English Engineering Education PROGRAM

HOKKAIDO UNIVERSITY Graduate School of Engineering

Master's and Doctoral Degrees / International Programs







Greeting from Prof. Tsuyoshi SETOGUCHI, Dean of the Faculty and Graduate School of Engineering



Welcome to the Graduate School of Engineering at Hokkaido University! I am excited to see that you are interested in our international program, e³.

Over the past 150 years, our university has formulated educational philosophies built on a "frontier spirit", promoting "all-round education", taking a "global perspective", and pursuing "practical learning". These philosophies are as relevant as ever in today's world, with global competence playing a key role in the modern international education. The

e³ program, started in 2000, aims to expand our university's reach beyond the boundaries of Japan. Multidisciplinary English education allows our students to benefit from the best Japanese technology and gives them access to cutting-edge knowledge and an international environment, so that they can develop communication skills and cultural awareness, become flexible researchers and engineers in the diverse fields of science and technology, and graduate ready for the global challenges.



The e³ program was established in 2000 aiming at fostering global engineering human resources and since then has been actively attracting high caliber students from diverse educational and cultural backgrounds.

High quality education in English

Master's or Doctoral degree entirely in English. More than 160 courses are offered in English.

Diverse choice of research fields

13 Master's and 12 Doctoral degree programs in 13 divisions:

- Applied Physics
- Materials Science and Engineering
- Mechanical and Space Engineering
- Human Mechanical Systems and Design
- ☐ Energy and Environmental Systems
- Quantum Science and Engineering
- ☐ Field Engineering for the Environment
- Engineering and Policy for Sustainable Environment
- Architectural and Structural Design
- ☐ Human Environmental Systems
- ☐ Environmental Engineering
- ☐ Sustainable Resources Engineering
- Cooperative Program for Resources Engineering*

 (*Master's degree only)

Excellent academic reputation

Study in one of the top 10 Japanese universities, which is also ranked highly in Asia and in the world.



Ranking

World Universities Rankings (2019)		
QS Asia	29	
QS World	128	
Times Higher Education (THE)	401-500	

Facts

Hokkaido University	(As of May 1st, 2018)
Student Enrolment	18,519
Undergraduate	11,933
Graduate	6,586
International Students	2,161
Faculty and Staff	3,974
Partner Universities	635 in 67 countries
School of Engineering	(As of June 1st, 2018

School of Engineering	(As of June 1st, 2018)
Student Enrolment	
Undergraduate (from 2nd year)	2,278
Master's	802
Doctoral	208
International Students	302
Faculty Staff	330
Non-teaching Staff	120

CONTENTS

Introduction	01-02
Campus Life	03-04
Field Selection	05-08
Application	09
Scholarships & Support	10
Short term Programs	10

AN UNFOR EXPERIENCE

Reasonable cost of living

Where can I stay?

For the first semester or two, most students will stay at the **University accommodation.** There are total 748 fully furnished, internet-enabled rooms (including 47 for family and couples) available

Many affordable **Private apartments** are located in close proximity to the campus. On-campus room guide service is available for free.

Is life in Sapporo expensive?

Sapporo provides an excellent quality of life and more reasonable cost of living compared with other major cities in Japan. You can comfortably live on a budget of approximately JPY 80,000 to 110,000 per month*.

		Single	Couple/Family
Dont	University accommodation	JPY 4,700- 31,000	JPY 37,000- 49,000
Rent	Private apartment	JPY 25,000- 40,000	JPY 40,000- 60,000
Food		JPY 20	0,000 to 35,000
Other		JPY 20	0,000 to 30,000

^{*}As of March 2019. Your budget depends on the lifestyle you choose. The amount is for reference only.



I am glad to carry out my studies at Hokkaido University under e³ because of the diversity that I am exposed to by interacting with researchers from many parts of the world. The programs offered not only encompass course work and research but field trips, conference opportunities and leisure trips that help to balance one's abilities.

Frances Semida CHIKANDA, D1 (Malawi) Laboratory of Environmental Geology (SRE)

Global perspective

Study together with colleagues from all over the world, join e³ active social life and create your own unique international experience!





Sapporo is the 5th largest city in Japan, with a population of almost 2 million people, and it is often rated as one of the most desirable places to live in Japan. The Hokkaido University campus is located in a beautiful setting in the center of Sapporo with easy access from the international airport. Enjoy plentiful nature of Hokkaido and experience skiing, hiking, and many other outdoor activities!

Good infrastructure and support services

How do I fit in?

Ask our staff! Friendly English-speaking staff of e³ and International affairs office of Engineering will help you with various issues, from academic affairs to everyday life.

Meet your buddy! Newly arrived international students are paired up with an enrolled student(s) and are given help to adjust to their new environment smoothly: from registering at the ward office and opening bank account to learning about the research facilities.

Join e³ orientation For new students to meet your colleagues and learn about the program.

Don't miss e³ welcome party, welcome trip and various social activities organised by e³ students.

Will I learn Japanese?

Optional courses of different levels, from introductory to advanced, are offered on campus. Learning some Japanese will help you to enjoy your everyday life and better understand Japan's unique culture.



The philosophy beneath the e³ program makes it like a small world. Excellent students from all around the world gather here to develop their knowledge and share ideas. e³ has built a warm and tight community to serve its purpose. There are many activities which not only help us to experience Japanese culture, but also help us to know each other and know the countries we are representing.

Shaoqi YANG, M2 (China) Laboratory of Structural Engineering (ASD)

Commuting stress free

Is it easy to commute?

Many students live nearby and commute by bike or walk. Central railway station is within walking distance and subway passes right next to the campus.



03

CHOOSE YOUR FIELD!

Each division offers Master's and Doctoral degree courses. Laboratories in the divisions are united in research groups with similar topics. Here you can check the key words of research areas for each group and pick your match.

Applied Physics

Striking advances in applied physics, such as in nanotechnology, exotic materials or photonics, are being made regularly in the world today, often ushering in new scientific fields and applications. We are boldly riding this scientific wave of the 21st century to investigate phenomena with practical applications ranging from microscopic scales down to molecular and atomic scales.

4 Research groups

■ Quantum Matter Physics

Complex systems, networks, superconductors, topological materials, topological crystals, graphene, nanotubes, molecular junctions, quantum wells, semiconductors, low dimensional systems, quantum matter, charge density waves, acoustics, phonons, nanotechnology and microscopy, picosecond laser ultrasonics, optics, metamaterials

Complex Material Physics

Nanotechnology, imaging, graphene, neural networks, clathrates, hydrates, cell biology, soft matter, polymers, liquid crystals, colloids, emulsions, rheology, new materials, microstructure, solid state physics, crystals, quasicrystals, diffraction

Optical Science and Technology

Femtosecond, ultrafast, vortex, optical vortex, nanostructures, nanoscience, spin, spectroscopy, condensed matter physics, optical polarization, polarimetry, astronomical optics, extrasolar planets, interferometry

Solid State Physics and Engineering

Semiconductors, nanostructures, quantum computers, spin, interferometry, spectroscopy, crystals, lasers, condensed matter physics, waves, phonons, acoustics, NEMS, metamaterials



Materials Science and Engineering

The division provides professional education in cutting-edge materials science, including material design based on related modeling, material production methods spanning the scale from nano to macro application, ecological processes as environmental system, and ecological and energy materials serving as new functional materials. The division also supports the development of materials science researchers and engineers with the capacity to work independently.

4 Research groups

Ecological Materials

Electromagnetic and novel material processing, CO² decomposition, novel nanostructure fabrication, materials recycling by electrochemical process, fuel cell

Materials Design

Strength of ferrous and non-ferrous metals, dendrite growth, phase-field simulation, nanoparticle science for electronic Materials, inorganic-organic nanohybrid materials phase diagram

Energy Materials

High-temperature strength, oxidation resistance alloys and coating, structure materials for fusion reactor, hydrogen storage materials, computational approach, nano-cluster

Energy Conversion Materials

Analysis of electronic and atomic structures of materials, first principles calculation of catalyst and its support, combustion synthesis of nonstoichiometric compounds, design of new ironmaking system, photo-energy and thermoelectric energy conversion, environmental benign materials

Mechanical and Space Engineering

Students in this division take course subjects in space engineering and cutting-edge mechanical engineering. These subjects, along with research activities in a laboratory the student belongs to, support the development of capability of sound judgment based on problem identification and resolution ability, presentation skills to communicate their ideas, the capacity to independently promote research and technology development, a strong sense of ethics and an international perspective.

2 Research groups

■ Space Systems Engineering

Space system, space propulsion, spacecraft, hybrid rocket, thermal design, space utilization, International space station, combustion, computational fluid mechanics, aerodynamic design, multi-physics flow simulation

■ Materials and Fluid Mechanics

Fluid dynamics, two-phase flow dynamics, molecular fluid dynamics, interfacial transport phenomena, mechanical and functional materials, fatigue, surface modification, structural mechanics, strength of materials, elasticity and plasticity, instability in solid mechanics

Human Mechanical Systems and Design

The division of human mechanical systems and design aims to conduct advanced research on "man-machine" systems that support new life and living by using bioengineering, robotics and control engineering, which are based on mechanical engineering, as well as offering specialized education related to these fields.

2 Research groups

■ Biomechanics and Robotics

Tissue biomechanics, human movement, medical engineering, assistive technology, motion and vibration control, robot navigation, mobile robot, smart structure, structural health monitoring

Micromechanical Systems

Fluid and solid mechanics, thermal conductivity, composites, functional material, stent, cell mechanics, bio-MEMS, mechanobiology, optimization, static and dynamic analysis



Energy and Environmental Systems

Our division is engaged in research and education on advanced energy systems through research on hydrogen fuel cells, next-generation engine systems, and innovative device for measurement and control of thermo-fluid phenomena, together with research and education on the evolution and development of future nuclear energy technologies including innovative nuclear systems, nuclear power plant safety, reactor physics, and radioactive waste management.

2 Research groups

Applied Energy Systems

Applied energy systems, energy conversion systems, flow control, applied thermal engineering

engine system engineering, internal combustion engine

■ Nuclear and Environmental Systems

Nuclear and environmental systems, nuclear reactor, nuclear safety and system engineering, nuclear waste management, boiling heat transfer

Quantum Science and **Engineering**

The research activities of this division cover a wide area of physics and engineering for the quantum beam science and the plasma. Based on the fundamental study of these research fields, we are aiming for state-of-theart materials characterization and fabrication techniques, medical-care and cancer therapy equipment, new devices for energy generation and saving, environmental monitoring technique, etc.

3 Research groups

Applied Quantum Beam Engineering

Neutron generation, neutron scattering / imaging, quantum beam, radiation detection / measurement, nuclear instrumentation, medical physics, proton therapy, neutron capture therapy

Plasma Science and Engineering

Plasma processing, plasma diagnostics, laser ablation, laser processing, plasma-surface Interactions, fusion engineering, vacuum engineering, simulation of electro-magnetic field in plasma

Nanomaterials Science

Quantum beam irradiation effects, in-situ observation, nuclear materials, transmission electron microscope, synchrotron radiation, surface science, well defined catalysis

ADVANCED RESEARCH FACILITIES

e³ website was very easy to navigate so it immediately felt to me that the program is very well organized as compared to other universities. I applied to Prof. Takashi Nakamura lab and I was lucky to get through. My research is focused on finding the characteristics of crack propagation on a particular type of steel which is used in High Speed Railways, space structures etc. Additionally to the experiments at our own facilities, my lab organized trips to Spring-8, one of the five largest synchrotron radiation facilities in the world located in Hyogo Prefecture. Our research project is the first of its kind initiative in the world and has been cited all over the world.

help each other in research, go out and play baseball together. My whole image about Japanese people as being reserved has changed.

Paras MEHENDIRATTA (India)

Master course student.

Laboratory of Mechanical and Functional Materials





WELL EQUIPPED LABORATORIES

Engineering and Policy for Sustainable Environment

The Division of Engineering and Policy for Sustainable Environment aims to produce future leaders capable of solving complex environmental and social problems from global perspectives while building consensus with local residents and using methods including system-engineering and socioeconomic approaches. These are intended to create the spaces and environments essential for safe, comfortable and well-developed human activities and harmonization with nature.

2 Research groups

Engineering for Sustainable Infrastructure System

Structural mechanics, structural dynamics, bridge engineering, steel structures, concrete structures, hybrid structures, seismic engineering, maintenance engineering, life time engineering, life cycle management

Policy for Engineering and Environment Infrastructure planning, national and regional planning, urban economics, transportation planning, traffic engineering, public involvement, mathematical programming, traffic information, construction management, image/video analysis, sensor data analysis, data visualization, data science



Field Engineering for the Environment

This civil engineering division supports the development of engineers and researchers capable of formulating solutions to environmental and natural disaster issues that threaten human societies. Through a well-designed approach with world-class technologies offered by field surveys, wide-area measurement and assessment, experiments with sophisticated equipment and facilities, and numerical simulation, students will graduate with specialized knowledge and skill in related civil engineering subjects.

2 Research groups

Geotechnical and Material Engineering for Disaster Prevention

Cement, sustainability, concrete durability, mineral additives, soil mechanics, geotechnics, geodisaster, soil testing, geodynamics, foundations, numerical simulation, frost geotechnics

Environmental fluid mechanics, hydrometeorology, climate model, coastal hydrodynamics, coastal disaster, renewable energy, fluvial geomorphology, watershed hydrology, river management, turbulence

Environmental Engineering

The Division of Environmental Engineering aims to produce highly specialized professionals with special capabilities essential to build sustainable social systems by conserving the environment and creating safe and comfortable living spaces based on the sound circulation and metabolism of water, air and substances. Such professionals should be furnished with the ability to engage in specialized work and R&D on environment.

2 Research groups

■ Water Metabolic System

Environmental biotechnology, biofilms, microbial ecology, public health, water quality standard, microsensor, fluoroionophore, lake Mashu, environmental risk engineering, innovative water treatment technology, drinking water guideline

■ Environmental Management Systems

Solid waste, landfill, thermal treatment, recycling, system optimization, air pollution, noise pollution, EIA, environmental health, sound material-cycle, bioenergy, soil and groundwater contamination, risk communication



Human Environmental Systems

The human environment consists of the built environment and partly of the natural environment. The human environment, such as residence space, indoor climates, forests and cities, is important for our lives and symbiosis with nature. Building envelopes, building facilities, urban green spaces, city facilities and so on are systems designed to improve properties of the built environment. We carry out research concerning the performance of that environment and systems to heighten the quality level. We also verify the properties under actual service conditions.

2 Research groups

Planning and Performances for Built Environment

Building construction, building material, energy & environment

■ Building Science and Space Planning Indoor environment, architectural environment, landscape

Architectural and Structural Design

We aim at fostering human resources who can put the new sophisticated policy and design for social safety-and-sustainability into practice based on acquired skills and field works related to safety mechanisms that support structural and urban spaces, by acquiring critical-thinking and problem-solving abilities on issues related to principles of symbiosis in the environmental spaces of buildings and cities and their design.

2 Research groups

Design concept, modern architecture, documentation preservation, architectural planning, environment behavior, community design, disaster recovery and reconstruction, city planning, sustainable design, design simulations

Structural and Urban Safety Design

Steel structures, seismic protective systems, seismic isolation, seismic retrofit, OpenSees, seismic response analysis, seismic input estimation, vulnerability analysis, human behavioral monitoring, social economic impact analysis

Sustainable Resources Engineering

Cooperative Program for Resource Engineering (Master's course only)

The main research and educational topics of both our divisions are mining engineering including geology, rock mechanics, mineral processing, and extractive metallurgy. We also provide excellent opportunities to study environmental protection and remediation technologies, resources recycling of urban mine, and application of IT and biotechnology, which are needed for sustainable extraction and supply of mineral resources to our society.

Cooperative Program for Resource Engineering is established through a collaboration between Hokkaido University and Kyushu University. The program aims to develop highly skilled resource engineers who can design and manage the entire process of the resource business.

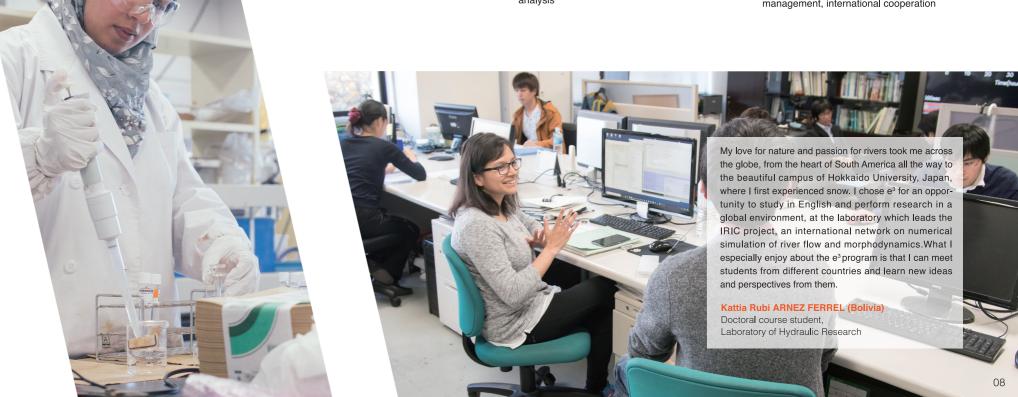
2 Research groups

■ Geoenvironmental Engineering

Rock slope stability, tunnel deformation, acid mine drainage, soil/groundwater pollution, environmental fluid mechanics, beachrock, biogrout, biocement, biomineralization, geophysical exploration, geothermal resources

Resources Engineering

Mineral processing, resources recycling, environmental mineralogy, water-rock interaction, ore deposit, inorganic material, soft matter, enhanced oil recovery, surface chemistry, geochemistry, resources management, project management, international cooperation





Application



Select a research field and laboratory



Confirm your eligibility and application options



Prepare a research proposal, transcripts etc. and submit on-line



Mail the originals to e³ office

Application and Admission Calendar

Admission to the e³ program is possible from either the Autumn semester, starting on October 1st or the Spring semester, starting on April 1st. Applications for each semester's admission are accepted and screened twice a year - via an early 1st call and a regular 2nd call.

e³ Special Selection

Admission semester	October 2019	Apri	12020	Octobe	er 2020	April 2021
Application call	[2nd call]	[1st call]	[2nd call]*	[1st call]*	[2nd call]*	[1st call]*
On-line application	March 25 - A	pril 19, 2019	Octorb	er 2019	April	2020
Submission of originals & Examination Fee Payment	April 22 - May 27, 2019		Novemb	per 2019	Late Ma	ay 2019

^{*}These periods are tentative. Please confirm the exact dates at the e3 program web page closer to the application period.

Requirements

Students who fulfill all the requirements and show high academic achievements, including higher-than-average GPA, may be accepted based on documents screening and an on-line interview.

Master's program

The standard time required to complete this degree is 2 years.

ENTRY REQUIREMENTS

In order to obtain entry into the Master's Program you MUST:

- -Hold a four-year Bachelor's Degree
- -Have above average grades 80%, or 3.0 on a 4-point GPA
- Scale (country-specific grading is considered)* -Have English proficiency equivalent to IELTS 6.0,
- TOEFL iBT 79 or TOEIC L&R 670**

COMPLETION REQUIREMENTS

- In order to obtain this degree, you MUST:
- -Obtain 30 credits from the English Curriculum -Be supervised in English
- -Submit a thesis in English and be examined in English
- -Satisfy the requirements on conference presentations and/or publications set up by your division

Doctoral program

The standard time required to complete this degree is 3 years.

ENTRY REQUIREMENTS

In order to obtain entry into the Doctoral Program you MUST:

- -Hold a four-year Bachelor's Degree and a Master's Degree
- -Have above average grades 80%, or 3.0 on a 4-point GPA
- Scale (country-specific grading is considered)* -Have English proficiency equivalent to IELTS 6.0 TOEFL iBT 79
- or TOEIC L&R 670**
- -Have demonstrated your research potential through nublications

COMPLETION REQUIREMENTS

- In order to obtain this degree, you MUST:
- -Obtain 10 credits from the English Curriculum
- -Submit a thesis in English and be examined in English
- -Satisfy all publication requirements set out by the division.

*If your grade is below the minimum requirement you may either be present for the entrance exam at the university or enroll as a research student first, and then take the entrance exam after you arrive in Sapporo.

**TOEIC L&R test requirement is currently being reconsidered. The present score is effective for those applicants who wish to enroll up to and including April 2020. Please check the program's web page for the updates if you are planning to enter the program after October 2020

For detailed information on entry, please check the program's web page https://www.eng.hokudai.ac.jp/e3/

Application documents: Check our web site for details.

Scholarships & Support

Apply for an acceptance letter or a scholarship through the e³ program

Japanese Government (MEXT) scholarships

Japanese government offers full-support scholarships for outstanding students (including monthly allowance of JPY 145,000 for PhD or JPY 144,000 for Master's program; recipients are exempted from tuition and admission fees). e3 accepts applicants through such frameworks as: University nomination (including Top Global University Project slot), Foreign Study Coordinator slot (regions with coordinator's office), Program for Indian Railways professionals, Embassy nomination.

Japanese Government (MEXT) scholarship via **Embassy recommendation**

You can apply for this type of MEXT scholarship through the Japanese embassy in your country of origin. After you pass the preliminary screening at the embassy, please contact the e³ program to receive an acceptance letter.

MEXT: Top Global University scholarship

The period of this scholarship is limited to maximum 24 months irrespectively of the degree program (Master's or Doctoral). Enrollment is possible from October only. Apply directly through the e³ program.

MEXT honors scholarship: reservation system

Financial assistance of JPY 48,000/month (for a period of 6 or 12 months) is available for a number of newly enrolled Master's and Doctoral students with good academic performance accepted directly into the e3 program through the special selection.

e³ Grant for self-supported Doctoral students

A grant of JPY 100,000 upon enrollment (one-time payment) is offered.



If you are applying for a scholarship offered by your country's government or some private scholarships and need a conditional offer letter, please contact us.

Other organizations' full support scholarships

Chinese Scholarship Council - please apply to our program to obtain an acceptance letter

Programs funded by Japanese International Cooperation Agency (JICA) e³ accepts applicants through various JICA scholarship schemes, including: AUN/SEED-Net – for students from participating institutions in ASEAN countries.

ABE Initiative – for young African professionals (54 African countries) Kizuna Program in Sustainable Resource Development (mining engineering) Scholarship program of Development Initiative for Road Asset Management JDS Program (in the field of Transportation Infrastructure) — for government officials

M-JEED Program – for researchers and faculty members from participating institutions in Mongolia.

Cost of education and tuition fee support

Tuition fee waivers

A discount of 25, 50 or 75% or full tuition fee waiver can be granted to the applicants in need.

Study support for Doctoral Students

Full tuition fee support through the combination of tuition fee waivers and employment as research assistant is available.

Academic fees		
Application fee	JPY 30,000	
Entrance fee	JPY 282,000 (upon enrolment)	
Tuition	JPY 267,900 per semester	

^{*}Subject to change **MEXT scholarship recipients are exempted from all the fees

Join e³ as a Double degree candidate

Already enrolled in a graduate program at a partner university which has a double degree agreement with us? You have a chance to complete a part of your degree at e3, and by fulfilling the requirements of two schools you can obtain degrees from both universities. Find out more about double degree programs: http://www.eng.hokudai.ac.ip/e3/admission-int/double

Are you interested in short-term research or study?

Research Internship

Are you a full time undergraduate or graduate student at a university outside of Japan? Join a research project at one of our laboratories on flexible terms!

Duration of the program is minimum 1 week, maximum 6 months. Please contact a potential supervisor at the Faculty of Engineering to agree upon the possible acceptance period and your research topic. Applications are accepted throughout the year.

For more details:

http://labs.eng.hokudai.ac.jp/ceed/industory/internship/interna

Exchange programs

Are you a student at one of over 200 worldwide partner institutions of Hokkaido University? You are welcomed to spend one or two semesters with us as a tuition-waived exchange student!

Research-oriented program (Special Research Students)

Graduate students undertake research centred on their specialized areas at one of our laboratories under the supervision of a faculty member of the Graduate School of Engineering.

Course work-oriented program (Special Audit Students)

Undergraduate or graduate students join regular classes (graduate students take courses from the e3 English curriculum). Acceptance is possible from October (Autumn semester) and April (Spring semester).

Please contact your home-university's study abroad office for further information about the application procedure.

10

Find out if your university or graduate school is our exchange partner:

https://www.global.hokudai.ac.jp/global/overseas-partnerships/international-agreements/



FOR DETAILS PLEASE CHECK OUR HOME PAGE