

Student-edited Faculty of Engineering PR Brochure

Ttime!



The Future Spread from Engineering

**Connect
with the World,
Industry,
Doctoral Degree Course,
and Society.**

**FACULTY OF ENGINEERING
THE UNIVERSITY OF TOKYO**

Connect through Engineering.

In the summer issue, we introduced the study program at the Faculty of Engineering, classifying it into five fields, under the title “Engineering Collection!”

Learning and research at the Faculty of Engineering are closely related with society.

This is an important characteristic that emphasizes solving problems in the world.

So what paths are open to the students learning at the Faculty of Engineering?

There are numerous options: Go on to graduate school to continue with your studies, pursue further research at a university or research institute, work as a company employee, start your own company ...

There is a wide variety of options for graduates of the Faculty of Engineering.

In this winter issue, we introduce the future paths open to engineering graduates and the connection between the Faculty of Engineering and society.

Do you want to go out into the world? Make use of your research in society? Further pursue your research? Be active in society?

Imagine your future!



- I'm wondering if I should go on to the doctoral degree course...
- The time it takes to obtain a doctorate degree varies!



- I want to study abroad!
- I want to interact with foreign students from overseas!



● Who can I talk to about employment?



- What made them decide on their jobs?
- How can I make use of what I learned at university when I become employed?
- What is the difference between corporate and university research?



● What kinds of jobs are engineering graduates working in?



- How is the Faculty of Engineering connected with companies?
- I want to start a business!

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Connect with the World.

Study Abroad Programs

There are various ways that the UTokyo enables studying abroad at overseas universities.

Student Exchange

Students can study abroad for one semester up to one year at UTokyo partner universities around the world. If you pay your tuition to the UTokyo, you can take lectures or conduct research at your destination without additional payment. Credits earned while studying abroad are regarded as those of the UTokyo if they meet the criteria.

Overseas Intensive Training Program

This is an initiative of the School of Engineering and the Faculty of Engineering to help students arrange their own destinations and visit renowned laboratories overseas. Students can reap the emotional rewards of publishing their findings and receiving reviews from leading experts in their fields.

Short-term Study Abroad Program

University-Wide Short-term Study Abroad Program

This is a short-term study abroad program in which the UTokyo recruits students from all faculties and graduate schools. This program covers a wide variety of activities, including lectures, fieldwork, exchange with foreign students, and cultural experiences.

Short-Term Overseas Study Abroad Program for Faculty of Engineering Students

This program offers an opportunity to study abroad at an English-speaking university for about four weeks during the spring break. Students can improve their international comprehensive abilities by taking lectures on engineering while focusing on English learning.

I studied abroad at MIT!

Go Hashimoto

Fourth year undergraduate student,
Department of Systems Innovation,
Faculty of Engineering



■ The exchange program to MIT

When I was a second-year student, I visited one of MIT's classes in the Department of Systems Innovation and was fascinated by the lively discussion. In addition, an older student told me all about the exchange study program. So in the winter of my third year, I went to the Massachusetts Institute of Technology as an exchange student!

My life while studying abroad was very fulfilling. As to the courses, I was mainly interested in classes where groups of students create projects. Not all of our projects were successful, but I learned many things that could not be learned in the classroom alone, such as the importance of communication within the group. I made every effort to communicate actively not only in the classroom but also in the dormitory and during extracurricular activities, and eventually I had about 200 friends on Facebook. At first, I had a hard time with the huge amount of assignments, but after I started doing my homework with friends, I was able to finish more easily, which allowed me to really enjoy my everyday life.

■ About my future and a message for you

I would like to find a job abroad after going on to a graduate master's program. At that time, I want to interact with those who I met during this exchange.

The Faculty of Engineering provides many opportunities to study around the world. I hope you go on to our faculty and to study abroad at the best university for your major.



At the Hackathon in MIT



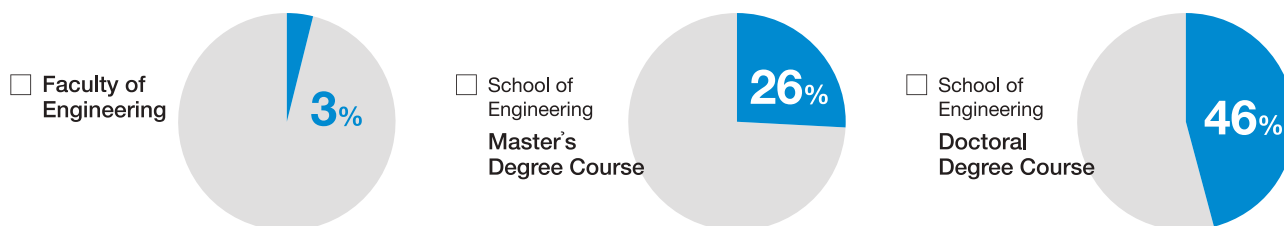
At an international conference in Boston

The UTokyo Faculty of Engineering offers a number of different international and study abroad programs.

Be sure to read the interesting stories from participants in these programs!

International Programs

The ratio of foreign students at the UTokyo Faculty of Engineering is shown below.



Foreign and Japanese students can interact at the International Lounge, and UTokyo students can learn English through the language program

International Lounge

Every Friday, foreign and Japanese students talk together over lunch. They discuss their countries, universities, living in Japan, experiences of studying abroad... any topic that interests them!

Special English Lesson

This program aims to improve the English proficiency of students and staff of UTokyo by inviting external English schools to the university. English conversation courses, TOEFL courses, and staff courses are held after school, and are offered at reasonable prices.

I'm coming from China to study at the University of Tokyo!

Yang Dongxu

Fourth year undergraduate student,
Department of Precision Engineering,
Faculty of Engineering



I was inspired to study at the University of Tokyo

The high school that I attended in China was very active in Japanese language education and many of the students went on to study at universities in Japan, so I started thinking about doing that. My love for anime and the fact that Japan is advanced in engineering helped me make my decision. After graduating from high school in China, I studied at a Japanese language school in Kyoto for about six months. Then I took the University of Tokyo entrance exam and passed.

I'm currently doing research on image processing at the Department of Precision Engineering. I'm trying to mount a camera on a mobile robot to capture the surrounding scenery and the route the robot travels so that the robot can recognize



At an event of the Department of Precision Engineering held at the May festival.

where it is in the room. The camera for a robot is like the eyes for a human. It is fascinating to process all the information gained through the camera, such as the color, shape, and arrangement of things, to control the robot.

I'm happy to be studying abroad!

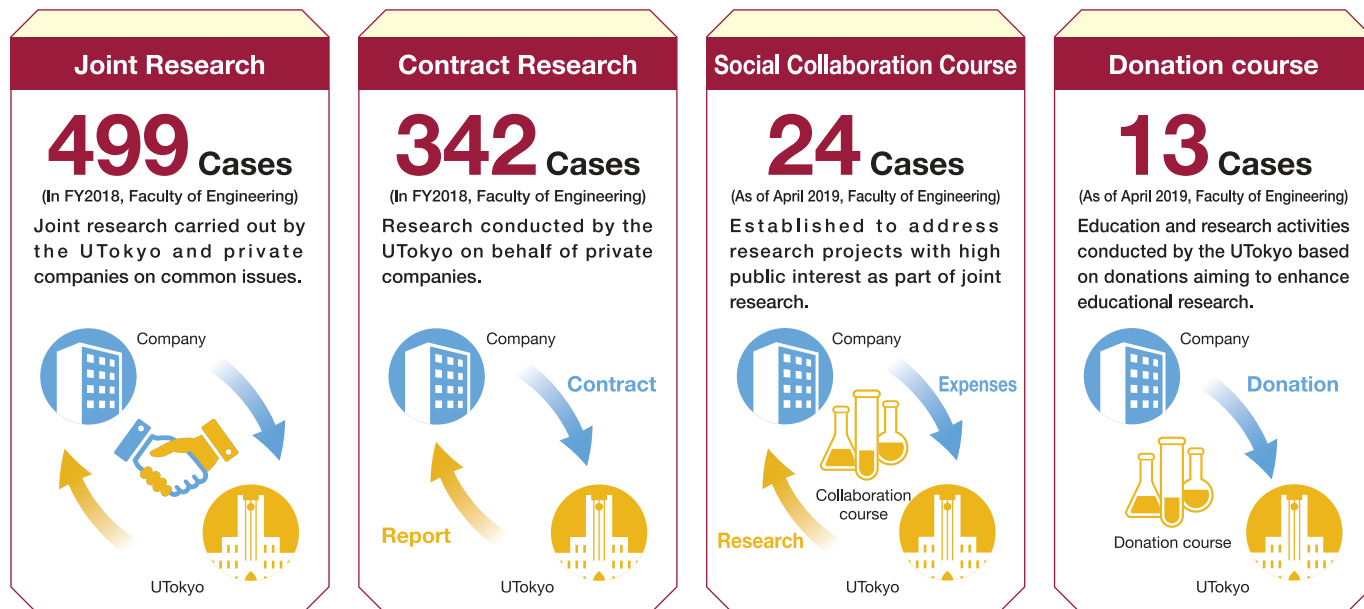
International students choose the department that they want to go to in their third year of university, but during the first and second year they belong to the College of Arts and Sciences Junior Division where they attend classes together with Japanese students. In this division, we often take lectures with other classes, so that we can interact with other international students.

Before coming to Japan, I was a bit worried about living alone in a foreign country, but I was able to become independent by doing many things by myself, such as government office procedures. I was sometimes perplexed by the cultural differences, particularly the Japanese custom of being cooperative compared to Chinese people, but I really enjoy interacting with Japanese students. If you are thinking of studying abroad, please do so; you will not regret it.



Connect with Industry.

The UTokyo Faculty of Engineering conducts numerous industry-academia collaborative research projects.



The future of space pioneered with nanosatellites

Professor Shinichi Nakasuka

Department of Aeronautics and Astronautics, School of Engineering



■ Revolution in space with artificial nanosatellites!

I started developing nanosatellites after seeing the small artificial satellites developed by engineers at an overseas university in 1999. In 2003, we completed a 10 cm cubic 1 kg nanosatellite and successfully launched it from Russia. Satellites of this size are still widely used, especially those connecting three or six cubic satellites, which are standard for launching from rockets and space stations.

Developing and launching a conventional large satellite costs at least ten billion yen and takes nearly five years. However, the cost of a nanosatellite ranges from several million to hundreds of millions of yen, and sometimes takes as little as half a year, so more launches are possible. Many things can only be understood after actually launching satellites, and those that were developed quickly and inexpensively have increased the number of companies and countries that are able to engage in space development.

■ Making space more familiar

We support everyone who is interested in space development and want to make space more familiar.

The students in my lab thoroughly study the design, manufacture, and operation of satellites, and they find employment at JAXA or a private company or they even start a business. In particular, we work

closely with venture companies that are set up in association with the lab and its projects. We conduct research and development of new technologies that are provided to the venture companies and they cover the joint research expenses, thus contributing to society.

We also provide guidance for overseas engineers and researchers. We invited thirty-six young Vietnamese researchers to Japan, divided them into the master's course at five universities, and provided guidance on satellite development, resulting in the launching of a 50 kg class satellite.

I am also involved in the "G-SATELLITE" project at the 2020 Tokyo Olympics where we will be launching a nanosatellite with a figure of the cartoon character "Mobile Suit Gundam." The satellite will communicate with the ground during the Olympics and Paralympics, and release photos of Gundam against the background of space and the earth. We hope you enjoy the message from space!



Nanosatellite



Satellite development site

To utilize the results of university research more effectively in society, we sometimes conduct collaborative research with other laboratories, communities, societies, and industries. Here, we interviewed two professors about their research through industry-academia collaboration.

Enhanced Startup Support

In addition to such industry-academia collaborations, support is also provided for entrepreneurs and university ventures. The “UTokyo Entrepreneur Dojo” is one example.

The UTokyo Entrepreneur Dojo is a series of programs through which students can systematically learn about entrepreneurship and startups (ventures) from the very beginning. The course consists of “Entrepreneurship I, II,” common subjects of the Faculty of Engineering,



Lecture scene

and “Entrepreneurship Challenge (Business Idea Contest).”

The Entrepreneurship course includes lectures by guest entrepreneurs, lectures on knowledge necessary for startups, and workshops. The course also grants credits. The Entrepreneurship Challenge is a business idea contest where teams of two to four members compete with each other, and alumni and alumnae of the Entrepreneur Dojo mainly act as mentors.

In addition to the above, various support programs are offered through collaboration between the Division of University Corporate Relations, TODAI TLO, The University of Tokyo Edge Capital (UTEC), and UTokyo Innovation Platform Co., Ltd. (UTokyo IPC).

Realizing joint fluoride research!

Professor Kyoko Nozaki

Department of Chemistry & Biotechnology, School of Engineering



Prof. Nozaki, University of Tokyo (Left) Mr. Okazoe, Principal Investigator of AGC (Right)

■ The University of Tokyo & AGC Inc.

The University of Tokyo and AGC Inc. launched a Social Cooperation Program in 2017 through which collaborative research is conducted on fluorine technology. The entire Department of Chemistry and Biotechnology, which covers a wide research field ranging from materials to biochemistry, is engaged in a large-scale research project in partnership with AGC.

It is difficult to perform fluorine experiments in a university laboratory due to the explosion hazard of fluorine gas or tetrafluoroethylene, which is an organofluorine compound. However, cooperation with AGC, which has amassed technologies for treating fluorine compounds through more than fifty years of experience, will allow us to pioneer new areas of science that will expand fluorine chemistry to organic chemistry, and life sciences.

■ The key to success of collaborative research

Selecting a research topic is the most important and difficult task in a collaborative project because it must be of academic interest to the university and also profitable for the company. AGC proposed a number of projects that are difficult for them to investigate due to lack of immediate profitability. To start with, the university selected

several academic topics among those suggested. The Social Cooperation Program is producing results year by year, and now we have launched new research projects that are valuable to both the university and AGC.

Although the company may be taking a risk by providing its expertise externally, it can benefit from obtaining new ideas from the university as well as contributing to social development by fostering students with an understanding of the industry.

■ Through fluorine research

One of the most important topics of organofluorine research is medical application. Fluorine atoms are found in nearly 30% of medicines currently on the market. For example, organofluorine compounds cure some diseases by controlling metabolism, because the human body cannot distinguish between hydrogen and fluorine atoms. We hope our collaboration will also be fruitful in this direction.



Design: Archichi Office Inc.
Photo: Takumi Ohta

Laboratory for organic synthesis (front) and reaction of fluoride compounds (back)



Connect with a Doctoral Degree Course

The University of Tokyo offers a wide range of educational programs and scholarships to support students who go on to a doctoral degree course!

World-Leading Innovative Graduate Study Program for Materials Research, Industry, and Technology (MERIT-WINGS)

This is a graduate school study program conducted through the cooperation of the departments of materials science from the School of Engineering, Graduate School of Science, and Graduate School of Frontier Sciences. Through lectures and overseas dispatch by teachers who are active in the frontiers of material science, this program fosters human resources with advanced expertise and a global perspective centered on integrated material sciences. Scholarships are provided from the second half of the first year of the master's degree course until the student receives a doctoral degree.

Graduate School of Engineering, The University of Tokyo Doctoral Student Special Incentives Program (SEUT-RA)

This system lets doctoral students participate in academic research at the School of Engineering aiming to effectively promote academic research activities, enhance the research system, and foster the abilities of young researchers. Students are provided with 120,000 yen or 50,000 yen per month based on the results of selection.

Leading Doctoral Human Resource Development Fund

This fund provides scholarships and research expenses to highly qualified doctoral human resources who have a strong desire and vision for social collaboration and industry-academia collaborative creation. The fund aims to develop human resources who can take the initiative in unexplored and complex areas with a strong sense of culture and ethics, and exert leadership in various fields, mainly in industry.

I returned to university and received a PhD degree

Associate Professor Taichi Ito

Department of Chemical System Engineering, Department of Bioengineering, School of Engineering



Research at a company

When I was a second-year undergraduate student in Komaba Campus, I read a brochure of the Department of Chemical System Engineering and knew about separation membranes^{*1}; eventually I knocked on the door of the department. I wanted to become a researcher like the young students at Komaba today. Fortunately, I enjoyed my undergraduate and master's research and hoped to keep studying at a company after obtaining my master's degree. In the end I worked as an engineer in the production process of color filters for liquid crystal displays at Toray Industries, Inc., and found that what I had learned in chemical system engineering was quite useful. However, there is a huge gap between a student and a professional engineer. I noticed that the professional engineer must be responsible for the output of his or her work and that we must do several works at the same time in addition to research. I also felt the importance of cooperation and collaboration as a team. I learned a lot.



Artificial kidney

I obtained a PhD and went abroad

After careful thought, I decided to leave the company and go back to basic research. I returned to the laboratory where I had done my master's course and obtained a Ph.D. When working as a postdoctoral researcher, I focused on biomaterials which can contribute to medicine, since I wanted to use my experience to try a new research field. I also wanted to go abroad, so I wrote letters to several labs in the United States. When I was hired by MIT^{*2}, I

strongly thought that a PhD^{*3} is a global passport. It was not easy to learn English but I got used to it in six months or so and now I really enjoy research in an amazing environment with excellent researchers from all over the world.



With the old labmates when I was a postdoc.

Engineering bridges between science and society. Join us!

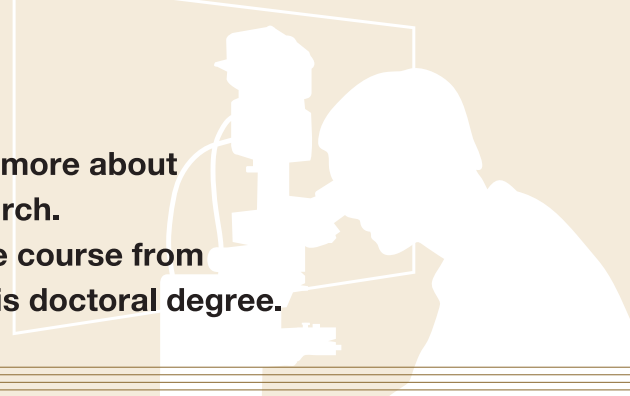
The experience in industry and in university in the States greatly affected my life. When we collaborate with companies or other labs, I can put myself in their shoes. I also know that the pleasure of discovery, serious discussion on unexpected results, and continuously challenging new ideas are the same in any place and any country. Engineering enables us to bridge between science and society. Young students can play an important role in engineering and help solve many issues in society such as energy and the environment on earth and a healthy and safe life. I am sure that young students will find their own way by focusing on their present studies, even if the future way to reach their dreams is not clear at present. Engineering, which is important in society, will guide your life. Join us!

^{*1} A typical example of a separation membrane is a reverse osmosis (RO) membrane that produces pure water from seawater by filtration under a pressure higher than the osmotic pressure of sea water. Another example is the dialysis membrane used for an artificial kidney or artificial lung.

^{*2} MIT (Massachusetts Institute of Technology).

^{*3} PhD is a doctoral degree.

In the doctoral degree course, you will be able to learn more about your specialized field and proceed with your own research. Here, we heard about the appeal of the doctoral degree course from active doctoral students and a teacher who obtained his doctoral degree.



I chose to go on to a doctoral course!

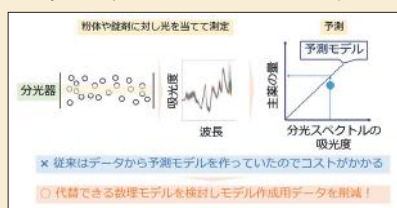
Shojiro Shibayama

Third year doctoral student, Funatsu-Kodera Lab,
Department of Chemical System Engineering, School of Engineering



Integration of informatics and chemistry

My research involves estimating the chemical composition of a sample using infrared sensors. General chemical analysis requires extracting part of the sample, which destroys and wastes the sample. On the other hand, infrared spectroscopy enables nondestructive sample analysis by irradiating light, reducing the cost of quality control. Thus my research will be useful for the quality control of pharmaceuticals and food. I originally had a longing for the field of information and was interested in combining programming and chemistry, so I joined the Funatsu lab (at that time). We conduct a wide range of research with the aim of solving problems in chemistry using information science techniques.



a PhD is required to become a world-class researcher, so I decided to go on to a doctoral course. Also, most of the people around me started working after graduating from the master's course, and I didn't feel that I had to follow everyone else. My study was not completed, so I continued my research on the same theme from undergraduate to doctorate level. I believe that my current research is impactful because it can reduce the cost of pharmaceuticals through information technology. In addition, there are few people who are doing similar studies, so I have a sense of mission to complete it.

My future activities

I'm going to continue as a researcher and I want to work at not only universities but also companies. I would like to make sure that what I researched and developed is utilized in society. After obtaining my PhD, I want to develop something completely new and create a global market.

The reason I continue studying in the doctoral course

When I was an undergraduate student, I attended a lecture where Professor Kitamori of the Department of Applied Chemistry said that

Message for students

Pursuing one thing is important for living in the future world. Rather than being someone who can easily be replaced by someone else, having some things that only you can do will help establish your identity and bring you a happy life.

I am a working student in a doctoral course!

Rikima Mitsuhashi

Financial System and Bank Examination Department, Bank of Japan
2nd year doctoral student, Shinagawa Laboratory, Department of Information
Physics & Computing, Graduate School of Information Science and Technology



My job as a working adult

I work at the Financial System and Bank Examination Department in the Bank of Japan. We check that the computer systems in banks and securities companies are working safely so that you can spend your money with confidence.

My research life in a doctoral course

I attend the university and conduct research as a working adult student. After finishing work, I usually work in the lab from 7 to 11 pm. On holidays, I enjoy spending time with my family.

I chose cyber security as my research theme because it is related to my work. I aim to implement advanced security measures utilizing OS (operating system) virtualization technology and methods that efficiently detect malicious software using AI.

The advantages of studying in the university

I decided to obtain a PhD while working because I felt there were strong advantages that could not be obtained through training at companies or external seminars. One of them is that I can acquire highly advanced skills by trying out various solutions related to my research theme.

Another advantage is that I can try anything without worrying about failing. In a company, we are required to achieve a certain result, whereas at the university, we can repeat trial and error and also make new discoveries from research failures. It can sometimes be discouraging when things do not go well, but this is what I want to do, and I will carry it out to the end.

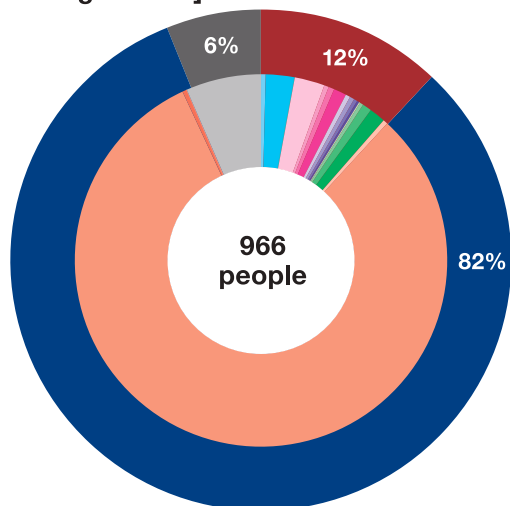




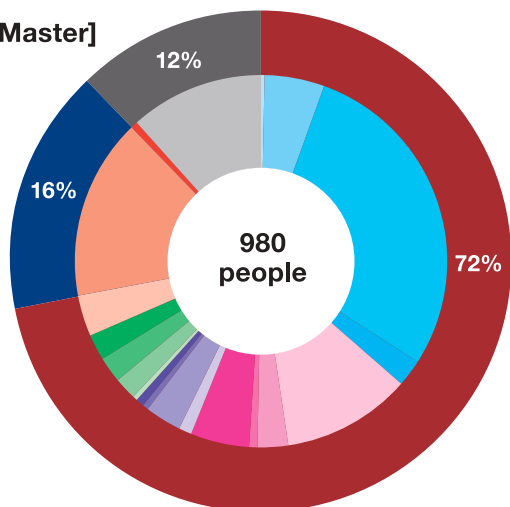
What Paths are Open to Engineering Graduates?

This page introduces the careers chosen by the FY2018 graduates of the UTokyo Faculty of Engineering.

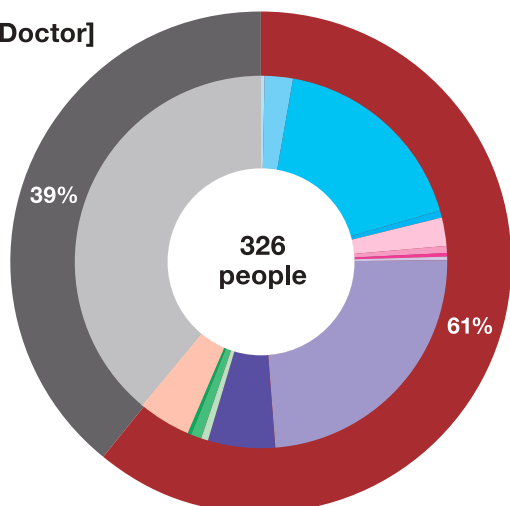
[Undergraduate]



[Master]



[Doctor]



- Employment
- Continuing education
- Others

- Mining, quarrying, gravel mining
- Construction industry
- Manufacturing
- Electricity, gas, heat supply, water supply
- Information and communication industry
- Transportation and postal services
- Trading company, retail trade
- Finance, insurance
- Real estate, Leasing
- Academic research, professional and technical services
- Tourism, food and beverage related services, entertainment
- Education and learning support business
- Medical, welfare
- Complex service business
- Service industry
- Government Office
- Other Industries
- Graduate Schools
- Other faculties
- Overseas Universities
- Others

Examples of employment

- **Construction industry**
Takenaka, Kajima, Shimizu
- **Manufacturing**
 - Metal: JFE Steel, Nippon Steel, Sumitomo Electric Industries
 - Machinery: Mitsubishi Heavy Industries
 - Transportation equipment: Toyota, Denso, Nissan
 - Electrical equipment: Sony, IBM Japan, Hitachi, Mitsubishi Electric, Keyence, Canon, Fanuc
 - Electrical Equipment: Olympus, Toshiba Memory
 - Chemicals: Fuji Film, Asahi Kasei, Mitsubishi Chemical, Sumitomo Chemical
 - Rubber products: Bridgestone
 - Glass and ceramic products: AGC
 - Petroleum: JXTG Energy
- **Electricity, gas, heat supply**
Tokyo Gas
- **Information and communication industry**
Nomura Research Institute, NTT Data, Softbank, Mitsubishi Research Institute
- **Transportation and postal services**
JR Central, JR East
- **Trading company, retail trade**
Mitsubishi Corporation, Sumitomo Corporation
- **Finance, insurance**
Mizuho Financial Group, Citigroup, Daiwa Securities, Simplex, Merrill Lynch Securities
- **Real estate, leasing**
NTT Urban Development, Daikyo
- **Academic research, professional and technical services**
AIST, UTokyo, RIKEN, JAXA
 - Tourism, food and beverage related services, entertainment: PwC Advisory
 - Service industry: Accenture, McKinsey & Company, DeNA, Deloitte Tohmatsu Consulting, Rakuten
- **Government Office**
MLIT, METI, JPO



Answers to Employment Questions!

Here, our questions about job hunting and future paths were answered by Mr. Masanori Ohmura, a career consultant from the Science and Engineering Career Support Office.



Q I don't really know what kind of job I want to do...

A Without self-analysis (what you want to do) or job analysis (what kind of jobs are available), you cannot think about your job hunting or future path. Think carefully about your goals, values, and interests. You can do self-analysis or seek advice.

Q I heard that the Faculty of Engineering has a department recommendation system. Is this correct?

A Although it depends on the department and major, about half the students use the department recommendation system. In the case of a department recommendation, the job hunting period is short, but if you receive a recommendation, it is hard to decline the offer. On the other hand, in the case of open applications, students can be selected by various companies in parallel and obtain multiple tentative job offers. In addition, there is an increasing number of students who decide on their employment before May due to earlier job hunting.

Q What kind of consultation is offered by the Science and Engineering Career Support Office?

A The office is located in Room 208 on the second floor of the Faculty of Engineering Bldg. 2. We provide general consultation on career formation and employment. Specifically, we provide counseling for self-analysis, as well as job information, correction of entry sheets, and mock interviews.

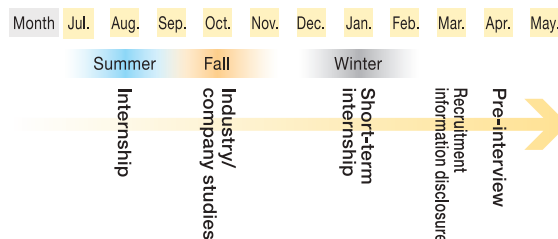
We also host and hold Industry Seminars (Company Research Seminars) and Company Briefings.



Dr. Masanori Ohmura

Q How does job hunting progress?

A Students will participate in summer internships based on their self-analysis and job analysis mentioned earlier. In the fall, they will carry out industry research and corporate research to narrow down the companies to apply to. The Corporate Research Seminar by alumni and alumnae hosted by the Science and Engineering Career Support Office is usually held at this time of year. After that, students will participate in short-term internships in winter, and many companies will release employment information and start interviews in March.



Q Is there any difference in ease of job hunting between faculty, master's, and doctoral graduates?

A Among technical occupations, research and development occupations generally require a master's degree or above. In the manufacturing industry, I think that faculty graduates can more easily find jobs related to production or product technology. Many doctoral graduates hope to work in research and development. If you want to get a job in a company, you may need to expand your job hunting to a wider range of fields, regardless of your specialty. You also have the option of conducting research other than in industry.



Connect with Society. (1)

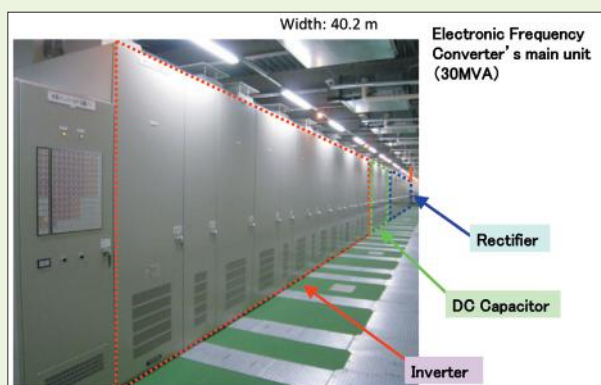
Development of electric power facilities to support the daily railway transportation

Toshimasa Shimizu
Central Japan Railway Company

Technology development looking ahead 10 years to contribute to the development of social infrastructure

After obtaining my master's degree in electronics engineering in 2008, I joined JR and am currently working on the development of electric power facilities in the Technology Research and Development Department. Under the management philosophy "Contribute to the development of Japan's main transportation artery and social infrastructure," we develop technology for electric power facilities such as power converters for electric railways as a position that shows the future path of our company. Considering the time of equipment renewal, we should conduct our research looking ten or twenty years ahead. I am an electric power engineer and my department has engineers in various fields related to railway operation as well as electricity. Regardless of our major, we cooperate to achieve our technical goals.

The people in my company have various careers. Since joining the company, I've been involved in enhancing the transportation capacity of the Tokaido Shinkansen and working on a power substation, but most employees change departments every few years and work on various jobs not limited to their specialty. Thus, we are required to have both a broad perspective and extensive knowledge.



Research in companies and in universities

During my undergraduate and graduate years, I studied optical communication devices and wondered if I should continue on to a



Profile

2008: Master of Engineering,
Department of Electrical Engineering,
School of Engineering,
The University of Tokyo

doctoral course or find a job. I decided to join Central Japan Railway Company because I thought about what I wanted to do for the next forty years and I knew I wanted to be involved in work that was directly created as a result of my efforts. After joining the company I was assigned to a power department. Although my work is different from my major in graduate school, I'm completely absorbed by it and I acquire new knowledge utilizing the expertise and attitude toward research that I gained during my school days.

Now I'm involved in technical development and I think that the difference between research in a company and in a university is that research in universities grows from remarkable physical phenomena while research in companies is mostly development for achieving a purpose. To provide safe and secure rail transport, we engage in development aspiring not only to complete the technology but also to enhance safety so that the technology can be put to practical use. In my opinion, this is the characteristic of research in companies.

Message for students

Companies require that we produce results. So I think it's important that you experience completing difficult experiments or tasks during your school days. I also feel that the experiences in my research life and in the water polo team that I belonged to during my undergraduate years have a good effect on my present work. In addition, I believe that especially students entering their second half of college life should actively work on projects with a goal in mind. You should challenge various things as much as possible, be aware of your limits and be able to ask others. This experience will help you after you become a working adult.

Contributing to society through manufacturing is a traditional trend that has supported Japan and will also be essential in the future. Of course you should value your interests, but I would be very pleased if you aspire to majoring in engineering considering the contribution to society.

Many engineering graduates go out into society and work for companies.
How did they choose their jobs and what are they doing?
Here are the voices of four members of society who are working in various jobs!

Great figures reappearing with leading-edge AI technology!

Sho Ohtani
ZAIZEN Co., Ltd.

I want to give my research results back to society!

I decided to major in aeronautics and astronautics in university because I was impressed by “Rocket Boys,” a novel based on a true story. In this story, rocket development by the main characters makes a declining coal town vibrant again. After reading the story, I decided that I wanted to give leading-edge research results back to society. When I was in university, my research topic was the application of energy management methods used by a space probe to electronic systems on the ground. It was interesting for me, but I also felt that I would be closer to my dream if I did my research in a company, the goal of which is commercialization. After graduating from the University of Tokyo, I started my career at a corporation whose business fields include the development of electronic systems.

Work in a previous company was different from my ideal and dream...

Working in the corporation, I spent a lot of time explaining my projects to other departments and attending long meetings. These tasks did not contribute to the progress of research or development. I felt that a better structure was needed for research and development. However, it would take more than twenty years to become a leader of the division, so I decided to change jobs. I looked for a working environment where employees could communicate well with the management, and I finally found a job as a director at ZAIZEN, which designs and operates digital



Profile

2013: Master of Engineering,
Department of Aeronautics and Astronautics,
School of Engineering,
The University of Tokyo

content. I was anxious about my new work because I knew nothing about running a business. However, one of my friends who had changed job and became a manager of a company advised me to gain experience where I would be nearest to my dream, and his advice brought me to this company.

Contribution to society with “Personality Reverse”

I work mainly on the “Personality Reverse” project now. The aim of this project is to develop and commercialize technologies for expressing personality, such as one’s way of talking or thinking, on a computer using which is AI techniques. We are presently selling “history talk,” which is AI that reproduces famous people utilizing “Personality Reverse.” This service enables the reproduction of famous people to advertise a local specialty or popular tourist site. I would like to use this technology to introduce the attractions of an area that even the local people don’t know about.

“Personality Reverse” <https://www.personality-reverse.jp/>
ZAIZEN Engineering Blog <https://tech.zaizen.jp/>





Connect with Society. (2)

Solving issues with measurement and control

Kohji Shibamoto
Nippon Steel

Job of instrumenting

I work in the Instrumentation Engineering Department Plant Engineering and Facility Management Center that takes on the broad responsibility of equipment maintenance of the company's thirteen iron mills. My field is measuring and controlling blast furnaces that produce about ten thousand tons of molten iron^{*1} a day and continuous-casting equipment that solidifies molten steel of 1500°C while pouring it. I'm also in charge of introducing new technology for sensors, and the last time I went overseas it was to examine whether we should introduce monitoring devices costing several hundred million yen. This is the true pleasure of "owner's engineering" where I can greatly improve the equipment for the company where I work.

Raise production by improving control

I raised the production rate by improving the control of the Pulverized Coal Injection (PCI)^{*2}, which was a most satisfying job. I was in charge of the PCI that produces gas, which is usually exhausted, circulated and reused, and the problem was that we couldn't control the temperature in the reactor because of the reuse of gas. It was difficult to clarify all the complicated movements of heat and gas in the process, but I was able to find the best control for the burners that heat the gas, expressing the heat and the gas in the process as a formula. I found it very rewarding that I myself worked and solved problems.

Even though steel processes are easily affected by the weather, they must be operated all day, every day, no matter what. We had trouble simulating them assuming the most terrible weather like a rainy day in winter and making them available throughout the year. Also, if the raw materials include water, we must make an



Profile

2011: Master of Engineering,
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appropriate fire according to the amount of water because water reduces the maximum production. However, we can't know the amount of raw materials if they include water, so we calculated the amount of water in the raw materials from the condition of the fire. We were also able to raise production that had not been evaluated up until then. It's gratifying to be thanked by the operators.

Research in graduate school

During my school days, I was controlling the positions of electrode needles that pricked a rat's brain using biological signals. In biological measurement, it was difficult to find the conditions under which I could get signals, and a further problem was that those signals sometimes disappeared because the rat moved and the needle slipped, or the composition in the rat's body had changed. I was working on research to continuously obtain good signals by moving the electrodes by micrometers^{*3} and searching for where the signals were strongest. I tried and failed in biological measurement because too much noise prevented getting signals and they didn't reproduce well. This experience proved its worth in the present job when I measure something under poor conditions.

*1 Molten iron in a blast furnace

*2 Equipment that produces powdered coal and blows it into a blast furnace

*3 A thousandth of a millimeter



The fourth blast furnace in Kimitsu



A steel manufacturing site



Iron manufacturing process that is required for constant production

“Connecting technology to society for enriching our lives”

Satoshi Kawabe

Ministry of Economy, Trade and Industry



■ Why I joined METI

When I was a college student, I studied at the Department of Systems Innovation to understand the whole system of how industrial products are made, marketed and distributed. I learned the basics of engineering, such as programming, hydrodynamics and material mechanics. Also, the project-based classes, such as the development of a cleaning robot, taught me the pleasure of manufacturing.

Through my studies at the Faculty of Engineering, I realized that technology had value only when used. That is why I decided to work at the Ministry of Economy, Trade and Industry (METI), one of whose missions is to develop policies that enrich society through technology.

METI has a wide range of jobs focused on creating a prosperous economic and social system. I have also engaged in various projects in the past eight years: energy policy, regional revitalization, robot policy, and reconstruction of Fukushima, including the decommissioning project of Fukushima Daiichi Nuclear Power Station.

■ Application of robots to nursing care

When I joined the robot policy team in METI, we promoted the utilization of robot technology in various fields. Nursing care, in particular, has serious problems which can be solved by robots, such as the physical burden of workers and the labor shortage. Thus, we discussed a new policy to develop nursing care robots.

Of course, products must offer good performance, but if their performance is too high, they become too expensive for users to buy. We identified the specific needs of nursing care sites through interviews and subsidized companies that developed inexpensive and easy-to-use devices that had only the functionality matching the requirements. Besides, we established safety standards for nursing care robots because they touch the bodies of the elderly.

■ Background as an engineer

In METI, I often have the opportunity to explain technical matters to those who are unfamiliar with technology. For example, on the issues related to the nuclear accident in Fukushima, I have to understand a wide range of fields, such as nuclear engineering, civil engineering in order to control groundwater, chemistry to manage radioactive materials, mechanical engineering to survey inside the reactor with robots and so on. Also, I have to explain

Profile

2012: Master of Engineering, Department of Technology Management for Innovation, School of Engineering, The University of Tokyo

these matters clearly to the public. Although it is a very challenging job, I strongly believe that I can make the best use of my background as an engineer.

Now I am studying the relationship between technology and society at Australian National University with the support of METI. No matter how excellent a nursing care robot is made, it will not be used if people believe that care should be done by humans. In addition, in terms of the reputational damage related to the nuclear accident in Fukushima, scientific safety does not mean that citizens can relax. I often feel the gap between the correct answer in science and that in society during my work. I want to learn more about how scientific technology and policy are and should be related to society so that I can contribute to enriching our lives with technology.



Explaining robot policy to elementary school students at the event



School life in Australia

At the Faculty of Engineering, students edit and publish the PR Brochure Ttime!

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東京大学工学部
FACULTY OF ENGINEERING
THE UNIVERSITY OF TOKYO



Editor's
Note

The Ttime! 2019 Issue was prepared with the goal of showing readers how fascinating the Faculty of Engineering is as a whole regardless of the department. We hope that as many people as possible will consider joining us.

In this winter issue, we interviewed students and teachers as well as general members of society. We appreciate the time they took from their busy schedule to share their valuable stories. We are already planning next year's interesting issue; please look forward to reading it!

**Please give us
your feedback!**



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Printing / Production :Anesta Co., Ltd.

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