Evolution and Environment	・Earth's Evolution and Environment	
	Chemistry and Biology	Molecular Science	・Functional Material Science ・Life Material Science	A few
		Biology and Environmental Science	・Sciences of Biological Functions ・Ecology and Environmental Sciences	
Special Graduate Course on Advanced Sciences			・Environmental Sciences ・Earth Science and Astrophysics ・Life Sciences	A few

2. Application Period and Selection Test

Application period:	**14 (Thu) – 20(Wed) January 2021** ※ 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 20(Wed) January 2021. **School of Engineering:** Applicants live in foreign country who wish to take an examination by internet-based interview, please contact Education Support Division (Engineering Team) in advance by e-mail by 11 (Fri) December 2020. <Communication Address> Education Support Division (Engineering Team):kougakum@stu.ehimeu-u.ac.jp
Selection test dates:	**18 (Thu) and 19 (Fri) February 2021**
Test place (venue):	Faculty of Engineering, Ehime University, 3 Bunkyo-cho, Matsuyama Faculty of Science, Ehime University, 2-5 Bunkyo-cho, Matsuyama
Result notification:	**8 (Mon) March, 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 successful candidates. However, telephone or email inquiries will not be entertained.
Admission formalities:	The admission formalities for the successful candidates will take place on **9**(Tue) – **15** (Mon) **March 2021**
The application documents must be submitted at or sent to:	Education Support Division (Engineering Team) Ehime University 3 Bunkyo-cho, Matsuyama, 790-8577 Tel.: 089-927 9697

3. Application Eligibility

An applicant to this program must be a non-Japanese national who is eligible for permission to stay in Japan as a student under the state regulations of immigration and refugee control; at the same time, must have or is expected to have eligibility for admission into the graduate school; and must meet one of the following requirements.

(1) Must have acquired or is expected to acquire by **March 2021** a Master Degree or Professional Degree (in accordance with the type of degree mentioned in Article 5 (2) of the Academic Degree Regulations, as stated in Article 9 of the 1953 Ordinance of the Ministry of Education, based on Article 104(1) of the Academic Act; hereinafter Professional Degree refers to this description).

(2) As for a degree from an overseas college or university, it must be equivalent to a Master Degree or Professional Degree in Japan, and at the time of application, it must have been acquired or is expected to be acquired by **March 2021**.

(3) As for a degree acquired from distant learning education system run by an overseas college or university, an applicant must have acquired or is expected to acquire a degree equivalent to Master Degree or Professional Degree through earning of the subject credits in Japan itself by **March 2021**. Any credits earned overseas will not be accepted.

(4) As for a graduate program run by an overseas university or college in Japan, recognized as being equivalent to an academic institution that meets all requirements of the education system of that nation

and designated separately by the Minister for Education, Culture, Science and Technology, an applicant must have acquired or should be expecting to acquire a degree equivalent to a Master program degree or a Professional degree by **March 2021**.

(5) Must have acquired or is expected to acquire a Master Degree or equivalent from the United Nations University by **March 2021**.

(6) Must be accepted as to have an academic ability equivalent to or greater than a master degree holder, after having attended an overseas university/college or an academic institution as in (4) above or the United Nations University and earned necessary credits, and having passed the exam and evaluation in accordance with Article 16(2) of the Graduate School Setup Criteria.

(7) A person designated by the Minister for Education, Culture, Science and Technology (According to the Article 118 of Bulletin of Ministry of Education, Culture, Science and Technology published in 1988)

(8) 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 Master degree or Professional degree holder, and must be 24 years old or above at the time of admission.

〈***Pre-application Eligibility Assessment for*** **Requirement#7 and #8** ***above***〉

1) Application Eligibility

<For an applicant meeting Requirement#7>

Applicants possessing only a bachelor's degree (undergraduate program) must have research experience, after acquiring the degree, for 2 (two) years or more at a university/college or research institute, and must have publications, such as book/s, scientific journal paper/s, lecture/s, research report/s, patent registration/s, etc. that may be recognized as being equivalent to a master degree research or above.

<For an applicant meeting Requirement#8>

The applicant must have a good research record or achievement in the form of published book/s, scientific journal paper/s, lecture/s, research reports, patent registration/s, etc. that may be recognized as being equivalent to a master degree research or above, and must reach 24 years old by **March 2021**.

2) Documents to be Submitted for Pre-Application Eligibility Assessment

   A) Pre-application Eligibility Assessment Form (specified format, **Form#7**)
   B) Research Activity Record/Achievement Form (specified format, **Form#6**)
   C) Graduation Certificate obtained from the last-attended educational institution
   D) Other relevant reference materials (such as Research Paper/s, Patent Certificate/s, etc.)
   E) Self-addressed envelope with an 84-yen postal stamp (for notifying the result of application eligibility assessment)

3) Submission Deadline: **11 (Fri) December 2020**

4) To be Submitted/Sent to:

   Education Support Division (Engineering Team)
   Ehime University
   3, Bunkyo-cho, Matsuyama, 790-8577
   JAPAN
   (**Note**: On the envelope, please write 'Pre-application Eligibility Assessment Papers for Doctoral Program enclosed' with a red pen.)

5) Admission Eligibility Assessment

Based on the submitted application documents, an assessment of admission eligibility will be made, and the applicant/s will be notified of the result by 12(Mon) January 2021. Please note any submitted documents for this purpose will not be returned or used outside of eligibility status, so if you are notified that you are eligible for application, you will need to re-submit any repeated papers/documents (listed in point No.5 of this guidelines) while submitting your application for admission. Moreover, the application

eligibility assessment result will only be valid for application to the **2021** doctoral program of this graduate school.

4. Selection Criteria

(1) Selection method

The selection for admission to this program will be made on the basis of an integrated evaluation of 1) submitted documents and 2) performance in an interview (including oral test).

(2) Interview question content (including the oral test)

The interview questions will be based on the applicant's master thesis research, research activities and achievements, doctoral research plan, etc.

5. Application Material and Documents to be Submitted

Application form, Personal Identification Card, and Admission Card	The application form must be filled out with the necessary information including the entrance test Admission Card and Personal Identification Card (provided with the application material; **Form#1**) with a photograph (The photograph should be 30-mm wide and 40-mm high (30mmx40mm); it must be full-face view directly facing the camera with no cap/hat, taken within the 3 months from the date of application.)
Degree certificate or Certificate of expected graduation	A copy of Master Degree Certificate or Certificate of expected date of graduation issued by the graduating university or college [For applicants meeting application eligibility requirement No. (1) to (6)] Applicants meeting application eligibility requirement No. (6) will have to include all necessary documents that help assess his or her ability to undertake doctoral research.
Grade sheets or Transcript (Bachelor Course)	Officially sealed copies of Grade Sheets or Transcripts of Bachelor Degree course issued by the graduating university or college
Grade sheets or Transcript (Master Course)	Officially sealed copies of Grade Sheets or Transcripts of Master Degree course issued by the graduating university or college [For applicants meeting application eligibility requirement No. (1) to (6)]
Summary or outline of master thesis	For those who have already completed a Master Degree program: A summary of the Master Thesis should be prepared on **Form#2** with about 2,000 letters in Japanese or about 500 words in English. Additionally, if you have similar research content in printed/published form, have a record of academic presentations and lectures, or possess any patent registration certificates, please include a copy of each of them.
Outline of Master Course research	For those who are expected to graduate from a Master Degree program: An outline of ongoing Master Degree research should be prepared on **Form#3** with about 2,000 letters in Japanese or about 500 words in English.
Research proposal	A Research Plan or Proposal must be prepared on the specified paper (provided with the application material; **Form#4**) including a tentative research topic or field, research concept, objectives, and methodology after adequately discussing the content in advance with the expected research supervisor.
Application processing fee	The application processing fee is 30,000 yen. It must be paid through postal bank or post office in Japan. Payment through other financial institutions or banks will not be accepted. ATM payment is also not accepted. After the payment of this fee,

	you will have to attach (paste) the stamped payment slip (certificate) with the provided paper (i.e., application processing fee payment certificate) and submit along with the application documents. The application processing fee, except for the conditions stated in point No. 7 of this guideline (i.e., Return of the application processing fee), will not be returned. [Note: Application processing fee is not required for applicants that expect to graduate from a master program of Ehime University in **March 2021** or scholarship recipients from the Japanese Government, i.e., Monbukagakusho.]
Admission card return-mailing envelop	Please write your full name and mailing address along with postal code on a stamped return envelope (374 yen stamp).
Letter of permission for entrance test	Applicants that are employed or enrolled in a doctoral program of a university or college must also submit a letter of permission to take the entrance test, issued by the head of the institution, prepared on **Form#5**.
List of publications	If available, please include a list of your all relevant publications, such as book/s, scientific journal paper/s, lecture/s, patent registration/s, etc. on **Form#6**.
Residence certificate	Applicants living in Japan must also include a copy of their Residence Certificate issued by the town or city office of residence with the application documents.

6. Points to be Noted While Applying

(1) Research Supervisor
You must communicate in advance, at least a month before the application time, with a perspective supervisor (Professor or Associate Professor) in the field of your research interest and obtain necessary advice/suggestions towards preparing for the entrance test. If you do not understand how to select an appropriate supervisor, please contact the Educational Support Division with a brief outline of your research interest.

(2) International students who are applying for the SPECIAL COURSE can, on occasion, receive special dispensation exempting them from the payment of examination fees, admission fees, and tuition. Please contact your potential supervisor for more details.

(3) Preparing the Research Proposal (Plan)
While preparing your research proposal, please note that you will have to first write your title (i.e., research topic) and then the research objectives and methodological plan in about 1000 characters in Japanese or 250 words in English after adequately discussing the content with your perspective supervisor.

(4) Please note we will not accept your application if the documents you send are incomplete or inadequately prepared, or consist of wrong information.

(5) In any circumstances, change/s in the filled-in information or submitted documents will not be permitted after acceptance of the submitted application.

(6) In case of any changes in your mailing address after the submission of application documents, we must be informed of the changes as soon as possible.

(7) When filling is the application forms, it is possible to use a computer to complete the forms.
You can download the application documents from the following Ehime University homepage.

Ehime University homepage (https://www.ehime-u.ac.jp/) > English > Topics （See the list）

(8) 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 institution or protector 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). Personal information will not be used for any other purpose and will not be provided to third parties.

Inquiry: Education Support Division (Engineering Team)
Ehime University
3, Bunkyo-cho, Matsuyama, 790-8577
Tel: 089-927 9697, Fax: 089-927 9694

7. Return of the Application Processing Fee

The paid amount of Application Processing Fee will be returned in the following case/s only.

(1) The Application Processing Fee was paid, but application papers 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) Mistakenly paid by a Japanese Government (Monbukagakusho) scholarship recipient
(4) Mistakenly paid by an applicant who is expecting to graduate from a master program and continue to doctoral program of this graduate school in **March 2021**.
(5) Submitted the application documents, but the application was rejected

〈Requesting for the return of the Application Processing Fee〉

- In case of **condition (1) or (2)** above, 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) or (4)**, 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.
- In case of **condition (5)**, we will send the 'Request for Return of the Application Processing Fee' form along with the application documents. Please fill out the form and send it 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
E-mail：suitou@stu.ehime-u.ac.jp

8. Admission and Fees

(1) Successful applicants will be directly informed about the procedure for admission formalities
(2) Initial Fees (Admission/Tuition Fees, Miscellaneous Fees)
(Note: On occasion, the admission fee and tuition for the 2020 fiscal year will be revised for the 2021 fiscal year.)
1) Admission Fee: 282,000 yen
(**Note**: Admission fee is not required for the applicants that expect to graduate a master program of Ehime University in **March 2021** or scholarship recipients from the Japanese Government, i.e., Monbukagakusho.)

2) Tuition Fee: Annual amount **535,800 yen**

(**Note**: If a current student's tuition is revised, a new recalculated fee will be applicable.)

We will inform you separately about the period of paying the tuition fee. A tuition fee is not required for scholarship recipients from Japanese Government (i.e., Monbukagakusho).

3) A few thousand yen will have to be paid as miscellaneous fees, such as for accident insurance, alumni activities, etc.

(**Note**: 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) Request for the Application Guidelines (including the application forms) may be made by sending us (i.e., Education Support Division, Engineering Team) a self-addressed stamped (250 yen) envelope (size: 33cm ×24 cm). Please write 'Request for Doctoral Program Application Guidelines and Forms for **April 2021** Entrance' on the outer envelope with a red pen.

(2) The submitted application documents and provided information must be complete, accurate, and authentic. Any unauthentic documents or falsely filled-in information may result in denial of admission or cancellation of the enrollment.

10.Outline and staffs

Engineering for Production and Environment

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 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
	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 Xia Zhu Material and structural design through special processing Technology Masafumi Matsushita Materials synthesis through extreme condition

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 properties of rock and behavior of rock caverns, Utilization of industrial waste for construction materials. Keiyu Kawaai Electro-chemical techniques for assessing durability performances, structural integrity of reinforced concrete and effect of repair including self-healing for cracking in concrete

	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
	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.

※Scheduled to retire in March, 2022

Materials Science and Biotechnology

Course	Field	Research outline	Staffs and Research Fields
Materials Science and Engineering	Applied Chemical Physics	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.	※※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 distribution in dielectric liquids, and reuse of used papers by lasers. 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.
	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, 2023

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, and functional materials based on organic polymers.	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
	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

	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.	Tatsuya Sawasaki Functional proteomics using wheat cell-free system Kazuyuki Takai Reconstitution of protein synthesis Hiroyuki Hori Structures and functions of nucleic acids and proteins related to expression of genetic information ※※Kenji Kawasaki Wastewater treatment, excess sludge disposal and solid liquid separation Hiroyuki Takeda Technological Development for Antibody therapeutics

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Electrical and Electronic Engineering and Computer Science

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.	Kazunori Kadowaki Degradation diagnosis of electrical insulation materials and application of streamer discharges for control of air and water pollution Masafumi Jinno Plasma electronics. Plasma gene transfection, bio-medical application and environmental preservation. Numerical modelling of plasma. Lighting. Tomoki Inoue Ergodic theory on dynamical systems with chaos, Mathematical foundations towards application of chaos and fractals Ryotaro Ozaki Research on optical properties of nano-structured liquid crystals or polymers. Numerical simulation of light propagation in nanostructured materials Hideki Motomura Generation and control of plasmas and their diagnostics for industrial applications
	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.	Satoshi Shimomura Fabrication of semiconductor nano structures by molecular beam epitaxy and application to optical and electronic devices. 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. 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.	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

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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, and distributed and parallel processing systems. 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
	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

	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. Hisayasu Kuroda High performance Computing : Development of high performance numerical library, large-scale numerical simulation on multiprocessors. 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

※Scheduled to retire in March, 2022

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Mathematics, Physics, and Earth Sciences

Course	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, 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 ※※ 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 ※※※ Yasushi Ishikawa Probability and stochastic analysis Yoshinori Yamasaki Analytic number theory Takamitsu Yamauchi General Topology Shin-ichi Oguni Noncommutative geometry and geometric group theory

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. 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.
	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 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.

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 (including Human impacts), 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 ※※※※ 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. Yasuyuki Murakami Research on the emergence and propagation process of ancient industrial Iron-technology and salt products in the human era associated with Earth Scientific methods. Archaeological and environmental studies on the social impact of ancient industrial developments. Rie S. Hori Geological and paleontological studies on deep-sea sediments and paleo environment. Takehisa Tsubamoto Evolution, paleobiogeography, and paleoecology of land mammals during the Cenozoic. Excavation, description, and paleontological study of vertebrate fossils. Xinyu Guo Simulation 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.

※･※Scheduled to retire in March, 2023

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Chemistry and Biology

Course	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 ※※ 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

	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 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 Kei Nomiyama Metabolic disposition and risk assessment of organohalogen compounds in wildlife Atsushi Ogawa Development of new biotechnologies based on cell-free systems
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 Inoue 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.

	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 Hiroki Hata Ecology of marine organisms, especially on species interaction and coevolution

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Special Graduate Course on Advanced Sciences

Field	Research outline	Staffs and Research Fields
Environmental Sciences	This division conducts, on the basis of physics, chemistry and biology and their interdisciplinary field, cutting-edge studies on the structure and variation mechanisms of the environment and ecosystems in coastal waters and their related environmental issues, and pollution and toxic effects of hazardous chemicals on a regional and a global scale. Students can mainly study environmental dynamics, environmental chemistry and environmental biology.	Xinyu Guo Simulation 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. Hisato Iwata Ecotoxicology of wildlife and species-diversity of disruption of cellular signaling pathway by environmental chemicals Tatsuya Kunisue Development of analytical methods for novel environmental contaminants with hormone-like activity and its application to ecotoxicology Kei Nomiyama Metabolic disposition and risk assessment of organohalogen compounds in wildlife Shin-ichi Kitamura Outbreak mechanisms of fish infectious diseases by marine environmental changes

Earth Science and Astrophysics	This division aims to nurture the researchers who have advanced knowledge and research competency through the studies on the structure and dynamics of the Earth, planets, and universe in GRC and RCSCE. The division consists of four terrains of high-pressure mineralogy, theory of Earth and planetary materials, galaxy evolution, and X-ray astrophysics.	Taku Tsuchiya Theoretical and computational study of minerals and modeling the Earth and planetary interiors. 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. Masanori Kameyama Mantle Dynamics ; Studies on flows, deformations, and evolutions of the Earth's interior based on the computational fluid dynamics. Yu Nishihara Experimental study on transport properties (such as rheology) of deep Earth materials. Jun Tsuchiya Computational study of the existence and its effects of volatile elements in the Earth's interior. Yoshio Kono Experimental study of magmas under pressure using high-pressure synchrotron X-ray techniques Tohru Shimizu Space plasma physics, fast magnetic reconnection based on MHD and kinetic theory and numerical studies. 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.

Life Sciences	This division provides education programs focusing on protein sciences, and has four main lecture contents that are grappled with in Proteo-Science Center : infectios molecular science, photo-life science, molecular life science, and protein function science.	Hiroyuki Hori Structures and functions of nucleic acids and proteins related to expression of genetic information Eiji Ihara Development of new method for polymer synthesis Kazuyuki Takai Reconstitution of protein synthesis ※※ Hidemitsu Uno Synthesis of bioactive compounds and highly functional materials of organic dyes. Tatsuya Sawasaki Functional proteomics using wheat cell-free system Miwa Sugiura Studies on the molecular structure and function of Photosystem Ⅱ Atsushi Ogawa Development of new biotechnologies based on cell-free systems

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