

**Tokyo University of Agriculture and Technology  
Graduate School of Engineering Doctoral Course  
Joint Doctoral Program for Sustainability Research  
(Tokyo University of Agriculture and Technology)  
International Specialized Program for Engineer Leader Education  
through ASEAN and Japan Cooperation**

**Application Guidelines for  
International Students with the Japanese Government Scholarship  
and Privately Financed International Students  
for October 2024 Enrollment**

Tokyo University of Agriculture and Technology Graduate School of Engineering Doctoral Course offers a curriculum “International Specialized Program (English course)” at all departments, and Joint Doctoral Program for Sustainability Research conducts all classes in English. Through these programs, we nurture engineer leaders who have the skills to create innovative added value for industrial products that support a super-smart society, centered on excellent foreign students from ASEAN countries.

## **I. Fields of Study and Students Recruited**

### **1. Fields of study and prospective supervisors**

- (1) Applicants should select the departments and prospective supervisors you wish to choose from among the research fields of the Graduate School of Engineering provided on pages 16 ~.
- (2) Prior to application, all applicants must consult with and obtain permission from your prospective supervisor for your enrollment and research topic.

### **2. Students recruited**

- (1) Candidates for MEXT scholarship 2
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- \* (1) and (2) can be applied together

## **II. Eligibility and Requirements**

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## **III. References for All Applicants**

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## II. Eligibility and Requirements

### Candidates for MEXT Scholarship

#### 1. Applicants

Graduate-level international applicants who will come to Japan as new students.

\*Applicants should have the MEXT grade point of 2.30 (out of 3.00) or above and are expected to maintain this academic standard during the scholarship program. Moreover, applicants should satisfy one of the conditions of “6. Language skill” below.

#### 2. Nationality

(Africa)

Algeria, Angola, Uganda, Eswatini, Egypt, Ethiopia, Eritrea, Ghana, Cape Verde, Gabon, Cameroon, Gambia, Guinea, Guinea-Bissau, Kenya, Ivory Coast, Comoros, Republic of Congo, Democratic Republic of the Congo, Sao tome and principe, Zambia, Sierra Leone, Djibouti, Zimbabwe, Sudan, Seychelles, Equatorial Guinea, Senegal, Somalia, Tanzania, Chad, Central Africa, Tunisia, Togo, Nigeria, Namibia, Niger, Burkina Faso, Burundi, Benin, Botswana, Madagascar, Malawi, Mali, South Africa, South Sudan, Mozambique, Mauritius, Mauritania, Morocco, Libya, Liberia, Rwanda, Lesotho

(Asia)

India, Sri Lanka, Nepal, Pakistan, Bangladesh, Bhutan, Maldives, Indonesia, Cambodia, Singapore, Thailand, Philippines, Brunei, Vietnam, Malaysia, Myanmar, Laos, Mongolia

(Central and South America)

Argentina, Uruguay, Ecuador, Guyana, Columbia, Suriname, Chile, Paraguay, Brazil, Venezuela, Peru, Bolivia

(Middle East)

Afghanistan, United Arab Emirates, Yemen, , Israel, Iraq, Iran, Oman, Qatar, Kuwait, Saudi Arabia, Syria, Turkiye, Bahrain, Jordan, Lebanon, Palestine

(Oceania)

Australia, Kiribati, Cook Islands, Samoa, Solomon Islands, Tuvalu, Tonga, Nauru, Niue, New Zealand, Vanuatu, Papua New Guinea, Palau, Fiji, Marshall, Micronesia

(Europe)

Iceland, Ireland, Azerbaijan, Albania, Armenia, Andorra, Italy, Ukraine, Uzbekistan, UK, Estonia, Austria, Netherlands, Kazakhstan, North Macedonia, Cyprus, Greece, Kyrgyzstan, Croatia, Kosovo, San Marino, Georgia, Switzerland, Sweden, Spain, Slovakia, Slovenia, Serbia, Tajikistan, Czech, Denmark, Germany, Turkmenistan, Norway, Vatican, Hungary, Finland, France, Bulgaria, Belgium, Poland, Bosnia-Herzegovina, Portugal, Malta, Monaco, Moldova, Montenegro, Latvia, Liechtenstein, Lithuania, Romania, Luxembourg

(North America)

America, Canada

#### 3. Age (upper limit)

Applicants who were born on or after April 2, 1989.

\*The exceptions to the above age requirements are limited to cases where MEXT judges that the applicant was unable to apply at the age of qualification due to the system and circumstances of the country of nationality (duty of military service, loss of educational opportunities due to war, etc.). We do not accept any personal circumstances (economic conditions, family circumstances, health conditions, university or work circumstances, etc.). However, if an applicant who has completed the young leaders program and who does not meet

the above age requirements, wishes to enter the doctoral program, we accept him/her only within 5 years after completing the program.

#### 4. Academic background

Applicants must meet any of the following items:

- 1) Applicants must either have acquired a master's degree or an equivalent degree in a specialized field, or expect to acquire the degree by the time of enrollment.
- 2) Applicants who have been recognized as having academic abilities equivalent to or greater than those of a holder of a master's degree or an equivalent degree by TUAT through individual entrance qualification screening. And applicants who have reached 24 years of age as of the first day of the enrollment month.

#### 5. Fields of study

Your major fields at university or related fields that you can study at our Graduate School of Engineering

#### 6. Language skill

Applicants are required to fulfill at least one among the following English proficiencies .

- 1) A score of qualification or examination test equal to or more than B2 equivalent of Common European Framework of Reference for Languages (CEFR) in English.
- 2) Applicants who completed the educational course that satisfies entrance qualifications for a Japanese graduate school doctoral course in English as the main language.
- 3) Applicants who are recognized by our Graduate School of Engineering as having the English proficiency specified in 1) above.

#### 7. Health

Applicants should be in good mental and physical health.

#### 8. Arrival in Japan

Applicants must be able to arrive in Japan between October 1 and October 14, 2024.

#### 9. Remarks

- 1) Applicants in one or more of the following categories are “ineligible.” They must decline the scholarship offer if they are found to fit any of the following criteria.
  - (1) Active members of the military or civilians employed by the military at the time of arrival in Japan and during the scholarship period;
  - (2) Applicant who is unable to come to Japan within the period designated by MEXT or our Graduate School of Engineering;
  - (3) Those who were the Japanese government (MEXT) scholarship students in the past (including those who declined after arrival in Japan). However, this does not apply to an applicant, who: (i) have academic or work experience of more than 3 years from the month following the last month of scholarship to the last month of scholarship; or (ii) the last Japanese government (MEXT) scholarship received was either a Japanese-studies student and later returned to a university from which he or she graduated (or expected to graduate) in their home or another country, an international student in Japan under the Japan-Korea Joint Government Scholarship Program for the Students in Science and Engineering Departments and later returned to South Korea, or an international student under the young leaders program. In addition, MEXT Honors Scholarship do not apply to the Japanese government (MEXT) scholarship, so you can apply even if you have received it in the past.

- (4) Those who have applied for duplicates of other scholarship programs under the Japanese government (MEXT) scholarship.
  - (5) An applicant who is staying in Japan (have Japanese resident card), or who is enrolled or scheduled to be enrolled in a Japanese university since the time of application until the scholarship provision.
  - (6) Those who plan to receive scholarships from an organization (including a governmental organization in his or her home country) other than the Japanese government (MEXT) after the start of scholarships.
  - (7) An applicant who failed to graduate and whose conditions and academic qualification are not satisfied by the prescribed date.
  - (8) An applicant who has dual nationality at the time of application and cannot prove that he/she has surrendered Japanese nationality by the date of arrival.
  - (9) An applicant who is planning long-term research activities (internships, fieldwork, etc.) outside Japan, or planning to take a long-term leave of absence from the time of application.
  - (10) An applicant who completed doctoral course and does not aim for obtaining a degree.
- 2) Admission shall be cancelled if a candidate who expected to graduate failed his/her graduation before the end of September 2024.
  - 3) In case the candidate does not meet the “4. Academic background, 1)” requirement, evaluation is required prior to the admission. Please inform your prospective supervisor at our Graduate School of Engineering by December 27 , 2023.
  - 4) We will prefer those who, while studying in Japan, contribute to mutual understanding between their countries and Japan by participating broadly in local schools and activities as human resources that help internationalize Japan. We also expect them to strive to promote the relationship between their countries and Japan by maintaining close relationships with their Japanese universities after graduation, cooperating in questionnaire surveys after graduation, and cooperating in projects implemented by Japanese diplomatic missions after returning home.

### **Application Procedure**

Applicants should submit the following documents before January 15, 2024.

(All the applicants must apply after contacting your prospective supervisor of our Graduate School of Engineering and obtaining acceptance.)

#### 1) Submittal of application

All the documents should be sent by international mail, etc. to your prospective supervisor.

#### 2) Documents to be submitted

- (1) APPLICATION FORM FOR JAPANESE GOVERNMENT (MEXT) SCHOLARSHIP (use enclosed form)
- (2) Field of your major and research plan (use enclosed form)
- (3) Research achievement (use enclosed form)
- (4) An abstract of either Master’s thesis, or equivalent paper in Japanese or English within 600 words.
- (5) A letter of recommendation, by the dean or head of the applicant’s affiliated institution. This letter must addressed to the president of Tokyo University of Agriculture and Technology. Please use the envelope issued by your university and an official seal of your university.

- (6) A certification that shows the applicant's birth, nationality, citizenship, or residence in the applicant's home country such as a transcription of domiciliary register or a proof of citizenship.
- (7) An academic transcript issued by the last university you have attended (are attending)
- (8) A certificate of degree (expected) from the last university you have attended (are attending)
- (9) An academic certificate of the last university you have attended (are attending) showing the GPA or the ranking which the applicant has been awarded within his or her class (e.g., Xth out of Y students.)
- (10) A certificate for language skill (e.g., TOEFL, IELTS, etc.)  
(If the applicant does not have a certificate to prove that you meet the requirements of "6. Language skill 1) - 2)", please contact your prospective supervisor as soon as possible.)
- (11) A certificate of health (use enclosed form and this certificate should be obtained within the past 6 months before the submission.)
- (12) A photocopy of passport (If you have already your passport. The pages where the name and the photograph can be identified)
- (13) Entrance examination fee of JPY 30,000  
(to be paid by using the prescribed payment form. Applicants outside Japan are advised to refer to their prospective supervisor for details)  
\*If applicants are adopted as Students with the Japanese Government Scholarship, We refund entrance examination fee after entering.

### 3) Remarks

- i) All the documents should be typewritten in either English or Japanese and printed two-sided in A4 size with enclosed form. (In the case the document is not English or Japanese, please attach the translation in English or Japanese with it.)
- ii) The submitted documents will not be returned
- iii) All documents should be correctly completed and submitted before the deadline.  
Documents submitted after the deadline and incomplete applications will not be accepted.
- iv) The documents and forms are subject to change.

### 4) Screening and aim of this program

- i) Admission will be determined based on the submitted documents and the oral examination. The date of the oral examination is scheduled to be any day between January 17 and 22, 2024. Details of the oral examination will be announced by the prospective supervisor.
- ii) Result of the examination will be notified by the prospective supervisor by the end of February, 2024.
- iii) TUAT will recommend the successful applicants to MEXT as a candidate for the Japanese Government Scholarship. After the screening procedure by MEXT, acceptance as a scholarship student will be decided. Notification of the acceptance for the scholarship will be sent from the prospective supervisor to the applicant around July 2024.
- iv) Classes and instructions are given mainly in English and this program offers a Doctor of Engineering or a Doctor of Philosophy in 3 years. The enrollment identification is a full time doctoral course student.

### 5) Allowance

The scholarship duration for MEXT Scholarship recipients is thirty-six (36) months from October 2024.

The amount of the monthly stipend for 2024 is yet to be determined. For reference, the monthly amount for 2023 scholarship was JPY 148,000/month (This amount is subject to change each year depending on the fiscal budget, prices, etc.).

The scholarship will not be paid to a recipient who is on a leave of absence or absent for a long period from his or her university. The scholarship will be cancelled in the following cases:

- i) If any portion of the recipient's application documents is found to be falsely stated.
- ii) If the recipient is in breach of his or her pledge made to the Minister of MEXT.
- iii) If the recipient violates Japanese laws and regulations and is imprisoned for more than a year.
- iv) If the recipient is subjected to a disciplinary action or expulsion by his or her university.
- v) If it is determined that the recipient will not be able to complete his or her course within the standard course term because of his or her poor academic achievement or suspension.
- vi) If the recipient comes to Japan or changes his or her resident status of “Ryuugaku (student) ,” without obtaining a new resident status of “Ryuugaku (student) ,” to any other status.
- vii) If the recipient receives another scholarship (except for a scholarship designated for research expenses).
- viii) After admission, if the recipient advances to higher courses without approval of extension of the scholarship grant period.
- ix) If the recipient leaves the host university or transfers to another graduate school.
- x) If the recipient’s annual academic grade point is less than 2.30 or the grading standard set by the university.

#### 6) Traveling costs

- i) Transportation to Japan: Recipients will be provided, according to the itinerary and route designated for them by MEXT, with an economy class air ticket from the international airport closest to their place of residence to Narita International Airport.  
Recipients will have to shoulder expenses such as domestic transportation from their place of residence to the nearest international airport, passenger service facilities charge (PSFC), airport taxes, special taxes on overseas travel and domestic travel expenses in Japan (basically the recipient's place of residence should be the current address stated in the application form). Moreover, an air ticket will not be provided if the recipient travels to Japan from a country other than that of his or her nationality.
- ii) Transportation from Japan: Upon application, recipients who wish to return to their home country within the last-payment month of the scholarship will be provided with an economy class air ticket for a flight from Narita International Airport to the international airport closest to their place of return.
- iii) Travel expenses for transportation from their place of residence in Japan to the nearest international airport, airport tax, airport use fee, special tax required for travel, travel expenses within nationality (including aircraft transit costs), travel insurance fee, carrying expenses related to goods and unaccompanied baggage will be borne by the international students. In addition, if you return home before the end of the scholarship period due to your own reasons or “5) Allowance i-x” above, you will not receive a return trip fee.
- iv) Recipients should bare the cost of travel insurance for their travels to/from Japan.
- v) If you continue to stay in Japan after the scholarship period ends (for example, advancement or employment in Japan), travel expenses for temporarily returning home will not be paid.

#### 7) Educational expenses

Tokyo University of Agriculture and Technology will bear the entrance fee, and tuition fee.

#### 8) Expenses necessary at the time of enrollment

- i) School fees including the entrance fee, and tuition fee will not be charged.

- ii) The Students Education and Research Accident Insurance insures students against unforeseen accidents and injuries (but not illnesses) in curricular and extracurricular activities. The expense is JPY 2,600 for 3 years.
- iii) The Student Liability Insurance Program provides compensation in the event that the student injures another person or damages another person's property during the regular course, internship, volunteer activities, off-campus research (surveys, tours, training), museum curator training, or extracurricular activities (such as overnight field trips and expeditions).

The cost of this insurance is JPY 5,400 for 3 years. A member fee for the University Co-op of JPY 5,000 is also required but will be reimbursed at the end of the Doctor's program.

(\*The costs of the insurance fee and the member fee for the University Co-op are subject to change.)

All the enrolling students are required to join the Student Liability Insurance Program in addition to the Students Education and Research Accident Insurance.

## Privately Financed International Students

### 1. Applicants

Doctoral course-level international applicants who will come to Japan or are residing in Japan and wish to obtain a doctoral degree from our Graduate School of Engineering

### 2. Nationality

No nationality requirements.

### 3. Age (upper limit)

No restriction.

### 4. Academic background

Applicants must meet any of the following items:

- 1) Applicants must either have acquired a master's degree or an equivalent degree in a specialized field, or expect to acquire the degree by the time of enrollment.
- 2) Applicants who have been recognized as having academic abilities equivalent to or greater than those of a holder of a master's degree or an equivalent degree by TUAT through individual entrance qualification screening. And applicants who have reached 24 years of age as of the first day of the enrollment month.

### 5. Health

Applicants should be in good mental and physical health.

### 6. Language skill

Applicants are required to fulfill at least one among the following English proficiencies .

- 1) A score of qualification or examination test equal to or more than B2 equivalent of Common European Framework of Reference for Languages (CEFR) in English.
- 2) Applicants who completed the curriculum that satisfies entrance qualifications for a Japanese graduate school doctoral course in English as the main language.
- 3) Applicants who are evaluated by TUAT that they have the above 1) English proficiency or higher.

### 7. Arrival in Japan

Applicants must arrive in Japan by October 14, 2024.

### 8. Other remarks

- 1) Admission shall be cancelled if a candidate who expected to graduate failed his/her graduation before the end of September 2024.
- 2) In case the candidate does not meet the “4. Academic background, 1)” requirement, evaluation is required prior to the admission. Please inform your prospective supervisor at our Graduate School of Engineering by December 27, 2023.

## Application Procedure

Applicants should submit the following documents before January 15, 2024.

(All the applicants must apply after contacting your prospective supervisor of our Graduate School of Engineering and obtaining acceptance.)



### 1) Submittal of application

All the documents should be sent by international mail, etc. to your prospective supervisor.

### 2) Documents to be submitted

- (1) 2024 academic year application form (use enclosed form)
- (2) Field of study and research plan (use enclosed form)
- (3) Research achievement
- (4) An abstract of master's thesis, or equivalent paper in Japanese or English within 600 words.
- (5) A certificate of degree (expected) and an academic transcript from the last university you have attended (are attending)
- (6) A certification that shows the applicant's birth, nationality, citizenship, or residence in the applicant's home country such as a transcription of domiciliary register or a proof of citizenship.
- (7) A certificate for language skill  
(e.g., TOEFL, IELTS, etc.)  
(If the applicant does not have a certificate to prove that you meet the requirements of "6. Language skill 1) - 2)", please contact your prospective supervisor as soon as possible.)
- (8) A certificate of health (use enclosed form and this certificate should be obtained within the past 6 months before the submission.)
- (9) A photocopy of passport (If you have already your passport. The pages where the name and the photograph can be identified.)
- (10) Entrance examination fee of JPY 30,000  
(to be paid by using the prescribed payment form. Applicants outside Japan are advised to refer to their prospective supervisor for details)

### 3) Remarks

- i) All the documents should be typewritten in either English or Japanese and printed two-sided in A4 size with enclosed form. (In the case the document is not English or Japanese, please attach the translation in English or Japanese with it.)
- ii) The submitted documents will not be returned.
- iii) All documents should be correctly completed and submitted before the deadline.  
Documents submitted after the deadline and incomplete applications will not be accepted.
- iv) The documents and forms are subject to change.
- v) The prescribed payment form for the entrance examination fee can be requested from Admissions Section of Koganei Student Support Office. Please request it early beforehand to avoid being late. After payment, please submit a receipt (right side of the money transfer bill) with application documents.

### 4) Screening and aim of this program

- i) Admission will be determined based on the submitted documents and the oral examination.  
The date of the oral examination is scheduled to be any day between January 17 and 22, 2024.  
Details of the oral examination will be announced by the prospective supervisor.
- ii) Result of the examination will be notified by the prospective supervisor by the end of February, 2024.
- iii) Classes and instructions are given mainly in English and this program offers a Doctor of Engineering or a Doctor of Philosophy in 3 years. The enrollment identification is a full time doctoral course student.

### 5) Expenses necessary at the time of enrollment

- i) Entrance fee of JPY 282,000.

ii) Tuition fee for the fall semester (Oct. to Mar.) is JPY 267,900 (JPY 535,800 per year).

Tuition fee and entrance fee will be adjusted at any time without notice.

iii) The Students Education and Research Accident Insurance insures students against unforeseen accidents and injuries (but not illnesses) in curricular and extracurricular activities. The expense is JPY 2,600 for 3 years.

iv) The Student Liability Insurance Program provides compensation in the event that the student injures another person or damages another person's property during the regular course, internship, volunteer activities, off-campus research (surveys, tours, training), museum curator training, or extracurricular activities (such as overnight field trips and expeditions)

The cost of this insurance is JPY 5,400 for 3 years. A member fee for the University Co-op of JPY 5,000 is also required but will be reimbursed at the end of the Doctor's program.

(\*The costs of the insurance fee and the member fee for the University Co-op are subject to change.)

All the enrolling students are required to join the Student Liability Insurance Program in addition to the Students Education and Research Accident Insurance.

### III. References for All Applicants

- i) Before arrival in Japan, students are advised to obtain information about climate, customs, manners, and universities of Japan. Please understand that you have to use Japanese in out-of-class life.
- ii) Please refer to the TUAT website for research, education and other details.  
(<https://www.tuat.ac.jp/en/>)
- iii) Personal information given on application will be adequately treated according to our Privacy Policy.
- iv) In accordance with the “Foreign Exchange and Foreign Trade Act”, Tokyo University of Agriculture and Technology (TUAT) has established “Tokyo University of Agriculture and Technology Regulations for Security Export Control” and has been conducting strict screening of prospective students to be admitted into TUAT. In case a prospective student or the contents of his/her studies/research is subject to regulation as defined by the above-mentioned Act or Regulations, TUAT must apply to the Ministry of Economy, Trade and Industry (METI) of Japan for its permission to allow his/her enrollment in TUAT, and s/he may not be able to begin his/her studies or research immediately at TUAT for the time being. Furthermore, in case METI denies a TUAT’s application in order to maintain international peace and security, the prospective student may not be able to pursue his/her studies or research at TUAT as a result.
- v) If you have any inquiry about these application guidelines, please contact the address below in writing.

Postal address:  
Admissions Section of Koganei Student Support Office  
Graduate School of Engineering  
Tokyo University of Agriculture and Technology  
2-24-16 Naka-cho, Koganei-shi  
Tokyo 184-8588 JAPAN  
E-MAIL: [tnyushi@cc.tuat.ac.jp](mailto:tnyushi@cc.tuat.ac.jp)  
Fax: +81-42-388-7013

## IV. Admission Policy and Fields of Study

### Graduate School of Engineering

#### 1. Purpose of learning

The Graduate School of Engineering (Doctoral Course) accepts students from Japan and overseas who are interested in the natural environment and scientific technology and making efforts to improve themselves. They seek to broaden their vision and acquire thorough knowledge, and supported by a strong sense of ethics and personal autonomy, they want to become engineers and researchers who play an active role in international society. Recently, we have seen remarkable developments in science and technology, and ICT has become more sophisticated and advanced. We have also seen developments in border areas as well as in specialized comprehensive fields related to various specialized fields. These advances have been astounding, and in the Graduate School of Engineering we are engaged in a wide range of research and education from basic science and engineering to applied advanced technology designed to meet these kinds of current demands. Our goal is to foster researchers and specialists who have a wealth of imagination and creativity and can carry out wide-ranging, advanced research and development.

#### 2. Admission policy

Aiming to develop individual students, the Graduate School of Engineering is looking for applicants who meet the following requirements:

1. Applicants who have a high level of ethics, sufficient basic academic knowledge of their field of study, and a broad view of their area of specialization.
2. Applicants who are on a quest to find truth in nature, have a manufacturing mindset, and are interested in science and technology. They should also be able to think independently in pursuing their research and cooperate and collaborate with others while being dedicated to solving research problems and contributing to society.
3. Applicants who are willing to take on the challenges facing humankind and can consider and judge from multiple perspectives and set their own research themes.
4. Applicants who have a high level of communication ability in Japanese or English.

#### Department of Biotechnology and Life Science

Our aims are twofold: (i) to train students to acquire an international mindset, communication skills, and the ability to make presentations at domestic and international conferences and write technical papers and (ii) to develop human resources who, as experts in cutting-edge biotechnology, can act immediately in response to the needs of modern society while being active at the core of society as researchers, specialists, and professionals with the ability to discover new needs and seeds of new technologies. In consideration of these aims, we therefore seek people who satisfy the following admissions policy:

1. The applicant must have (i) advanced specialized knowledge and academic ability in chemistry, life sciences, and engineering to engage in cutting-edge research in the field of biotechnology and life science and (ii) acquired a bird's-eye viewpoint and high ethical standards essential for researchers who lead the field.
2. The applicant must have (i) an inquisitive mind for cutting-edge research in the field of biotechnology and (ii) a strong desire to contribute to society through interdisciplinary and international cooperation and collaboration.
3. The student must be willing to (i) set research questions proactively and logically through cutting-edge expertise, advanced analytical skills, and insight in the field of biotechnology and (ii) boldly face challenges concerning technological innovation, planning of unexplored technologies, and original advanced research on various issues facing humankind.
4. The student must possess the advanced language and communication skills necessary to disseminate research results internationally

#### Department of Biomedical Engineering

While aiming to give students specialized knowledge related to the leading technology at the core of modern medicine, through collaboration with specialists from different fields, we aim to foster students who can acquire practical abilities based on biomedical innovation processes and develop as leaders in

international society. As researchers, specialists, and professionals, these leaders can serve as bridges between various industrial fields and sow the seeds for developing the medical devices and health practices of the future. In consideration of these aims, we therefore seek people who satisfy the following admissions policy:

1. Applicants who have a high sense of ethics, basic academic knowledge and ability, and a broad vision to learn from biomedical engineering.
2. Applicants who are on a quest to find truth in nature, have a manufacturing mindset, and are interested in biomedical fields. They also think independently while pursuing their research, can cooperate and collaborate with various researchers, engineers, and specialists who cross borders between discipline, and are dedicated to solving research problems and contributing to society.
3. Applicants who are able to (i) consider and judge various problems facing humanity related to health, medicine, and sanitation from multiple perspectives, (ii) set their own research agenda, and (iii) be willing to boldly take on challenges connected to the development of new fields of research, medicine, and healthcare technology.
4. Applicants who are highly skilled in communicating in Japanese or English.

### **Department of Applied Chemistry**

The purpose of this program is to develop talented people who can (i) lead the development of highly specialized science and technology internationally as chemists and materials scientists related to the fields of nature, life, the environment, and energy and (ii) contribute to the formation of a safe and secure sustainable society. Accordingly, we seek talented persons who satisfy the following admissions policy.

1. Applicants must have (i) systematic and abundant basic academic ability in the fields of chemistry and physics and related fields and (ii) the ethical standards necessary for researchers and engineers.
2. Applicants must be highly motivated and proactive in regard to (i) creating new value regarding chemical substances from the atomic and molecular perspective and (ii) contributing to society both domestically and globally as world-class experts in their field.
3. Applicants must be willing to set their own research agenda in the field of chemistry and materials science related to nature, life, the environment, energy, etc., from an academic and industrial perspective. Moreover, they must be prepared to boldly pursue unexplored theories, pioneer new research fields, and advance science and technology by synthesizing a wealth of knowledge and engaging in independent research.
4. Applicants must have excellent communication skills in Japanese or English and be able to publicize their research results to the world.

### **Department of Applied Physics and Chemical Engineering**

The objective of the doctoral program is to foster engineers and scientists who can solve problems related to energy, the environment, and new materials through (i) an integrated understanding of chemical engineering and physical engineering and (ii) advanced professional leadership skills that will allow them to play a leading role in the solution process. As a result, by playing a social and international role, they will contribute to the creation of a sustainable society. We therefore seek people who satisfy the following requirements:

1. Applicants must have the following skills: (i) sufficient basic academic skills in chemistry, physics, mathematics, English, etc. for studying chemical engineering and physical engineering, (ii) master's level research skills, and (iii) a broad perspective and a strong sense of ethics.
2. Applicants must have the following: (i) an interest and track record in research in the fields of chemical and physical engineering related to energy, the global environment, medicine and food, materials, or the process and measurement technologies that form the basis for solving problems in those fields and (ii) a desire to make social and international contributions through world-leading research activities in one or more of those fields.
3. Applicants must be able to (i) consider and judge various problems facing humanity from multiple perspectives by integrating and utilizing chemical engineering and physical engineering, (ii) set their own research agenda, and (iii) be willing to boldly take on challenges as an independent researcher aiming to solve those problems.

4. Applicants must have a high level of communication skills, in Japanese or English languages, and the ability to discuss research both orally and in writing.

#### **Department of Mechanical Systems Engineering**

Based on a high level of fundamental analytical ability in mathematics and physics and a broad and deep expertise in mechanical-systems engineering, the department's aim is twofold: (i) design and create unique and world-leading advanced mechanical systems to create a science-and-technology-driven society on a global scale that can develop sustainably in harmony with the environment and (ii) train advanced engineers and researchers who can work internationally with a deep understanding and insight into world society and culture through their rich communication skills. To meet those aims, the Department seeks talented people who satisfy the following admissions policy:

1. Applicants must have (i) a high level of academic ability for applying oneself to cutting-edge research concerning mechanical-systems engineering and (ii) a strong desire to contribute to humanity and society through international activities in their field of specialization.
2. Applicants must have (i) the ability to identify and solve problems with their advanced analytical skills, specialized knowledge, and insight in mathematics, physics, and mechanical-systems engineering and (ii) the ability to think flexibly to deal with research issues in new research fields and interdisciplinary areas.
3. Applicants must have acquired intellectual curiosity and insight in each specialized field of mechanical-systems engineering so as to be able to discover development goals on their own, personify the routine of experimentation and analysis, and develop considerations and discussions.
4. Applicants must have the language skills necessary for internationally disseminating their research results and the adaptability to handle the diversification of science and technology.

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

The purpose of this program is to train talented people with (i) the ability to discover issues suitable for independent researchers who will learn leading academic knowledge about electrical engineering and computer science that supports the foundation of modern society by fostering flexibility for meeting social needs, (ii) the ability practical to execute research and technological development, and (iii) an international mindset and ability to disseminate information. In consideration of these aims, we therefore seek people who satisfy the following admissions policy:

1. Applicants must have a broad perspective, sufficient basic academic skills to study electrical engineering and computer science, and a high level of ethics.
2. Applicants must be interested in research in the fields of electrical engineering and computer science and have a strong desire to contribute socially and internationally through activities in these fields.
3. Applicants must be able to (i) consider and judge various issues facing humanity from multiple perspectives on the basis of basic knowledge of electrical engineering and computer science, (ii) be able to set their own research agenda, and (iii) be willing to boldly take on challenges.
4. Applicants must have advanced communication skills in Japanese or English languages.

#### **Joint Doctoral Program for Sustainability Research**

The Joint Doctoral Program for Sustainability Research is a three-year doctoral program offered at Tokyo University of Foreign Studies (TUFS), Tokyo University of Agriculture and Technology (TUAT), and the University of Electro-Communications (UEC), as part of a cooperative initiative of the three universities.

#### **Admission policy**

Aiming to develop individual students, the Joint Doctoral Program for Sustainability Research is looking for applicants who meet the following requirements:

- Possess a passion to combat global problems of poverty, conflict, food and resources, energy and the environment, information and ICT, and motivated to play a role in global society in the future.
- Able to think logically and flexibly to conduct interdisciplinary and cross-sectoral research and to demonstrate the academic knowledge, expertise, and language skills required to conduct research.

- Able to adapt to various environments and diverse cultures; accepting of cultural values different from one's own; and equipped with the expertise, broad vision, ethical sensibility, and a resolute mind to play an active role in carrying out missions on a global scale.

<b>Department : Biotechnology and Life Science</b>		
Speciality&Major Research Fields	Academic Advisor	Research Subject
Cell engineering	Mikako SAITO mikako(at)cc.tuat.ac.jp	Disease model cells of diabetes. Regenerative cell engineering. ES cells. Single-cell gene engineering. Femtoinjection. Food safety control and regulatory science.
	Tetsushi MORI moritets(at)go.tuat.ac.jp	Exploitation and elucidation of the characteristics, role and molecular traits of novel/uncultivable environmental microorganisms using molecular biology based approaches.
Biomolecular and structural informatics	Yutaka KURODA ykuroda(at)cc.tuat.ac.jp	We carry out biophysical and bioinformatics studies of protein structure, function, and aggregation at a molecular level using recombinant DNA technologies, NMR, and computational simulation for understanding and controlling the immunogenicity and cytotoxicity of misfolded and aggregated therapeutic proteins.
	Hiroshi TSUGAWA* <sup>1</sup> htsugawa(at)go.tuat.ac.jp	Our laboratory studies the complex metabolic system of living organisms through the development of mass spectrometry omics techniques that illuminate the diversity of metabolites from plant, human, and the associated microbiome.
Structure and cellular function of biomolecules	Yasumoto NAKAZAWA yasumoto(at)cc.tuat.ac.jp	i) Structural analysis of silk fibroins. ii) Development of the medical implantation devices such as artificial cardiac valves and cardiovascular patches based on the silk fibroin.
Molecular biology and pathophysiology	Yoshihiro OHTA ohta(at)cc.tuat.ac.jp	Development of novel techniques for organelle imaging and their application to mitochondrial study. Cell death, Ca <sup>2+</sup> signaling and generation of reactive oxygen species are mainly focused.



Department : Biotechnology and Life Science		
Speciality&Major Research Fields	Academic Advisor	Research Subject
	Masaki INADA inada(at)cc.tuat.ac.jp (Collaborative faculty)	Molecular pathological investigation using gene targeted mice and disease models on mice.
	Michiko HIRATA* <sup>1</sup> hirata(at)cc.tuat.ac.jp	Molecular pathology is investigating that based on gene editing techniques in molecular biochemistry. Focusing fields are development of drug screening models and diagnostic-imaging methods on life related diseases and skeletal disease including osteoporosis, periodontal disease and its related cancers.
Nanobiotechnology	Kazunori IKEBUKURO ikebu(at)cc.tuat.ac.jp	Nucleic acid engineering of aptamers for the application to diagnosis and novel bottom-up nanotechnology.
	Ryuji KAWANO rjkawano(at)cc.tuat.ac.jp	The goal of my research is to establish a system that uses biological nanopores for single-molecule detection. Channel membrane proteins have nanochannels around 1 nm in size. These biological nanopores are capable of detecting and electrically recognize even single molecules with a high signal-to-noise ratio. However, the channel size is limited by the inherent protein structure. I plan to develop artificial nanochannels such as synthetic nanopores or polypeptides combined with biomaterials (proteins and lipid bilayers) on the basis of MEMS technology for novel nanopore sensing.
Biobusiness	Wakako TSUGAWA tsugawa(at)cc.tuat.ac.jp	Development of novel biodevices for the in vitro diagnostics and environmental monitoring systems based on proteins or enzymes.
Molecular Biochemistry	Ryutaro ASANO ryutaroa(at)cc.tuat.ac.jp	Artificial protein design based mainly on antibody molecules and their detailed functional analyses for development of next-generation biologicals and biosensors.
Marine Biotechnology	Tomoko YOSHINO y-tomoko(at)cc.tuat.ac.jp	Development of novel bio-nanomaterials through genetic engineering by microorganisms for biosensing and biomedical applications.
Biomolecular engineering	Atsushi ARAKAKI arakakia(at)cc.tuat.ac.jp	Molecular analysis of biomineralization mechanism. Biomimetic synthesis of organic/inorganic hybrid nanomaterials using biological molecules.
	Tsuyoshi TANAKA tsuyo(at)cc.tuat.ac.jp (Collaborative faculty)	Production of biofuels, chemicals and pharmaceuticals on the basis of biological functions of various microorganisms. Development of Bio-sensing system based on lab-on-a-chip technologies.
Bioelectronics	Nobuhumi NAKAMURA nobu1(at)cc.tuat.ac.jp	Bioelectrochemistry and Raman spectroscopy of metalloproteins and construction of biofuel cells. Development of ionic liquids as ion conductors, solvents for biomass extraction and energy conversion.

Department : Biotechnology and Life Science		
Speciality&Major Research Fields	Academic Advisor	Research Subject
	Takahiro ICHIKAWA t-ichi(at)cc.tuat.ac.jp	Lipid molecules form bilayer structures that play an important role as a field for various functional biomolecules. In our laboratory, we aim for the construction of novel fields by controlling self-organization behavior of amphiphilic molecules.
Synthetic organic chemistry Bioorganic chemistry/chemical biology	Kazuo NAGASAWA knaga(at)cc.tuat.ac.jp	Total synthesis of biologically active natural products. Development of organocatalyst.
	Kaori SAKURAI sakuraik(at)cc.tuat.ac.jp	Development of novel chemical tools to study biological functions of glycolipids and natural products.
	Masayuki TERA* <sup>1</sup> tera(at)go.tuat.ac.jp	Design and synthesis of functional molecules controlling nucleic acids, proteins, and cellular surfaces.
Medicinal enzyme engineering	Christopher VAVRICKA * <sup>1</sup> chris(at)go.tuat.ac.jp	Computationally-driven enzyme engineering can now enable the sustainable biosynthesis of virtually any desired chemical product. Therefore, we are developing computational approaches for the discovery and engineering of specialized enzyme functions that can extend metabolic pathways to produce valuable medicinal compounds.
Biosociety engineering Biomolecules and proteomics	Masafumi YOYODA yohda(at)cc.tuat.ac.jp *Retires in March 2025	Structure and function of molecular chaperones. Genetic analysis systems for SNP genotyping and bioremediation.
	Keiichi NOGUCHI knoguchi(at)cc.tuat.ac.jp (Collaborative faculty)	Structure analysis of bio-related molecules using X-ray diffraction, nuclear magnetic resonance, mass spectroscopy and electron microscopy methods.
	Kyosuke SHINOHARA k_shino(at)cc.tuat.ac.jp	We examine the role of cilia in our body. Cilia are nanomachine motor device that protrude from cell surface and play important role on transport of fluid in airway, brain, and oviduct. Using knockout mouse, electron microscopy, and protein engineering, we address molecular mechanism of motility and mechanical property of cilia: How cilia move or how cilia acquire their stiffness and integrity.
Theoretical linguistics	Yuji HATAKEYAMA* <sup>1</sup> hatayu(at)cc.tuat.ac.jp	Syntactic structure, semantic structure, and information structure.

<b>Department : Biomedical Engineering</b>		
Specialty & Major Research Fields	Academic Advisor	Research Subject
Biomedical electronic nanodevices	Kenzo MAHASHI maehashi(at)cc.tuat.ac.jp	Development of biomedical electronic nanodevices for early diagnosis and for realization of safe and secure society. Nanocarbons are expected for fabrication of devices owing to their unique structures and superior electrical properties. In this department, biological sensors and quantum devices are developed.
3D image technology	Yasuhiro TAKAKI ytakaki(at)cc.tuat.ac.jp	Holographic displays and light field displays which naturally satisfy human depth perception without any contradiction are developed to realize next-generation head-mounted displays and glasses-free 3D displays used for VR/AR technology and metaverse. Moreover, hologram contact lenses which can be placed into eyes are also developed to enable the augmentation of human vision.
Medical ultrasound	Kohji MASUDA masuda_k(at)cc.tuat.ac.jp	Our research topic is "Ultrasound," which is knowledge of physics and electrical engineering and has a potential to apply to both diagnosis and treatment without harming the human body. In collaboration with medical researchers, we are conducting research themes in various fields such as verification experiments of biological effects caused by ultrasound and information extraction using image processing and machine learning. We are working towards realization of therapeutic technology by combining these achievements.
Biomedical sensing	Kenji IKUSHIMA ikushima(at)cc.tuat.ac.jp	Innovative sensing technologies related to ultrasound and terahertz waves by utilizing our unique measurement schemes and advanced quantum technologies. We aim to visualize information that is inaccessible by conventional technologies and apply it to various fields such as medical diagnosis, cell evaluation, and inspection of food and industrial materials.
Biophysics	Yoshihiro MURAYAMA ymura(at)cc.tuat.ac.jp	Biophysics and Soft matter physics. Experimental study on biological function, especially, mechanical properties and rheology of biopolymers and mechanics of microorganism.
Lightwave sensing technology	Yosuke TANAKA tyosuke(at)cc.tuat.ac.jp	Our research deals with multi-function and high-speed optical signal processing, optical sensing systems along with related devices and data processing techniques, which are applied to monitoring artificial structures and biological objects.

<b>Department : Biomedical Engineering</b>		
Specialty & Major Research Fields	Academic Advisor	Research Subject
Superconducting Materials	Akiyasu YAMAMOTO akiyasu(at)cc.tuat.ac.jp	Experimental research on superconductivity, superconducting materials, and superconducting application. Especially development of novel strong magnets using new high temperature superconductors for medical and green applications.
Biomaterials	Yuki AKAGI* <sup>1</sup> y-akagi(at)go.tuat.ac.jp	We are developing smart-materials based on chemistry, biology, and material engineering, to meet unmet medical needs. Furthermore, we aim to realize highly efficient/accurate diagnosis and treatment, by combining them with physical energy such as laser or heat.
Complex systems in microfluidic devices	Taiji OKANO* <sup>1</sup> okano(at)go.tuat.ac.jp	Research using artificial cell models with cell-like characteristics to investigate the mechanisms underlying living systems from the physical perspective. Development of microfluidic devices needed in advanced life science research.
Mechanobiology and engineering for human health and diseases	Daisuke YOSHINO* <sup>1</sup> dyoshino(at)go.tuat.ac.jp	Research for mechanobiology of human health and disease. Development of biomedical devices and medical techniques for vascular diseases.
Cultural anthropology	Yuichi ASAI* <sup>1</sup> asai(at)go.tuat.ac.jp	My major research fields are cultural anthropology, linguistic anthropology, and environmental anthropology. My research focuses on how human language constructs socio-cultural phenomenon and the natural environment. Since 2007, I have engaged in fieldwork in the Fiji Islands, South Pacific, and examined unique characteristics of Fijian ritual and mythical cosmology, through linguistic analysis of Fijian language.

Department : Applied Chemistry		
Speciality&Major Research Fields	Academic Advisor	Research Subject
Opto-electronic Materials	Yoshinao KUMAGAI 4470kuma(at)cc.tuat.ac.jp	Growth of compound semiconductor crystals from vapor phase based on the thermodynamic analysis and construction of growth system.
Energy Chemistry & Electrochemistry	Etsuro IWAMA iwama(at)cc.tuat.ac.jp	Material design and characterization of nanostructured materials for electrochemical energy storage. Modification of the material/electrolyte interfaces in electrodes for high power and energy-efficient applications.
Molecular Synthesis	Taichi KANO kano(at)go.tuat.ac.jp	Development of efficient synthetic methods for bioisosteres and their application to synthesis of biologically active compounds. Design of organocatalysts as artificial enzymes and their application to environmentally benign reactions.
Molecular Design	Akio SAITO akio-sai(at)cc.tuat.ac.jp	Development of novel and efficient procedures for the synthesis of heterocyclic compounds.
Molecular Catalysis	Masafumi HIRANO hrc(at)cc.tuat.ac.jp	Activation of inactive bond in organic molecules by transition-metal complexes and the application toward molecular transformation with high atom efficiency.
	Keiji MORI k_mori(at)cc.tuat.ac.jp	Concise construction of fused-cyclic skeleton by sequential C-H bond functionalization and development of $\pi$ - $\pi$ interactions based novel chiral ligand.
Inorganic Solid State Chemistry	Kazuyuki MAEDA k-maeda(at)cc.tuat.ac.jp	Development of novel nanospace materials such as zeolite-related materials and coordination polymers, especially inorganic-organic hybrid nanosheets and related nanospace materials.
Capacitor Technology (Sponsored Laboratories)	Kenji TAMAMITSU <sup>*1</sup> tamamitu(at)cc.tuat.ac.jp	Development of energy storage devices and their functional nanomaterials. Electrochemical energy storage by electric double layer capacitors. Lithium-ion capacitors and hybrid supercapacitors.
Organic and Polymeric Materials for Electronics and Optoelectronics	Takeshi SHIMOMURA simo(at)cc.tuat.ac.jp	*Functional Polymers for Flexible Molecular Electronics *Development of Conducting Polymer Nanofibers *Polymer Energy Devices Using Low-Dimensionality and Flexibility *Development of Soft Devices with Self-Assembling Properties
	Koji NAKANO k_nakano(at)cc.tuat.ac.jp	*Development of organic functional materials based on organic synthetic chemistry *Design and synthesis of new $\pi$ -conjugated molecules, and their application to organic electronic/optoelectronic materials *Development of highly-active and selective polymerization catalyst

Department : Applied Chemistry		
Speciality&Major Research Fields	Academic Advisor	Research Subject
Fundamental Organic Chemistry for Molecular and Polymeric Materials	Akiko OKAMOTO* <sup>1</sup> aokamoto(at)cc.tuat.ac.jp	*Design and Analysis of Spatial Organization of Aromatic-Rings-Accumulated Organic Molecular Compounds: Single Molecular Spatial Organization in Crystal, Crystalline Molecular Packing, and Molecular Structure in Solution *Synthetic Study of Aromatic Condensation Polymers having Repeating Units of Non-coplanarly Accumulated Aromatic Rings
Polymeric Biomaterials	Yoshihiko MURAKAMI muray(at)cc.tuat.ac.jp	*Biomaterials *Surgical Tissue-Adhesive Materials *Gels for Endovascular *Drug-Release Matrix *Polymers Agent *Polymeric Film for Bioanalysis
	Takahiro MURAOKA muraoka(at)go.tuat.ac.jp	*Bio-inspired synthetic organic chemistry and supramolecular chemistry for 1) protein manipulation and stabilization, 2) membrane functionalization, and 3) cellular activity control.
Physical Chemistry of Organic and Polymeric Materials	Toshiyuki WATANABE toshi(at)cc.tuat.ac.jp	*Development of photoresponsive polymers *Development of reversible thermoresponsive recording of fluorescent image *Synthesis of diamond from carbon dioxide *Development of photoresponsive drug delivery systems
	Hiroyuki OZAKI hiroyuki(at)cc.tuat.ac.jp *Retires in March 2024	*Electronic and Geometric Structure Analysis of Extrathin (4–10 Å) Molecular Aggregates on Clean Surfaces *Creation, Characterization, and Manipulation of a Single Sheet (or Chain) of a Polymer
Organic and Polymeric Materials Chemistry	Yoko TATEWAKI* <sup>1</sup> ytatewa(at)cc.tuat.ac.jp	*Development of organic functional materials for electronics devices *Synthesis of conducting and magnetic materials *Preparation of self-assembly nanomaterials *Conducting and magnetic properties of organic devices
Organic and Polymeric Materials with Integrated Molecular Structure	Shinji KANEHASHI* <sup>1</sup> kanehasi(at)cc.tuat.ac.jp	Development of novel functional materials for sustainable society such as unutilized biomass-based products, gas separation, purification, and barrier materials for mitigation of climate change (i.e., global warming), clean energy production (e.g., hydrogen, biogas, natural gas), and food waste problem.
Material Systems Mathematics	Hiroshi GODA* <sup>1</sup> goda(at)cc.tuat.ac.jp	*Knots, links and 3-dimensional manifolds
	Eri HATAKENAKA* <sup>1</sup> hataken(at)cc.tuat.ac.jp	*Invariants of knots and manifolds in low dimensions
Material Technology for Organic and Polymeric Substances	Hiromu SAITO hsaitou(at)cc.tuat.ac.jp	*Polymer Blends *Mechanical and Optical Properties of Polymers *Morphology Design of Polymers by Supercritical Fluids *Crystallization of Polymers

<b>Department : Applied Physics and Chemical Engineering</b>		
<b>Specialty &amp; Major Research Fields</b>	<b>Academic Advisor</b>	<b>Research Subject</b>
Interfacial Chemical Engineering	Hiroshi TAKIYAMA htakiyam(at)cc.tuat.ac.jp	Research and development of industrial crystallization technology for producing crystalline particles such as pharmaceuticals, foods, battery materials and functional materials.
	Yuichiro NAGATSU nagatsu(at)cc.tuat.ac.jp	Fundamental study of chemo-hydrodynamics (liquid flow with chemistry) and applied study of chemo-hydrodynamics for environmental and energy fields.
Particle Technology	Wuled LENGGORO labwl(at)cc.tuat.ac.jp	At the intersection of chemical processing, particle/aerosol technology, transport phenomena (fluid, mass, and heat), and bio-systems. Develop technologies to contribute to protect food production and water systems, and save critical ecosystems. Bridging the "micro" and "macro" material-energy transfers within the global environment.
Chemical Energy Engineering	Hidehiro KAMIYA kamiya(at)cc.tuat.ac.jp *Retires in March 2024	
Environmental Bio-Engineering	Akihiko TERADA akte(at)cc.tuat.ac.jp	Development of bioreactor systems and materials for water/wastewater treatment by controlling complex microbial community in natural environments and control/prevention of biofilms for environmental/medical applications.
	Shohei RIYA <sup>*1</sup> sriya(at)cc.tuat.ac.jp	Development of recycling system for agricultural waste or sewage sludge. Waste treatment using anaerobic digestion, and residue processing into soil amendment. Study on nutrient or greenhouse gas dynamics in the soil amended with waste-derived material.
Optical and Electronic Materials Engineering	Hiomasa SHIMIZU h-shmz(at)cc.tuat.ac.jp	Research on integration of dissimilar materials including semiconductors, magnetic materials, macromolecules, biomaterials, highly efficient optical modulations, and highly sensitive sensors, for application to interdisciplinary activities.
	Satria Zulkarnaen BISRI <sup>*1</sup> satria-bisri(at)go.tuat.ac.jp	Development of optoelectronic and energy devices based on solution-processable quantum nanomaterials (e.g. colloidal quantum dots, 2D nanomaterials, carbon nanotubes, etc.) and iontronics (ion-controlled electronics), including photodetectors, transistors, solar cells, supercapacitors and light-emitting devices. Research on the emerging physical phenomena originated from precise assembly control of nanomaterials. Discovery of environmentally friendly and sustainable colloidal quantum dot compounds.
Atomic Processes	Atsushi HATAKEYAMA hatakeya(at)cc.tuat.ac.jp	Experimental studies in atomic, molecular and optical physics on the basis of laser spectroscopy, laser spin polarization, and laser cooling. The physics of atom-surface interactions and its applications to precision measurement and quantum manipulation.
Chemical Reaction Engineering	Chihiro FUSHIMI cfushimi(at)cc.tuat.ac.jp	Research and Development of reactors for pyrolysis, gasification or hydrothermal liquefaction. Development of thermal/biomass power plants that integrates with other renewable energy. Process development of biochemical production. Development of fluidized bed reactors for thermochemical reactions.

<b>Department : Applied Physics and Chemical Engineering</b>		
<b>Specialty &amp; Major Research Fields</b>	<b>Academic Advisor</b>	<b>Research Subject</b>
	Makoto SAKURAI sakuraim(at)cc.tuat.ac.jp	Research on the creation and design of the following new reaction field and reaction process. Development of high functional structured catalyst for application to the micro chemical process. Application of fine bubble process to the environmental field. Development of unsteady operation for high efficiency chemical process. Design of new high efficiency energy conversion process by thermochemical cycles.
Material Separation Engineering	Hideaki TOKUYAMA htoku(at)cc.tuat.ac.jp	Development of functional polymers and gels and process for metal separation, organic compound separation, drug delivery system, etc. Preparation of micro- or nanoparticles and porous materials.
	Hidenori OHASHI* <sup>1</sup> fr1057(at)go.tuat.ac.jp	Functional membrane development and systematic device design in energy and life-science fields based on the molecular transport understanding. (from lithium ion battery, protein refolding, to chemical grafting)
Process Systems Engineering	Yoshiyuki YAMASHITA yama_pse(at)cc.tuat.ac.jp *Retires in March 2025	Design and application of smart and dependable process control systems, process monitoring for connected industries, process simulators, and decision support for various process systems.
	Sanghong KIM* <sup>1</sup> sanghong(at)go.tuat.ac.jp	Development and applying process data analysis, process modeling, and process control technologies. The purpose is to realize anomaly detection, yield improvement, control performance improvement, etc. for a wide range of processes such as chemistry, semiconductors, and pharmaceuticals.
Organic Electronics	Toshihiko KAJI* <sup>1</sup> kaji-t(at)cc.tuat.ac.jp	Organic electronics and optics. Experimental research on organic electronic devices, such as solar cells, and on nanostructure/crystallinity control of organic thin films.
Quantum Electronics	Godai MIYAJI* <sup>1</sup> gmiyaji(at)cc.tuat.ac.jp	Experimental study on nonlinear optical interaction process between light and mater with intense femtosecond laser pulses and its application to material nano-processing technique.
Quantum Beams	Hiroki MINODA* <sup>1</sup> hminoda(at)cc.tuat.ac.jp	Development of transmission electron microscopy and its applications to biological specimens and functional materials in their actual environment.



Department : Mechanical Systems Engineering		
Specialty & Major Research Fields	Academic Advisor	Research Subject
Fluid Mechanics	Masaharu KAMEDA kame(at)cc.tuat.ac.jp	Bubble dynamics, high-speed aerodynamics, and fluid measurements. Current research topics are (1) pressure-sensitive paint for unsteady aerodynamics, (2) fragmentation of vesicular magma in volcanic eruption, (3) supersonic air-inlets, and (4) mass transport by bubbling.
	Yoshiyuki TAGAWA tagawayo(at)cc.tuat.ac.jp	Main research field of Yoshiyuki Tagawa's lab is in multiphase flow / micro-fluidics. Current research topics are on supersonic microjets impacting on soft matters. Here we investigate the fundamental mechanism of generation of the microjets and their applications for medical devices / industrial processes. Also the dynamics of droplets are investigated.
Materials Engineering for Machinery	Toshio OGASAWARA ogasat(at)cc.tuat.ac.jp	Experimental and analytical studies of advanced composite materials and composite structures for aerospace systems, automobiles, and robots. Development of novel composite materials such as carbon nanotube composites, ceramics/intermetallic composites, high temperature polymer matrix composites, ablator.
	Akinori YAMANAKA a-yamana(at)cc.tuat.ac.jp	Multi-scale simulation of microstructure evolution and elastoplastic deformation behavior in metallic materials (especially in steel) using phase-field method and crystal plasticity finite element analysis based on homogenization method and its experimental validation.
Strength of Materials	Satoshi TAKADA <sup>*1</sup> takada(at)go.tuat.ac.jp	Physics of granular materials and its application to powder technology. Analysis of response to external forces based on particle simulations and continuum modeling.
Elasto-Plasticity and Material Forming	Toshihiko KUWABARA kuwabara(at)cc.tuat.ac.jp *Retires in March 2025	Numerical simulation of material forming, constitutive modeling of metals based on multi-axial stress tests, development of experimental methods for evaluating the formability of metals, development of novel material forming technology, intellectualization of forming machines and dies.
	Keiichi NAKAMOTO nakamoto(at)cc.tuat.ac.jp	The research work is focused on the area of machine tool and machining technology to realize "Intelligent Shape Creation with True CAM (Computer Aided Manufacturing)". Our target is to develop effective manufacturing software regarding process planning and tool path generation in multi-axis control machining. In addition, we are working on various researches to machine the mold of optical elements with high efficiency and high precision.
Analysis of Mechanical Components	Yasuhisa ANDO y-ando(at)cc.tuat.ac.jp	Studies on micro/nano tribology and application of new functions to surfaces using micro fabrication technologies. Studies on applications and development of MEMS (microelectromechanical systems), such as 3D-microstages.

Department : Mechanical Systems Engineering		
Specialty & Major Research Fields	Academic Advisor	Research Subject
Vibration Analysis and Control	Takayoshi KAMADA <sup>*1</sup> kama(at)cc.tuat.ac.jp	Active vibration control, smart structure, health monitoring, earthquake resistance technology, base isolation and vibration control of building, vehicle control, elevator technology.
	Yuta KURASHINA <sup>*1</sup> kurashina(at)go.tuat.ac.jp	Our group is devising research on soft robotics using mechanical dynamics and soft matter. This includes research on hydrogel micro/nano devices and ultrasonic non-contact actuations for applications in drug delivery systems (development of drug release mechanisms), regenerative medicine (cellular tissue formation), and drug discovery modalities (design of drug carriers suitable for organs).
Thermal and Fluid Systems	Akira MURATA murata(at)cc.tuat.ac.jp	Heat and fluid flow related to gas turbines, Numerical simulation of turbulent heat transfer, Flow visualization, and Heat transport device utilizing phase change.
	Kaoru IWAMOTO iwamotok(at)cc.tuat.ac.jp	Efficient thermal-fluid control techniques for energy saving and environment impact mitigation will be developed. Efficient turbulence control techniques for drag reduction of airplanes, those for material engineering (efficient production of high-quality materials), those for bioengineering (effect of fluid pulsation) and those for chemical engineering (efficient production of hydrogen).
	Takuma HORI <sup>*1</sup> hori(at)go.tuat.ac.jp	Research on heat transfer: Heat and mass transfer in energy harvesting or storage devices, Thermal conduction in nanomaterials, Structure optimization, Coarse grained and multiscale simulations, Thermo-fluid dynamics in interfaces.
	Yuki UEDA uedayuki(at)cc.tuat.ac.jp	Engine and refrigerator powered by acoustic wave. We have investigated energy conversion, heat transfer, and mass transfer caused by thermoacoustic effects.
Simulation Engineering	Hiroshi MOURI h-mouri(at)cc.tuat.ac.jp *Retires in March 2024	Aiming to automatic driving, recognition technology of the surrounding circumstances using on-board sensors, state estimation techniques and the vehicle control technology have been studied, e.g. the localization technique based on the data of laser range finder, camera and satellite. In addition, investigation on vehicle dynamics control and the one on analysis of human drivers' error based on driving recorder data have been achieved.
	Pongsathorn RAKSINCHAROENSAK pong(at)cc.tuat.ac.jp	Research interests include the development of active vehicle control technologies with integrated sensing of human driver, vehicle motion and road surroundings for safety and security of motorized society, e.g. the safety devices for personal mobility, vehicle dynamics and control, and human-centered driver assistance systems.

Department : Mechanical Systems Engineering		
Specialty & Major Research Fields	Academic Advisor	Research Subject
	Takao MAEDA t-maeda(at)go.tuat.ac.jp	Our research interests are space exploration robotics and mechatronics, especially surface exploration robotics. Locomotion, autonomous algorithm, and integration of them are the main research topics. We also propose a new plan for future explorations. We develop new technologies required for future space exploration missions using simulation and experiment.
Precision Measurement	Wataru NATSU summer(at)cc.tuat.ac.jp *Retires in March 2025	The main research topics are: research and development on environmental-friendly production system for shape generation with ECM, EDM and polishing; phenomena elucidation and application technology for electrochemical machining; research and development on machining simulation technology; shape generation for Hard-to-machine materials with electrochemical and mechanical polishing; and research on micro deep-hole machining by EDM.
Control Systems	Yasutaka TAGAWA tagawa(at)cc.tuat.ac.jp *Retires in March 2025	Research is under way in developing novel devices for modeling and controlling of mechanical systems. Basic research and device development are performed for vibrational testing systems for the next generation, advanced motion simulator, and power assist systems for man-machine cooperative motion. Design method is studied for controlling systems based on transfer functions.
	Ryo ARIIZUMI	Research is designs of dynamic systems represented robot. Based on mechanics, control engineering, and machine learning, propose methods to design "Smart" movement while using both physical nature and computer properly.
Manufacturing System Engineering	Hiroyuki SASAHARA sasahara(at)cc.tuat.ac.jp	Additive manufacturing. Physical simulation to predict the machining process. Development of a new machining/processing method which can give a functional additional value to the generated surface. New machining technology for energy saving and clean processing.
Precision Measurement	Itsuo HANASAKI hanasaki(at)cc.tuat.ac.jp	Cross-disciplinary approaches on the phenomena typically at micro/nano spatio-temporal scales with an emphasis on the theoretical aspects mainly based on the concepts of statistical mechanics and dynamical systems.
Algebraic Mechanical Engineering	Katsuyuki NAOI <sup>*1</sup> naoik(at)cc.tuat.ac.jp	Representation theory of infinite-dimensional Lie algebras and their q-analog
Geometric Mechanical Engineering	Nobutaka NAKAZONO <sup>*1</sup> nakazono(at)go.tuat.ac.jp	Study of discrete integrable systems. (Keyword: Painlevé equation, soliton equation, Toda lattice)

<b>Department : Mechanical Systems Engineering</b>		
<b>Specialty &amp; Major Research Fields</b>	<b>Academic Advisor</b>	<b>Research Subject</b>
Intelligent Systems for Mechanical Engineering Mechanical Information and Communication	Hiroyuki NISHIDA hnishida(at)cc.tuat.ac.jp	Research on magnetohydrodynamics, aerodynamics and flight dynamics of advanced space propulsions and reusable space vehicles. For example, research on control of high-energy plasma flow for advanced propulsion, development of flow control device and application of the flow control device to reusable space vehicle. Numerical simulation and experiment are conducted to address these objectives.
Human Behavior Systems	Hideyuki TANAKA <sup>*1</sup> tanahide(at)cc.tuat.ac.jp (collaborative faculty)	Basic research on perception and motor control mechanisms underlying human motor behaviors. Applied research based on the principle and theories of human behavior systems.
Human Motor Control	Hikaru YOKOYAMA <sup>*1</sup> h-yokoyama(at)go.tuat.ac.jp	Neuromuscular control of human movement, motor control, brain-machine interface, and rehabilitation engineering.

Department of Electrical Engineering and Computer Science		
Specialty & Major Research Fields	Academic Advisor	Research Subject
Electronic System Engineering	Ya ZHANG <sup>*1</sup> zhangya(at)go.tuat.ac.jp	Fundamental and applied research on semiconductor quantum nanostructures and nanoelectromechanical systems. Development of the next-generation electronics, such as single electron transistors, quantum information processing devices, high-sensitivity terahertz sensors, etc.
Power Electronics	Mingcong DENG deng(at)cc.tuat.ac.jp	Nonlinear fault detection and nonlinear fault tolerant control system design using AI techniques, nonlinear control of smart material actuators and micro-hands.
Electronic Device Engineering	Jun-ichi SHIRAKASHI shrakash(at)cc.tuat.ac.jp	Novel nanofabrication techniques, single-electron transistors and atomic junctions. New computing architecture, Ising spin model, Ising spin computing and artificial synaptic devices. Quantum computing, noisy intermediate-scale quantum (NISQ), quantum annealing and quantum-classical hybrid algorithms.
	Wakana KUBO w-kubo(at)cc.tuat.ac.jp	Development of solar cells, optical devices, and functional materials based on light management technology realized by plasmonic metamaterials.
Integrated Functional Electronics	Tomo UENO tomoueno(at)cc.tuat.ac.jp	Development of Integrated Circuit based on novel device and process technology. Low temperature insulating film fabrication, OLED fabrication, electrical measurement, physical & chemical analysis.
Radio Communication System Engineering	Kenta UMEBAYASHI ume_k(at)cc.tuat.ac.jp	Wireless communication network, Signal processing and resource control for efficient and reliable wireless communication, Advanced signal processing for multiple antennas based communications, Cognitive radio techniques, Physical layer security, Nano-device and Terahertz wireless communications.
	Takehito SUZUKI takehito(at)go.tuat.ac.jp	Terahertz antennas, Extreme materials in the terahertz waveband, Terahertz metamaterials, Extreme-sensitivity terahertz polarization measurements, ultrahigh-speed wireless communication in the terahertz waveband, Terahertz application systems.
Intelligent Systems	Kunihiro FUJIYOSHI fujiyosi(at)cc.tuat.ac.jp	Computer-Aided Design and Design-Automation of VLSI layout problem, using combinatorial algorithm and graph theory.
Medical Information System Engineering	Akinobu SHIMIZU simiz(at)cc.tuat.ac.jp	Multidimensional Signal Processing. Medical Image Processing and Pattern Recognition based on Artificial Intelligence, Optimization Theory, and Mathematical Statistics. Computer-aided Diagnosis in Medical Imaging.
	Ken TAKIYAMA <sup>*1</sup> ken-taki(at)cc.tuat.ac.jp	Main themes are 1. Elucidation of neural mechanisms that relate to motor control and learning and 2. Proposal of efficient training to improve motor skill. Main techniques are neural network model and human behavioral experiments. We plan to utilize electroencephalograms and machine learning techniques.

Image Processing	Toshihisa TANAKA tanakat(at)cc.tuat.ac.jp	Biosignal informatics (brain-machine interfaces, neuroscience, cognitive science, biomedical information processing for medicine, and AI techniques based on signal processing, machine learning, and mathematical engineering). In addition, imaging audio/acoustics, communications, and biological applications.
	Kohei YATABE* <sup>1</sup> yatabe(at)go.tuat.ac.jp	Acoustic signal processing and its application to measurement, analysis and synthesis of sound.
Algorithmics	Keiichi KANEKO k1kaneko(at)cc.tuat.ac.jp	Algorithms for interconnection networks, parallel/distributed processing, dependable computing.
	Ryuhei MIYASHIRO r-miya(at)cc.tuat.ac.jp	Mathematical programming, discrete optimization, algorithm, modeling.
Systems Software	Mitaro NAMIKI namiki(at)cc.tuat.ac.jp	Systems software (operating systems, compiler, protocol stack, window system), embedded systems, high performance computer systems, distributed processing, network architecture, low power computer systems, information systems.
	Hiroshi YAMADA hiroshiy(at)cc.tuat.ac.jp	Operating systems, system virtualization, parallel and distributed systems, system software for dependable computing and cloud computing.
Artificial Intelligence	Katsuhide FUJITA* <sup>1</sup> katfuji(at)cc.tuat.ac.jp	Artificial intelligence related to autonomous agents, multi-agent systems, data mining, complex networks, knowledge management.
	Shun WATANABE* <sup>1</sup> shunwata(at)cc.tuat.ac.jp	Information theory, Communication Engineering Cryptography, Information security.
Computer System Engineering	Yu NAKAYAMA* <sup>1</sup> yu-nakayama(at)go.tuat.ac.jp	Mobile, IoT, and spatial information technologies for next generation information networks, applications, and schemes for utilizing them.
	Hiroe IWASAKI hiroe(at)go.tuat.ac.jp	Research and development of video processing architecture to realize AI processing and video encoding processing toward to location free for achieving the SDGs.
System Design	Takafumi SAITO txsaito(at)cc.tuat.ac.jp *Retires in March 2025	Computer graphics, visualization, image/video processing, shape processing.
Biologically-inspired computing	Toshiyuki KONDO t_kondo(at)cc.tuat.ac.jp	Neurocomputing, evolutionary computation, cognitive robotics, cognitive interface design, brain-computer interface.
Image and vision computing	Ikuko SHIMIZU ikuko(at)cc.tuat.ac.jp	Computer vision, shape and appearance modeling, image recognition.
Computer networks	Nariyoshi YAMAI nyamai(at)cc.tuat.ac.jp	Research for administration, deployment, management, operation, and evaluation of large-scale distributed systems including the Internet, such as Internet architecture, network security, and so on.

	Hironori NAKAJO nakajo(at)cc.tuat.ac.jp	Processor micro-architecture, parallel processing, VLSI design, high performance computing, embedded computer.
Statistical classification and retrieval	Seiji HOTTA <sup>*1</sup> s-hotta(at)cc.tuat.ac.jp	Classification and clustering, invariances in recognition, information retrieval.
Human computer interaction	Kinya FUJITA kfujita(at)cc.tuat.ac.jp *Retires in March 2026	Human-centered smart interface, telework, online communication, virtual reality.
Natural Language Information Science	Kazuko SHINOHARA <sup>*1</sup> k-shino(at)cc.tuat.ac.jp *Retires in March 2024	Cognitive linguistics, Conceptual Metaphor Theory, Spatial cognition and language.
	Ryoko UNO <sup>*1</sup> ryokouno(at)cc.tuat.ac.jp	Grammatical analysis and constructive approach to explore the cognitive basis of grammar
Mathematical Informatics	Nobuo HARA <sup>*1</sup> nhara(at)cc.tuat.ac.jp	Algebraic geometry and commutative algebra in positive characteristic. In particular, study of algebraic varieties and their singularities via the Frobenius morphism.
	Mikio MURATA <sup>*1</sup> mmurata(at)cc.tuat.ac.jp	Discretization and ultradiscretization of differential equations, Cellular automaton, Integrable systems and Painleve equations.

<b>Collaborative Study Fields of Graduate School of Engineering</b>		
<p>The following academic study fields aim to activate collaborative study with external research institutes that are celebrated for their excellent research achievements.</p> <p>Note: Those who wish to study in any of the collaborative fields should obtain prior guidance from Chair of each department..</p>		
<b>Department : Biotechnology and Life Science</b>		
Speciality&Major Research Fields	Academic Advisor	Research Subject
Nanotechnology-Based Cell Engineering (Cooperation Program with National Institute of Advanced Industrial Science and Technology (AIST))	Chikashi NAKAMURA chikashi-nakamura(at)aist.go.jp  Hyonchol KIM* <sup>1</sup> kim-hc(at)aist.go.jp  Ayana YAMAGISHI* <sup>1</sup> a-yamagishi(at)aist.go.jp	We develop a new biotechnology, “nanotechnology-based cell engineering”, by using nano / micro-device and nano-probe technologies to reveal functions of cancer cells, immune cells and iPS cells. The findings are applied for practical applications, in next-era cell therapies and diagnostics, e. g. genome editing therapy and liquid biopsy.
<b>Department : Applied Physics and Chemical Engineering</b>		
Speciality&Major Research Fields	Academic Advisor	Research Subject
Non-equilibrium Process Engineering (Cooperation Program with Mitsubishi Chemical Holdings Corporation)	Hiroyuki KAKIUCHI* <sup>1</sup> Naoki NOGUCHI* <sup>1</sup> Hideto HIDAKA* <sup>1</sup>	Most of industrial processing of chemical products are in continuous operation. On the other hand, non-equilibrium process operation is emerged recently. We study the theory and practical methods for unsteady and non-equilibrium processing systems.
<b>Department : Mechanical Systems Engineering</b>		
Speciality&Major Research Fields	Academic Advisor	Research Subject
Transport Systems Engineering (Cooperation Program with Railway Technical Research Institute)	Hajime TAKAMI* <sup>1</sup> Kazuyuki HANDA* <sup>1</sup>	Education and research are carried out, focusing on advanced analysis and design methods to develop higher-speed train systems for future generation: car body design applicable to higher-speed, technologies for lighter car body design and safety improvement. Social needs and problems for future transport systems are analysed and evaluated.



<p>Aero Space Engineering (Cooperation Program with National Institute of Japan Aerospace Exploration Agency)</p>	<p>Takashi YAMANE<sup>*1</sup> Takashi AOYAMA<sup>*1</sup> Yasushi WATANABE<sup>*1</sup> Yoshiyasu HIRANO<sup>*1</sup> Yoji OKITA<sup>*1</sup></p>	<p>Aircraft propulsion engineering, high-speed aerodynamics, structure / materials, aerodynamics / aeroacoustics and rotorcraft concerned with the developments of airplane and spacecraft are studied. In the aircraft propulsion engineering, simulation technology of engine system for airplane, heat resistance and cooling technology of high temperature turbine are studied. In the high-speed aerodynamics, flow control at ultrasonic and hypersonic speed on engine intake and hypersonic boundary layer are studied. In the aerodynamics/aeroacoustics and rotorcraft, unsteady CFD on aircraft, non-linear sound propagation / transmission on rockets, and high-speed rotorcraft are studied. In the structure and materials, damage mechanisms of composite structures, and optimization of airframe structures are studied.</p>
<p>Traffic Safety Engineering (Cooperation Program with National Traffic Safety and Environment Laboratory, National Agency for Automobile and Land Transport Technology)</p>	<p>Michiaki SEKINE<sup>*1</sup></p>	<p>The research and education for the development of advanced welfare society is promoted by applying the fundamental studies on symbiotic science and technology. Especially, the research and the education are studied at cooperated laboratories where the social environment foundations of safety in road traffic and social environment are guaranteed, verified and examined.</p>
<p>Human-Robot Cooperation Engineering (Cooperation Program with National Institute of Advanced Industrial Science and Technology(AIST))</p>	<p>Ko AYUSAWA<sup>*1</sup> Natsuki YAMANOBE<sup>*1</sup> Ryusuke SAGAWA<sup>*1</sup></p>	<p>Research on cooperation between humans and robots by modeling of human behavior, motion retargeting for robots, and motion generation based on machine learning to realize collaboration and communication with robots.</p>
<p>Automobile prevention safe engineering (Cooperation Program with Japan Automobile Research Institute)</p>	<p>Nobuyuki UCHIDA<sup>*1</sup> Hisashi IMANAGA<sup>*1</sup></p>	<p>Causation analysis of traffic accidents is a fundamental part of active safety research. Particularly, understanding of driver behavior during pre-crash period is important for developing preventive safety measures or Advanced Driver Assistance Systems (ADAS). Critical events captured by driving data recorder ("DORA-RECO") will be analyzed for the purpose. Instrumented vehicle experiments which reproduce typical pre-crash scenarios will be conducted for developing preventive safety measures.</p>

<b>Department : Electrical Engineering and Computer Science</b>		
Speciality&Major Research Fields	Academic Advisor	Research Subject
Advanced Electronic Information System Technology (Cooperation Program with Central Research Laboratory of Hitachi, Ltd)	Masahiko ANDO LI Yongun <sup>*1</sup>	Optoelectronic Devices, Nanophotonics, Bioinformatics.
Information-Communication Engineering (Cooperation Program with National Institute of Information and Communications Technology)	Hiroyuki TSUJI <sup>*1</sup> Soichi WATANABE <sup>*1</sup> Nobumitsu HIROSE <sup>*1</sup>	Education and research for fundamental technologies related with wireless communication HF devices, communication systems, communication environment and electromagnetic wave measurement technologies which support the development of the next-generation information-communication application fields and their key technologies.
Biomedical Electronics (Cooperation Program with RIKEN)	Hideo YOKOTA <sup>*1</sup> Keiichi KITAJO <sup>*1</sup> Shin YOSHIKAWA <sup>*1</sup> Masanobu MURAYAMA <sup>*1</sup>	Electronics in biomedical engineering related to measurement, signal processing, interfacing, imaging, simulation, and mechatronics.
Fundamentals of advanced intelligence (Cooperation Program with RIKEN)	Mihoko OTAKE <sup>*1</sup> Qibin ZHAO <sup>*1</sup> Hiromi ARAI <sup>*1</sup>	Education and research for fundamental and applied artificial intelligence related to discrete optimization, search and parallel computing, tensor learning, approximate Bayesian inference, cognitive behavioral assistive technology.
Urban Space Informatics (Cooperation Program with National Institute of Advanced Industrial Science and Technology(AIST))	Akio SASHIMA <sup>*1</sup>	Analysis of Sensory Data, Machine Learning, Mathematical Analysis of Social Simulation, Service Design and Social Implementation. Education and research are carried out for "Urban Space Informatics," the aim of which is to realize utility and safety in urban space and humans living there. The approach is 1) to analyze and understand sensory data of urban space and humans by machine learning with target model, and 2) to explore possible worlds by social simulations with real sensory data.
Intelligent Data Engineering (Cooperation Program with Central Research Laboratory of Hitachi, Ltd)	Toshio MORIYA <sup>*1</sup>	Research Subject: Artificial intelligence technologies that process and leverage Big-data collected in Internet-of-Things (IoT) environments.

Joint Doctoral Program for Sustainability Research		
Field of Study	Name	Research Contents
Biomedical Engineering	Kazuhiko MISAWA	Sustainability research is extremely important in creating innovations based on advanced science and technology. From basic to applied research and practical implementation, sustainability research emphasizes not only environmental compatibility, but also social significance and cultural value, as well as economic viability. In this laboratory, we are mainly focusing on biomedical systems, examining industrial applications that combine scientific originality and industrial innovation, and validating their sustainability upon social implementation. We promote both natural and social scientific research aimed at visualizing and disseminating the concept of sustainability in scientific and technological innovation to global society.
	Terumasa ITO  (*Do not select as a primary research advisor)	To ensure the well-being and safety of individuals and communities, advances and innovations in medical technology and improvements in the quality of life are highly demanded. To create new technology that meets these demands, it is important to have close interdisciplinary collaboration between engineering fields that support electronics and information technology, and life science fields such as medicine, pharmacy, and agriculture. Based on the technologies of ultrafast optics and molecular spectroscopy, we do seamless R&D projects from basic research to applied research in biomedical engineering, and their practical implementations. We believe that our technologies will revolutionize next-generation medical diagnosis, drug discovery, and food science, leading to the creation of new industrial fields.
Energy Science	Hiroko KATORI	It is necessary to explore complex issues such as securing energy resources and conserving the environment from the perspective of comprehensive fields, not just the field of engineering. Also, in order to propose new technology that leads to the creation of new industries, we need to break down these complicated problems into each element (systems approach) and look at them from a broad angle. The method to clarify the mechanism of the phase transitions in magnetic materials is similar to the method to solve complicated problems related to energy. To realize a sustainable society using the knowledge of magnetic materials and the research methods acquired from the magnetic phase transition study, we will work on energy-related issues. Topics discussed in classes include “Proposal of energy problem solving methods using new principles,” “Realization of energy conversion technology using new methods,” and “Development of energy-efficient and environment-friendly production process.”
International Agricultural Development	Atsushi CHITOSE	Agriculture plays an important role in enhancing economic development, food security and poverty reduction in developing countries. Creating policies for effective food supply, agricultural development, and rural area development requires a thorough understanding of historical, cultural, institutional, social, economic and environmental issues underlying the agriculture and rural livelihoods of developing countries. Provided with this perception, we explore the current situations and challenges in agriculture and rural livelihoods as well as the behavior of relevant stakeholders in developing countries. Students are required to proceed with their research from an economic perspective, paying due attention to the fact that poverty, food insecurity, economic performance, resource and energy issues, and environmental problems are all interrelated in a society.
Biological Resources Functional Chemistry	Yoshihiro NOMURA	A high value-added strategy that capitalizes on the use of biological functionality of agricultural products will play an important role in contributing to agricultural development and increases in farm income. Also, the promotion of an effective use of the unused biological parts that used to be discarded is considered as another possible strategy to raise farm income. These development strategies are assumed to work effectively in developing counties because they are endowed with abundant biological resources. Given the needs of developing countries in modern society, we conduct advanced research for the development of new applications through utilizing the unused biological resources and reusing the used biological resources. Students are required to conduct their research relying on the chemical analysis of functional elements in agricultural and fishery resources, and further identifying challenges and finding solutions for new product innovation by capitalizing on specific biological functionality.