Opening your future through Soft-Path

IWATE UNIVERSITY

Graduate School of
Science and Engineering
(Doctoral Program)

Graduate School of
Science and Engineering
(Doctoral Program)

We seek to foster human resources who have expert knowledge in engineering fields and peripheral areas, and well-rounded human beings who can establish international careers, and further to promote basic and applied research actively in the areas of science and technology, aiming to elucidate natural laws and promote technological innovation.
In addition, we are trying to promote these qualities in education and research in coordination with the people of the region, and establish a Graduate school of Science and Engineering that can exist in both a regional and an international context.

Graduate School of Science and Engineering

Doctoral Program

- Division of Fundamental and Applied Sciences
- Division of Systems Innovation Engineering
- Division of Design and Media Technology

Graduate School of Arts and Sciences

Master's Course

- Division of Science and Engineering
  - Chemistry
  - Biological Sciences
  - Mathematical Science and Physics
  - Materials Science and Engineering
  - Electrical, Electronic, and Communication Engineering
  - Mechanical and Aerospace Engineering
  - Computer Science and Intelligent System
  - Design and Media Technology
- Division of Regional Innovation and Management
  - R egional Industry
  - Regional and Community Design

Graduate School of Science and Engineering

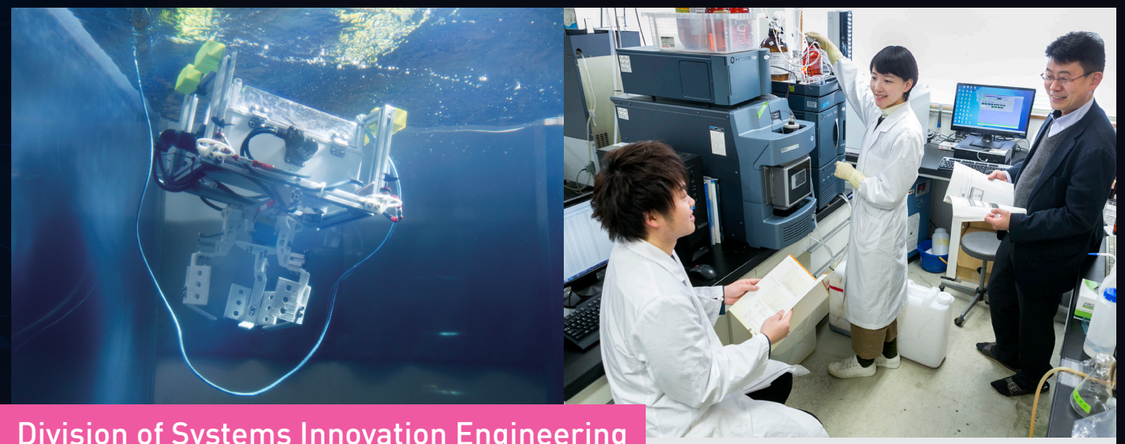
(Doctoral Program)

The Graduate School of Science and Engineering aims to create a sustainable, safe and secure society. Our goal is to offer the essential depth of knowledge to explore specialized field, a broad education, an understanding of the local area, internationality, leadership, and ethical standards, fostering talented personnel with the abilities and experience necessary for each of their fields who strive to discover new knowledge and create new values with an insatiable desire for truth.

Division of Fundamental and Applied Sciences

This division gives students the ability to cast light on the true nature of a variety of natural phenomena through cutting-edge education and research based on core study of the fundamental sciences: math, physics, chemistry, and biological sciences. We also foster researchers who contribute to the progress in science as the intellectual asset of humanity. Our students develop and apply their core studies at a high level, gaining the ability to solve a range of problems faced by modern society, including energy, environmental and medical issues, and the ability to create innovative technologies that will lead to the creation of future industries. Our goal is to foster highly specialized engineers, and researchers who will contribute to the development of local and international society.

The Division of Fundamental and Applied Sciences is made up of four education and research areas: the Chemistry Area, Biological Sciences Area, Mathematical Science and Physics Area, and Materials Science and Engineering Area. Students in the Chemistry, Mathematical Science and Physics, and Materials Science and Engineering Areas study a science and engineering education program. Students in the Biological Sciences Area study a science education program.



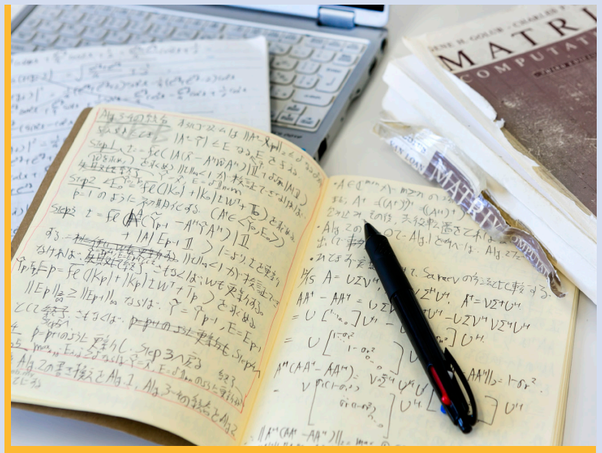
Division of Systems Innovation Engineering

In this time of the fourth industrial revolution, our existing industrial society is continuing to see great change due to the IoT and AI, making it necessary to develop education and research that will foster talented personnel who can understand people, society, and industry in its entirety as a system rather than developing and improving existing elemental technology, and have both highly specialized and extensive knowledge. The Division of Systems Innovation Engineering carries out research and education in a wide range of areas related to electrical and electronic communication, computer science and intelligent systems, mechanics, civil and environmental engineering, and their interfaces, in order to pioneer cutting-edge new technology and integrated technology; we aim to foster highly specialized engineers and researchers who can contribute to the shift to a “sustainable society” to solve the environmental and energy crisis, handle the “ubiquitous society” with a high level of digitization, construct the intelligent “mechanical systems” of the future, and contribute to the maintenance of “civil engineering,” the pillar of safety and stability.

Division of Design and Media Technology

In the Division of Design and Media Technology, we aim to create safe, comfortable spaces and products and environmentally-friendly digital content, connecting people, things, and information more comfortably, using varied design thinking and high-level media technologies that support design thinking, based on the needs of a society seeking spiritual enrichment. Our goal is to foster talented personnel who have the creativity to produce advanced designs and the high-level media system skills to contribute to the realization of those designs, and who can create cutting-edge digital content and basic media technology with an international viewpoint and awareness of problem-solving in their locality. We provide high-level education and research on “design” related to “product and content” design, “media” linked to the basic technology of “computer graphics, computer vision and sensing technologies,” and a combination of these fields. We aim to foster highly specialized engineers and researchers who (1) understand the interlinked fields of design and media, (2) have an awareness of problem-solving in their locality alongside an international viewpoint, (3) and have the capacity to actively carry out research and development in a variety of fields within design and media, based on our program in which the students develop the ability to explore and solve problems by touching on a variety of issues, including those in their locality. Students who complete this course receive a degree in either Engineering or Design.

Research Topics



Division of Fundamental and Applied Sciences

Professor

Shinya Miyajima

Numerical computation
Matrix theory
Interval analysis

Verified numerical computation in matrix problems.

In science and engineering, mathematical models are developed for understanding phenomena. By solving these models, forecasting unknown phenomena and designing new industrial goods are possible. These models are frequently solved by numerical computations, since solving them analytically is difficult.
In general, results of numerical computations do not coincide with exact solutions, since some kinds of errors are included. In order to obtain exact conclusions from the numerical results, we need to estimate the errors and compute sets enclosing the exact solutions. The numerical verification algorithms have been developed for this purpose. These algorithms enable us to compute the sets rigorously enclosing the exact solutions via floating point computations.
Our main research interest is to establish new numerical verification algorithms for solutions of matrix problems. In order to develop these algorithms, we prove theorems for verifying local existence and uniqueness of the solutions using floating point operations. These algorithms can be applied for guaranteeing accuracy of the numerical results.

Division of Systems Innovation Engineering

Associate Professor

Nao Ishikawa

Environmental science
Soil science

Understanding the pollutant behavior in soil and water environments for developing effective environmental conservation measures

Pollutants transfer from their sources to various soil and water environments, resulting in water and soil pollution, which are interlinked. Moreover, pollution affects the organisms inhabiting these environments; thus, understanding the behavior of these pollutants in the environments is important for environmental conservation.
In this study, the behavior of various pollutants, such as radioactive substances and antibiotics, in soil and water environments has been explained. The major research objective includes studying the effect of soil organic matter on cesium (Cs) fixation by soil. Radiocesium, a radionuclide, widely dispersed in the environment after the nuclear accidents in Fukushima, Japan. The wastes containing radiocesium are enclosed in soil and subsequently, buried in landfills because clay minerals in the soil can effectively fix radiocesium. However, adsorption of soil organic matter on the clay minerals prevents radiocesium access to the adsorption sites of clay minerals. The study aimed to understand the relationships between the soil organic matter and its masking effect on Cs adsorption by the clay minerals using different soil samples. Therefore, this study has important implications for safe radiocesium disposal measures to prevent the dispersion of radiocesium from the landfills.

Division of Design and Media Technology

Professor

Takamitsu Tanaka

Design
Art Engineering

Developing a product with Kuji Amber, with the sensibility of young people—both the students and the corporations feel the benefit of that.

We at the Industrial Design Laboratory have been lucky enough to work with the Kuji Kohaku Co., Ltd. (Kuji Kohaku) for many years, and have worked with them to develop various amber-themed products. Of these products, the ones that have received the most praise and are even now popular products are the “amber-embellished wallet” and the “card case.” Joint development for these products began when Kuji Kohaku asked us if we could design and develop a product that was not jewelry, but that would still be used every day. Because most of the students had never seen or touched amber, they actually went to Kuji City to learn more about it, listening to lectures at the museum and engaging in the actual excavation process. Afterwards, they began the design process. About 20 students participated in the project, and each student made about 10 designs, so we ended up with about 300 sketches. We submitted these to Kuji Kohaku and also conducted a survey at our exhibition at a department store. The wallet and the card case seemed to have the most support across a wide range of ages, and so we began production of those. Through this project, Kuji Kohaku was able to transcend its usual fixed ideas and create a product with younger, fresher ideas, and the students were able to simulate a real-world experience, and get a sense of what kind of design ability is required of design professionals. The project, which was also praised for its contribution to the regional community, was a meaningful one for both sides.

About Iwate Prefecture

Iwate Prefecture is located 500 kilometers to the north of Tokyo, in the nature-rich North Tohoku Area (39 degrees north latitude, 141 degrees east longitude), and with an area approximately seven times that of Tokyo, is the second largest prefecture in Japan.
Located in various locations throughout the prefecture are famous nature sites like Mount Iwate (known as the "Southern Fuji"), the ria coast (a number of beautiful coastlines formed when deep valleys, eroded by rivers, sunk into the ocean), as well as historical and cultural sites, the most well-known being the town of Hiraizumi, and some of the most well-known hot springs and ski resorts in Japan.

Access to Morioka

【Tohoku Shinkansen/Akita Shinkansen】

Tokyo – Morioka	2 hrs. 10 min. (Hayabusa)
Sendai – Morioka	39 min. (Hayabusa)
Shin-Aomori – Morioka	49 min. (Hayabusa)

【Plane/Iwate Hanamaki Airport [JAL]】

Osaka (Itami) – Hanamaki	1 hr. 25 min.
New Chitose Airport (Sapporo) – Hanamaki	55 min.
Nagoya (Komaki) – Hanamaki	1 hr. 15 min.

Iwate Hanamaki Airport
⇕
Morioka Station (Iwateken Kotsu Bus)
50 min.

Area of Iwate Prefecture

Climate data

	Morioka (1991-2020)	Berlin (1981-2010)
average annual temperature	10.6℃	9.3℃
average annual precipitation	1279.9mm	515.2mm
Köppen climate classification	Cfa	Cfb

Prefectural Capital: Morioka City

Population

Approx. 300,000

Festival


Sansa Festival


Chagu Chagu Umakko Festival

Famous Items


Nambu Ironware


Remen


Nambu Senbei (Crackers)

Campus Map

Campus Area 14,719,739㎡

Ueda	426,592㎡
Elementary School Attached to the Faculty of Education	
Kindergarten Attached to the Faculty of Education	
Junior High School Attached to the Faculty of Education	
Takizawa Farm	
Takizawa Research Forest	
Omyojin Pasture	
Omyojin Research Forest	
Kamaishi Satellite Office	
Other	1,4293,147㎡

Interviews with International Students

Graduate School of Science and Engineering (Doctoral Program)

SOPACHITWATANA SUPASUMOND

《Thailand》

Biography

High-school in Wattana Wittaya Academy (Thai)

Silpakorn University (Thai)

Kingston University (England)

Q. What do you study? Why did you choose Iwate University?

Iwate University offers me a wide-range of interesting things which involves both design and engineering. I can guarantee that I'll get not only technical tools but also a critical thinking process including data analysis along with a confidence to solve problems. In the future I have to return to my country and become a teacher in a university. With a wide application, I strongly believe that this university's Ph.D. degree would help me achieve the depth of knowledge necessary to become a strong contributor to the field of both design and engineering. Moreover, I will gain more confidence to guide my future students, carry them with the intellectual skills that I have learnt, and help them develop from critical to creative thinking.

Q. How do you feel about Iwate University? How do you like here?

After spending almost half a year in Morioka, I clearly see that it was indeed a professional program, not only my doctoral class but also other classes too. I am joining the Japanese class in which I can develop my Japanese skill and experience Japanese culture. Besides learning, I've made many friends from all around the world and I appreciated that.

Q. What do you like about Morioka and/or Iwate prefecture?

Before I came to Morioka, I was advised that the winter in Morioka is very cold. But if you have the right clothes, and go to the right places, you will be fine. I begin to appreciate the snowy days and the beautiful scenery in the city of Morioka. A lot of nature, good food and reasonable prices on every corner. I am really enjoying my year in Morioka and warmly recommend it to prospective students

Contact Information

Support available in Japanese, English, Chinese, and Korean

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Iwate University Graduate School of Science and Engineering Website

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