October 2023 Admission

Graduate School of Advanced Science and Engineering
(Master's Course)
Division of Advanced Science and Engineering

Application Guidebook

(Special Master Course for Students to Study Japanese-style Manufacturing)

Applied Chemistry Program
Chemical Engineering Program
Electrical, Systems, and Control Engineering Program
Mechanical Engineering Program
Transportation and Environmental Systems Program
Architecture Program
Civil and Environmental Engineering Program
Informatics and Data Science Program
Smart Innovation Program

October 2022

広 島 大 学

Hiroshima University

Admission Policy of Graduate School of Advanced Science and Engineering

【Master's Course】

The Division of Advanced Science and Engineering of the Graduate School of Advanced Science and Engineering seeks students who have the following aspirations and motivation and have the basic academic abilities necessary for it:

① An ambition for the promotion of advanced and high-level academic and inter-disciplinary research;

② The will to be engaged in professional occupations such as researchers and engineers in areas related to natural science, engineering, and information science;

③ A zeal for establishing the "science for sustainable development" from a multifaceted perspective and for solving regional and international issues by acquiring knowledge and study skills for the academic areas related to natural science, engineering, and information science as well as a wide range of intelligence; and

④ Common sense and ethics required for a member of society.

In order to admit such individuals, Graduate School of Advanced Science and Engineering selects applicants through a multifaceted and comprehensive evaluation process based on its own Diploma Policy and Curriculum Policy, using interviews, academic tests, and external examinations.

Application Guidebook

October 2023 Admission

This special master course is designed for students to study Japanese-style manufacturing. This course includes the following courses and classes etc.

Intensive Japanese Language Course, Japanese-Style Manufacturing Course (Problem Based Learning), Internship in Companies in Hiroshima Prefecture, Regular Engineering/Technology Classes, Master Course Research, Dissertation.

The Graduate School of Advanced Science and Engineering seeks students in the following capacity:

1. Number of students to be admitted

The number of students to be admitted and the address for submission of application documents are listed below.

October 2023 Admission

Program	Admission capacity	Contact Submission address for application documents
Applied Chemistry	Several students	Support Office for the fields of Engineering, Hiroshima University 1-4-1 Kagamiyama, Higashi-Hiroshima 739-8527, Japan Tel: +81-(0)82-424-7518
Chemical Engineering		
Electrical, Systems, and Control Engineering		
Mechanical Engineering		
Transportation and Environmental Systems		
Architecture		
Civil and Environmental Engineering		
Informatics and Data Science		
Smart Innovation		

* The application guidebook for this special course are limited to the above 9 programs. Please note that programs other than the above are not included in the Graduate School of Science and Engineering.

2. Eligibility for Application

Applicants must be foreign nationals and belong to the following applies:

(1) Graduates/students from a partner university or Hiroshima University.
(2) Those who visit Japan for study with a will to work for companies in Hiroshima.
(3) Those who can speak Japanese or willing to study Japanese.

3. Application Requirements

Applicants must fall under all of the above categories and have scored over 505 on the TOEFL®-PBT or over 63 on the TOEFL®-iBT (over 600 on the TOEIC® or over 5.5 on the IELTS® or over 160 on the Cambridge English Qualifications) or equivalent. Scores must be submitted at the time of application. Those who have received higher education in English can apply.

4. Application Procedure

(1) Application Period

The application period shall run from **December 1, 2022** to **January 31, 2023**.

(2) Application Documents

No.	Application Documents	Notes
1	Admission Application Form	Use the prescribed form.
2	Reasons for Application	Use the prescribed form.
3	Summary of Bachelor's Thesis	Use the prescribed form.
4	Research Plan	Use the prescribed form. (Should be made after consulting with a prospective academic advisor of HU.)
5	Letter of Recommendation	Recommendation from an academic advisor. (Should be made by typewriting and signed by handwriting.)
6	Pledge	Use the prescribed form.
7	Application Fee	30,000 Japanese yen Enter your personal information on the website and make payment by a credit card within "(1) Application Period". **Step 1: Access the Online Application System.** Access the following web page : Hiroshima University's Admission Information https://www.hiroshima-u.ac.jp/en/nyugaku **Step 2: Select the item "Registration for UCARO" on the login screen of UCARO.** Account registration for UCARO (free for charge) is required for application. Hiroshima University uses the system of UCARO for checking the applicant's number and processing a part of admission procedure for the accepted applicants. **Step 3: Input the information regarding the application in the Online Application System.** Follow the instruction shown on the screen to input your name, address, etc. **Step 4: Upload your photograph.** Follow the instruction shown on the screen to upload the digital data of your photograph (File format: JPEG). * The uploaded photo, which will be used for identification at the examination, will be also used for your student ID card after enrollment. Therefore, please be sure to upload your photo that meet the on-screen precautions. Once uploaded, your photo will not be allowed to be replaced. A fee of JPY 1,000 will be charged for changing the content of your student ID card (photo and your name) after enrollment. **Step 5: Pay the entrance examination fee of 30,000 yen.** Credit card: VISA, MasterCard, JCB, AMERICAN EXPRESS, Diners Club **Step 6: Complete the registration of the application information.**

<table>
<tr><td></td><td></td><td>Write down <u>the application number of six digits</u> that is shown on the screen.</td></tr>
<tr><td>8</td><td>Academic Transcript</td><td>Must be written in English or Japanese issued by a university or college president or dean.</td></tr>
<tr><td>9</td><td>Certificate of Graduation, or Certificate of Expected Graduation</td><td>Must be written in English or Japanese issued by a university or college president or dean.
The applicant who graduated or is expected to graduate from a university in China (excluding that in Taiwan, Hong Kong, and Macao) is required to submit the following documents:
<table>
<tr><th>Graduate</th><th>Prospective Graduate</th></tr>
<tr><td>・教育部学历证书电子注册备案表*
・毕业证书
・学士（硕士）学位证书</td><td>・教育部学籍在线验证报告*
・毕业预定证书</td></tr>
</table>
* Obtain the document for which the Web authentication will be valid as of Tuesday, February 15, 2023 via the authentication system of the Ministry Education of China (中国高等教育学历证书查询). http://www.chsi.com.cn/xlcx/bgys.jsp</td></tr>
<tr><td>10</td><td>Certificate of English Language Ability</td><td>Submit the actual score results (not a copy) from exams taken from May 2019 until the time of application. Applicants will be unable to apply if they don’t submit their original sheet. At the time of application, scores shall be reviewed and then returned.
<u>(The document is not required for applicants who have received higher education in English. (Instead, please submit the document that can prove that.))</u>

Note: Please submit scores from one of the following tests:
* TOEFL®
* TOEIC®
* IELTS®
* Cambridge English Qualifications</td></tr>
<tr><td>11</td><td>Certification of Japanese Ability</td><td>Certification of Japanese ability, if any (additional)</td></tr>
</table>

Note i) All documents above and examination fee will not be returned for any reason.
ii) The applicant has to pay the charge for use of the Online Application System (1,000 yen per application) in addition to the entrance examination fee.

(3) Application Method

Please submit all documents of (2) to the following office within the period of (1) by mail.

Support Office for the fields of Engineering,
Hiroshima University
1-4-1 Kagamiyama, Higashi-Hiroshima 739-8527, Japan Tel: +81-(0)82-424-7518

5. Method of Selection

Students will be selected on the basis of the submitted documents and the results of the oral examination via internet using Skype or the other method.

* Details of the examination date and venue are informed you by your prospective academic advisor (or program manager).

6. Announcement of Results

The notification of admission will also be sent to accepted applicants by e-mail **March 10, 2023**.

(No telephone enquiries regarding admission shall be accepted)

7. Admission Procedures

(1) Admission Documents

Documents shall be sent to successful applicants.

(2) Admission and Tuition Fees

a) Admission Fee: 282,000 yen

b) Tuition Fee: 535,800 yen (per year)

*Admission fees shall not be returned for any reason.

*The above fees are listed as current for **April 2022**. Should the amount be revised at the time of or after enrollment, students will be required to pay the revised fee.

(3) Admission Procedure Period

New students will begin procedures in the middle of **August 2023**.

(Details will be announced separately.)

8. Scholarship

Allowance: Each grantee will be provided monthly with **100,000** yen for 24 months.

The scholarship will not be paid to a grantee who takes a leave of absence or is long absent from Hiroshima university.

Scholarship will be cancelled for a grantee in the following cases. Furthermore, if scholarship payments were made during the period the following cases applied, the grantee may be ordered to return scholarship payments received during that period.

① If any of his/her application documents is found to be falsely stated;

② If he/she is subjected to disciplinary action, such as expulsion or removal from register, taken by Hiroshima University;

③ If it becomes definitive that the grantee will not be able to complete his/her course within the standard course term because of his/her poor academic achievement or suspension.

9. Inquiries, Submission

Support Office for the fields of Engineering, Hiroshima University
Hiroshima University
1-4-1 Kagamiyama, Higashi-Hiroshima 739-8527, Japan
Tel: +81-(0)82-424-7518 Fax: +81-82-424-5461
E-mail: kou-gaku-daigakuin@office.hiroshima-u.ac.jp

Inquiry regarding “the Online Application System”

Online Application Help Desk (Japanese Speaking Only) Service Hours: 10:00 - 18:00 (Except from December 30 to January 3) Tel:+81-3-5952-3902
UCARO Support Office (Japanese Speaking Only) Service Hours: 10:00 - 18:00 (Except from December 30 to January 3) Tel:+81-3-5952-2114

10. Others

(1) Regarding Personal Information Management and Handling

Any personal information acquired through this application (full name, date of birth, sex, etc) shall be used only for the purposes of admission selection and notification. Hiroshima University shall keep the data only of those who have been admitted for the purposes of student support (scholarship application, tuition waiver application, etc) and for the purposes of examination and research (entrance exam improvement, applicant trend surveys/analysis, etc). Hiroshima University will not use personal information for any other purpose, nor provide information to any third party.

(2) Smoking has been prohibited entirely in all HU campuses from January, 2020.

(3) Hiroshima University has established the university’s Rules on Security Export Control in accordance with the Foreign Exchange and Foreign Trade Act, and conducts strict examinations for acceptance of international students, etc. Therefore, please be advised that International applicants may be unable to

receive their desired education or conduct their desired research due to the restriction by the above regulations.

11. Lists of Academic Supervisors

Applicants should always consult with supervisor for research content prior to application.

Applied Chemistry Program

Specialty	Research Fields	Academic Staff
Organic Supramolecular Chemistry	Education and research on development of synthetic reactions and supramolecular complexes applied for creating functional organic molecules in everyday life, medicinal field, and high technology.	IKEDA Atsushi KAWASAKI Riku
Polymer Chemistry	Education and research on polymer chemistry, especially, precision polymerization catalyzed by transition metal complex and development of new polymers from renewable biomass.	SHIONO Takeshi NAKAYAMA Yuushou TANAKA Ryo
Organic π-Conjugated Materials Chemistry	Education and research on novel organic functional and semiconducting materials such as π-conjugated polymers, and their application to energy and/or electronic devices such as organic solar cells. Education and research on novel organic synthetic methodology by developing new reactions, reagents, and catalyst, and their application to syntheses of various organic functional materials and pharmaceuticals.	OSAKA Itaru SAITO Masahiko
Materials Analytical Chemistry	Education and research on analytical chemistry, especially, development and application of new methods in x-ray spectroscopy and electron spin resonance spectroscopy.	HAYAKAWA Shinjiro KOMAGUCHI Kenji
Functional Dye Chemistry	Development of novel functional dye and polymer materials with epoch-making optoelectronic characteristics, fluorescence sensing ability and therapeutic activity. Education and research on new functions of organic/inorganic materials and their applications to novel electronic/optoelectronic devices	OOYAMA Yousuke IMAE Ichiro IMATO Keiichi
Inorganic and Hybrid Materials Chemistry	Research and education on ceramics, with main interests on molecular design, synthesis, characterization, and applications of new inorganic or inorganic-organic hybrid materials having functional nano-structures.	INUMARU Kei KATAGIRI Kiyofumi FUKUOKA Hiroshi TARUTANI Naoki
Catalytic Materials Chemistry	Synthesis and characterization of novel functional metal oxide materials such as metal oxide clusters, zeolites, and related materials, and their application to catalysts and adsorbents in environmental and energy research fields.	SADAKANE Masahiro TSUNOJI Nao MINATO Takuo

Supervisor below in charge of plural programs takes charge of the program in the following table, including this program.

Program	Specialty	Research Fields	Academic Staff
Smart Innovation Program (Applied Chemistry)	Element-Based Organic Materials Chemistry	Education and research on element-based materials, in particular synthesis and applications of polymers with inorganic elements, and development of functional materials with epoch-making optoelectronic characteristics.	OHSHITA Joji ADACHI Yohei
	Computational Materials Science	Education and research on computational chemistry, in particular understanding of chemical and physical phenomena based on molecular simulation and applications using data science.	ISHIMOTO Takayoshi KANEMATSU Yusuke

Chemical Engineering Program

Specialty	Research Fields	Academic Staff
Thermal-Fluid Engineering	Development of self-healing coating for industrial materials, printable electronics using metal complex (conductive, power storage, power generation materials). Synthesis of nanoparticles and nanostructured particles.	OGI Takashi YABUKI Akihiro (Concurrent post)
High-Pressure Fluid Property	Measurement and modeling of the equilibrium and transport properties for supercritical fluid + polymer systems. Development of innovative material processing technology for functional organic and inorganic materials utilizing particular characteristics of supercritical fluids.	TAKISHIMA Shigeki KIHARA Shinichi USHIKI Ikuo
Polymer Technology	Education and research on development of robust water production processes of which key technology is polymer membrane restoration, production of high functional organic compounds from unused resources using biological processes, investigation of carbon behaviors in the aquatic environment and enhancement of carbon storage, development of innovative separation and wastewater treatment systems using stimulus responsive polymers or polymer gels, development of a highly efficient functional polymer and analysis of reaction using polymer.	NAKAI Satoshi GOTO Takehiko
Separation Technology	Development and characterization of nano- or subnano-porous ceramic membranes, and their application to gas separation, pervaporation / vapor permeation, nanofiltration / reverse osmotic processes, and catalytic membrane reactors. Sol-gel and plasma-enhanced CVD for functionalized materials. Transport mechanism of gas/liquid molecules through microporous membranes. Evaluation of membrane-based separation processes.	TSURU Toshinori KANEZASHI Masakoto NAGASAWA Hiroki
Fine Particle Technology	Development of novel high-performance classification system. Development of powder treatment process using microwave heating method. Improvement and life prediction of bag filter system. Analysis of particle dispersed system by DEM-DNS and DEM-CFD simulation. Evaluation of physical and chemical particle property. Application of zeta potential measuring device and vibration fluidized bed.	FUKUI Kunihiro ISHIGAMI Toru FUKASAWA Tomonori
Interfacial Systems Process Engineering	Synthesis and fabrication of fine materials and micro-controlled surfaces by the generation and transport of gasborne matter; contamination phenomena induced by small particulate matter and trace amount of gaseous matter; development of synthetic process of organic-inorganic hybrid porous materials; investigation of mechanism of particle formation and assembly in small droplets.	SHIMADA Manabu KUBO Masaru
Sustainable Materials Process Engineering	Development of self-healing coating for industrial materials, printable electronics using metal complex (conductive, power storage, power generation materials). Synthesis of nanofibers, nanogel and biomaterials using self-organisation technology.	YABUKI Akihiro LEE JI HA
Green Process Engineering	Education and research on treatment of waste and wastewater, evaluation of environmental impacts of the human activities and its reduction by greenization of chemical processes, and ecological engineering for conservation and restoration of damaged ecosystems.	NISHIJIMA Wataru UMEHARA Akira NAKAI Satoshi (Concurrent post) SUENAGA Toshikazu

Electrical, Systems, and Control Engineering Program

Specialty	Research Fields	Academic Staff
Social Informatics	Research interest of Social Informatics Lab covers decision analysis for organizations with competitive or cooperative relationships, data analysis of business activities, modeling of artificial agents with psychobehavioral preferences and so forth. Our researches also relate to the following disciplines: game theory, optimization, decision analysis, simulation analysis, artificial agent modeling, network analysis, machine learning, evolutionary computation, nonlinear data analysis, and applications to electricity power systems.	NISHIZAKI Ichiro HAYASHIDA Tomohiro SEKIZAKI Shinya
Production Systems Engineering	Research on design, planning and control techniques of large-scale, complicated manufacturing systems and supply chains. Some research topics are the utilization of human capability as a fundamental element of the production system, the development of manufacturing systems which adapt to the change of manufacturing environment, the application of optimization and simulation techniques for planning facility, production-distribution-inventory systems, and service systems, and the development of scheduling techniques.	TAKAHASHI Katsuhiko MORIKAWA Katsumi NAGASAWA Keisuke
Mathematics	Research on inverse problems and the eigenvalue problems of differential equations. Mathematical analysis of linear PDEs. Dynamical systems and ergodic theory. Research on nonlinear elliptic and parabolic differential equations, and applications to the dynamical system and phenomenological theory. Statistical physics of neural networks.	IKEHATA Masaru SHIBATA Tetsutaro KAWASHITA Wakako SANO Megumi YONG Moo Chung WAKASUGI Yuta UCHIYAMA Satoki
Electric Power and Energy System	Research on large-scale, complex and nonlinear electric power systems, including problems of operation, planning, stability analysis, and control. Recent topics include the construction of smart microgrid using new type of converter under development (hardware) and its control technologies (software). Keywords: renewable energy, distributed power generation, battery, vehicle-to-grid, optimization technique, artificial intelligence (AI) application, control system design, analysis technology, reliable ICT application, algorithm development.	ZOKA Yoshifumi SASAKI Yutaka TAOKA Satoshi
Biological Systems Engineering	The main subject of research is the measurement, analysis and modeling of biological functions with its engineering applications. The research area covers human motion analysis, bioelectric signal processing, welfare robotics, artificial life, soft computing, electric circuit design and medical electronics engineering, physical assist devices, haptics, virtual reality, human augmentation, and human interaction, etc.	TSUJI Toshio KURITA Yuichi ZU Soh
Applications of Cybernetics	Research on the modeling and application of a complicated phenomenon. For example, measurement and diagnosis for the living body information and system integration, engineering application, etc.	MATSUMOTO Yoshio KOMINE Hidehiko MIYATA Natsuki

Supervisor below in charge of plural programs takes charge of the program in the following table, including this program.

Program	Specialty	Research Fields	Academic Staff
Smart Innovation Program (Electrical, Systems, and Control Engineering)	Control Systems Engineering	Research and education on system control technology and digital signal processing. Specifically, adaptive & learning control system technology for industrial systems, Cyber-Physical Systems (CPS), Model Based Development (MBD) and digital signal processing for communication systems and image processing.	YAMAMOTO Toru WAKITANI Shin NAKAMOTO Masayoshi KINOSHITA Takuya
	Smart Robotics	Research on hyper-human robotics technology exceeding man's capability, and its real world applications. For example, high-speed robot vision, robot mechanism design, mobile robot, sensor-based manipulation, multimedia applications, industrial applications, medical applications, bio-applications, etc.	ISHII Idaku TAKAKI Takeshi

Mechanical Engineering Program

Specialty	Research Fields	Academic Staff
Machinery Dynamics	Studies for analyzing, simulating, and controlling mechanical systems such as robotic systems, e.g., Stable realtime simulation of deformable objects; Force control techniques for human-robot collaboration; Modeling and computational techniques for pneumatic tires; Teleoperation control of biped robots; Physics-based modeling of hydraulic systems; Control techniques for cancelling joint friction; Periodic-disturbance observer for industrial machines; Periodic/aperiodic separation control.	KIKUUWE Ryo MURAMATSU Hisayoshi
Mechanics of Materials	Experimental study on impact thermo-mechanical and fracture behavior of materials with phase transformation and characterization by observation of microstructure; Development of new members with high collision energy absorption by using material with high impact energy absorption; Development and modification of impact testing methods; Multi-scale analysis of steel with phase transformation based on the homogenization technique; Dislocation mechanics by the microforce concept and coupling with a transformation-crystal plasticity theory; Simulation of interface motion driven by phase transformation using microforce balance equation; Mesh free method such as GIMP for impact and phase transformation problems.	IWAMOTO Takeshi
Control Engineering	Analysis and control of dynamical systems including robust control, model predictive control, optimal control, nonlinear control, and their applications to mechanical systems, biological networks, and privacy mechanism design.	WADA Nobutaka KAWANO Yu
Machine Intelligence and Systems A	Realization of machine intelligence. In particular, the collective intelligence generation, control and analysis based on the concept of decentralized autonomous systems by building swarm robotic systems or conducting large-scaled computer simulations with emerging techniques in the field of biomimetics and computational intelligence.	OHKURA Kazuhiro
Machine Intelligence and Systems B	Research on design, planning and control of manufacturing systems; Research on optimum/intelligent production planning and scheduling.	EGUCHI Toru
Mechanical Design and Systems	Three-dimensional measurement of the motion of machine tools and its control; Kinematic modelling of machine tools and robots and error diagnosis; Three-dimensional geometric measurement; Monitoring and intelligent control of machining processes; Strength, failure analysis and design of gear drives; Simulation of gear vibration and noise; Development and design of a new-type gear with higher strength and performance than that of the Involute gear; Estimation and improvement of power transmission performance of gear and traction drives; Improvement in performance of gear pumps; Design and tribology of various machine elements.	IBARAKI Soichi IKEJO Kiyotaka
Machining and Machining System	The sensing technology and the components for machine tools; Machining for the difficult-to-cut materials; Development of the free-cutting steels and the new cutting tools; Laser assisted machining process; Laser processing of brittle materials.	YAMADA Keiji TANAKA Ryutaro
Materials Physics	Elucidation of physics phenomena in high-functional and high-performance metals, ceramics and metal matrix composites, and development of these materials: (1) Material process optimization with nano- and meso-scale texture control; (2) Evaluation of mechanical and functional properties in wide range from nanoscale to milliscale; (3) Observation and characterization of microstructure with optical, scanning electron and transmission electron microscopes; (4) Modeling with computer simulations (molecular dynamics method, finite element method, etc.).	SASAKI Gen SUGIO Kenjiro
Properties Control for Mechanical Materials	Analyses and micro-macro modeling for materials fabrication process, and development of materials property control by their techniques: (1) Casting using the material control technology, the alloying using the sintering method, and a diplo-phasing and compositing; (2) Thermal and mechanical conditions of the material engineering quality of the material by the analysis of a material process, research-and-development; (3) Nano-meso scale by the mechanical engineering techniques, such as control of the dynamic or control.	MATSUGI Kazuhiro CHOI Yongbum
Strength and Fracture of Mechanical Materials	The microscopy of the fatigue crack growth mechanism by using high-resolution microscope; The evaluation of material strength of advanced structural materials; Evaluation of fatigue strength and damage mechanism of joints welded by various joining methods (resistance spot welding, laser welding, friction stir welding, adhesive joining); Establishment of fatigue life estimation method under actual loading; Elucidation of fatigue and creep damage mechanisms of oxide dispersion-strengthened platinum-rhodium alloy.	SUGETA Atsushi AKEBONO Hiroyuki

Specialty	Research Fields	Academic Staff
Materials Forming Science and Engineering	Mainly experimental evaluation of elastic (viscoplastic) properties and rupture limits of metallic materials, modeling and property identification based on elastic-plastic mechanics, prediction of forming limits and springback of difficult-to-form metallic plates, hot and warm plastic forming, improvement of accuracy of numerical simulation of plastic forming processes, optimization problems in plastic forming.	HINO Ryutaro
Materials Joining Science and Engineering	Development of high-quality / high-efficiency welding and joining processes using hot-wire method with several heat sources (laser, GMA and GTA); Development of dissimilar joining processes (LFW and FSW) using frictional heat source; Evaluation of hot cracking susceptibility and elucidation of mechanism of hot cracking during welding using in-situ observation technique with high-speed cameras and multi-sensor camera; Prediction of hot cracking initiation and distortion during welding using computational simulation; Development of novel joints based on microstructure formation and strength analysis of welded joints.	YAMAMOTO Motomichi CHOI Jeongwon
Materials Engineering for Energy Conversion and Storage	Research and development of energy conversion materials which are in particular related to: Secondary battery materials (Li-Ion and Ni-MH); Fuel cell with non-conventional mechanisms, energy conversion systems (thermochemical hydrogen production and electrolysis of NH_3 and H_2O), and/or solid state hydrogen storage materials; Energy recovery from waste and biomass.	ICHIKAWA Takayuki
Thermal Engineering	Production of hydrogen from biomass using supercritical water; Heat transfer and chemical reactions in supercritical water; Hydrothermal pretreatment of biomass; Chemical heat pump; Structural analysis of nanocrystal; Fundamental research of carbon nanotube.	MATSUMURA Yukihiko
Mechanical Power and Motor Systems	Large-scale computer simulation of Magnetohydrodynamics for magnetic confinement fusion plasmas; Development of carbon-neutral energy using plasma; Development of new imaging diagnostics for turbulence and its applications; Numerical analysis and measurement to elucidate wall heat transfer mechanism in turbulent flow in pipes, and characteristics of gas-liquid two-phase flows such as liquid jets and fuel sprays for loss reduction technology; Development of new research areas on medical science and engineering using dynamical systems theory and data-driven science	SUZUKI Yasuhiro OGATA Yoichi
Combustion Engineering	Construction of reaction mechanisms for practical combustion; Improvement of IC engine combustion based on detailed kinetic analysis; Measurements of ignition properties of fuel components and mixtures; Improvement of combustion based on the ignition characteristics of fuels; Low NOx, low SPM tubular combustion; Micro combustor; Fire safety.	MIYOSHI Akira SHIMOKURI Daisuke
Reactive Gas Dynamics	Fundamental studies on high-speed reactive gas flows such as detonations or explosions; Development of new internal combustion engines or heat sources using high-speed combustion; Fundamental studies on laser ignition; Numerical studies on laser-plasma physics such as laser fusion or laser-plasma x-ray sources; Physics and chemistry of explosions in gas-phase or solid-gas-mixed-phase fluids.	ENDO Takuma JOHZAKI Tomoyuki KIM Wookyung
Plasma Science	Applications of high-density arc plasmas to scientific and engineering fields; Development of plasma window for separation between vacuum and atmosphere; Development of coherent/incoherent bright X-ray sources driven by lasers.	NAMBA Shinichi YAMASAKI Kotaro
Quantum Energy Applications	Monte Carlo simulation on interactions of radiations with matter; Microdosimetry of radiations; Dosimetry of Radiation Hazards; Medical and Engineering Applications of Radiation; Measurement of nuclear reaction cross sections in high and medium energy radiations; Measurement of gamma radiations, alpha and beta particles and environmental radioactivities.	ENDO Satoru KAJIMOTO Tsuyoshi

Transportation and Environmental Systems Program

Specialty	Research Fields	Academic Staff
Structural Systems	Buckling and ultimate strength evaluations Fracture and fatigue strength evaluations Computational Mechanics, Applied Mechanics, Solid/Structural Analysis Research on a floating structure for offshore wind power generation Energy harvesting using mechanical vibration Nondestructive inspection, Numerical electromagnetic field analysis	TANAKA Satoyuki
Structural Innovation	Design technologies and optimization methods for large-scale structures such as vehicles. Topology optimization method and its application. Computational method for structural analysis.	KITAMURA Mitsuru YAMAMOTO Takeki
System Safety	Research on safety assessment and maintenance for structures and transportation equipment systems. Development of sensors for dynamic load and deformation measurement. Development of instrumentation system for structural safety management. Automatic control and planning of ship equipments and systems.	SHINTAKU Eiji TANAKA Yoshikazu
Transportation System Innovation	Research on planning and design methodology for transportation systems using ICT Design and planning of new transportation system using maritime logistics big data Development of efficient construction system using factory monitoring	HAMADA Kunihiro TANIGUCHI, Naokazu
Marine Transportation System	Development of an environment friendly marine vehicle Research on prediction of performances of marine vehicle Research on marine navigation safety Research on a new energy transportation	YASUKAWA Hironori SANO Masaaki
Fluid Dynamics for Transportation and Environmental Systems	Research on the reduction of wind resistance acting on a bridge of ship, Research on seakeeping performance of a ship in nonlinear wave, Research on aerodynamics of an automobile in the real world, Assessment and prediction of ocean-atmosphere environment due to vehicle transportation, Research on an advanced technology of electrical energy generated by renewable energy (wind, ocean power, vibration) Research on a technology of energy harvesting Research on CFD technology by using Particle Based Method	MUTSUDA Hidemi NAKASHIMA Takuji
Air Transportation and Ocean Systems	Research on the aerodynamic properties of WIG flying over the waves, Research on the passive control of the wind turbine with elastic composit material, Research on the human-powered aircraft, Theoretical and experimental researches on Ship seakeeping, Research on the remote sensing technology of marine environment, Research on the acoustic tomography technology of marine environment	IWASHITA Hidetsugu SAKUNO Yuji
Geophysical Fluid System	A study of influence of the Kuroshio on the state and variability of the Seto Inland Sea. A study of tidal mixing and tidal front. A study of the turbulent processes from planetary scale to microscale in an ocean. A study of the spontaneous transition between two states in a geophysical flow.	ARAI Masazumi

Architecture Program

Building Engineering Field

Specialty	Research Fields	Academic Staff
Building Materials and Compornents	Applying technologies of RFID for the building life-cycle support Durability design for reinforced concrete buildings Repairing method for buildings, materials and components for sustainable buildings Applying wireless sensor technology for maintenance of building elements Control technology of cracking in concrete Evaluation for aesthetic quality of concrete texture	OKUBO Takaaki
Structural Mechanics of Building	Study on large-scale wooden construction using wooden materials including CLT Research on development of wooden rigid frame structure Evaluating method of residual seismic performance of existing wooden construction Long term performance evaluation of wooden buildings and materials	MORI Takuro
Building Structures	Seismic design of steel structures Vibration control system of steel structures Beam-to-column connections and column-bases of steel structures Buckling analysis and design of steel frames Seismic retrofit of existing structures	TAGAWA Hiroshi CHEN Xingchen
Disaster Prevention Engineering	Seismic response and risk analyses of earthquake resistant, vibration controlled and isolated buildings Estimation of soil-structure interaction effects shock-resistant design of buildings Earthquake ground motion evaluation Building damage estimation Spatial data analysis for risk evaluation and damage identification	NAKAMURA Naohiro MIURA Hiroyuki
Earthquake and Structural Engineering	Seismic design of reinforced concrete members Repair and reinforcement of reinforced concrete buildings Deterioration prediction method for reinforced concrete buildings Advancement of crack reduction technology for reinforced concrete members Aesthetic evaluation of reinforced concrete buildings	TERAMOTO Atsushi

Architecture Field

Specialty	Research Fields	Academic Staff
Urban and Architectural Planning	Urban environmental planning (green, wind, water, climate, hazard, energy, and built environment). Compact city design with population decrease. Sustainable community design with using GIS. Housings in urban and local area. The planning of social welfare and community facilities. The region-based housing supply system. The planning and the management of building production processes.	TANAKA Takahiro SUMIKURA Hideaki ISHIGAKI Aya
Architectural History and Design Theory	Theory on peace architecture and urban design. Theory on environment and landscape design. History of modern architecture and modern urbanism in Japan and World. Research and planning for the conservation of buildings and towns.	MIZUTA Susumu
Architectural Environment	Problems concerning with human behavior and/or environmental psychology in architectural and urban field Psychological evaluation of regional landscape and living environment Energy conservation of buildings Efficient use of renewable energy	NISHINA Daisaku KINDAICHI Sayaka
Architectural Project	Design of an environmentally conscious architecture Architectural design using BIM and CFD analysis Design of temporary shelters immediately after the disaster Study on wooden buildings using domestic solid wood	NAKAZONO Tetsuya

Supervisor below in charge of plural programs takes charge of the program in the following table, including Architecture Field of this program.

Program	Research Fields	Academic Staff
Transdisciplinary Science and Engineering Program	Building and urban environmental science for achieving sustainable development in developing world.	KUBOTA Tetsu

Civil and Environmental Engineering Program

Specialty	Research Fields	Academic Staff
Structural Materials and Concrete Structures	Education and research on the physicochemical characteristics of cementitious materials, the mechanical and durability performance evaluation of plain, reinforced and prestressed concretes, effective utilization of resources, environmental impact evaluation of concrete, and maintenance of concrete structures.	KAWAI Kenji OGAWA Yuko RIYA Catherine George
Structural Engineering	Education and research on evaluation of structural performance and durability of concrete structures, strength development and deterioration of cement-treated soils, and cementitious engineered barrier for nuclear waste management. Education and research on mathematical structural design and structural optimization by FEM etc., bifurcation buckling of structures, dynamics problems and fluid-structure interaction problems, and multiple folding stability problems such as bridges, bridge damage survey analysis and development due to natural disasters.	NAKARAI Kenichiro ARIO Ichiro
Geotechnical Engineering	Evaluation of mechanical property of soft ground, Ground improvement techniques, Engineering properties of cement treated clay and recycled geo-materials, Development of new construction technology for waste disposal facility in coastal areas, In-situ testing of weathered granite soil and the application on disaster prevention of natural slopes in heavy rainfall, Estimation and countermeasures of sand liquefaction by earthquakes, Evaluation of seismic site response of ground, Earthquake resistant design of geotechnical works, Maintenance and condition evaluation method for road pavement and geotechnical structures, Conservation of historic structures based on geotechnical engineering.	HATA Toshiro HASHIMOTO Ryota
Infrastructure Management	Structural analysis and simulation, damage identification and deterioration diagnosis of infrastructures	KHAJI Naser
Global Environment and Planning	Development of planning methodology, and analysis for following themes; recycling and low-carbon society, urban transportation system by making full use of an economical evaluation, a statistical model, and a mathematical planning, a travel behavior model, or network science. Researches on material flows for scarce metals, market share forecast on low emission vehicles, development of statistical model for "big-data", on consensus building by statistical approach for text data	TSUKAI Makoto FUSE Masaaki
Environmental Preservation Engineering	Biological wastewater treatment. Energy recovery from biomass by microbes. Nitrogen and Phosphorous removal. Microbial community analysis. Analysis and modelling of behavior of trace toxic chemicals in air and water environments. Application of membrane filtration technique on wastewater treatment.	OHASHI Akiyoshi OZAKI Noriatsu KINDAICHI Tomonori
Hydraulic Engineering	Flood forecast; interactions among flood flow, vegetation and morphology in rivers; multi-scale phenomena of flow and sediment transport in a dynamic fluvial system; sedimentation sorting and variation in porosity and sediment volume in rivers; tsunami dynamics in rivers; multi-phase flows with sediment transport around river structures; sediment-flood inundation and sediment capacity in rivers, global sediment dynamics, long-term precipitation analysis	UCHIDA Tatsuhiko INOUE Takuya HATONO Misako
Coastal Engineering	Development of technology to improve environment in river bank Practical use of "sediment microbial fuel cells" more than solar batteries Research on groundwater and tidal flat environment in tidal estuaries	HIBINO Tadashi NAKASHITA Shinya

Supervisor below in charge of plural programs takes charge of the program in the following table, including this program.

Program	Research Fields	Academic Staff
Transdisciplinary Science and Engineering Program	Transportation planning methods, evaluation of transport policies, and sustainable development and transport	FUJIWARA Akimasa
	Various urban, transportation, environment and energy, health, and tourism issues are targeted from the viewpoint of mobilities and urban policy. Relevant research deals with the development of methodologies (e.g., human behavior modeling, planning and evaluation methods), technological development, and policy evaluation and formulation for problem solving based on interdisciplinary approaches.	ZHANG Junyi
	Urban risk management / Advanced infrastructure planning / Activity-based analysis	CHIKARAISHI Makoto
	Numerical models for coastal hazards・disaster prevention・mitigation, Renewable energy resource evaluation and management, Evaluation of climate changes impacts on natural hazards and renewable energy resource.	LEE Han Soo

Informatics and Data Science Program

Specialty	Research Fields	Academic Staff
Intelligent Systems	Machine learning, High-performance computing, Parallel and distributed computing, Quantum computing, Embedded system	ITO Yasuaki
Computer Systems	Research on novel computer architectures, systems, and computing techniques for machine learning and combinatorial optimization. In particular, we use GPUs, FPGAs, and quantum computers for accelerating machine learning and for solving combinational optimization problems.	NAKANO Koji TAKAFUJI Daisuke
Distributed Systems	Theory and practice on parallel and distributed systems, such as secure and efficient resource sharing schemes, real-time file exploration in wide area networks, high-performance computing using PC clusters, contents delivery in service providing networks, and environment monitoring systems based on wireless sensor networks.	FUJITA Satoshi
Visual Information Science	Computer graphics, visualization, image processing, image recognition and understanding, computer vision, machine learning, deep learning, brain-inspired computing and various applications of these technologies, such as biomedical imaging and image analysis, optical design, vision and language-based information fusion (computer vision and natural language processing), video surveillance and human-computer interaction.	KANEDA Kazufumi RAYTCHEV Bisser HIGAKI Toru
Learning Engineering	Research on technology-enhanced learning systems designed based on knowledge modeling, implemented with artificial intelligence, multimedia and web technologies, and then practiced from viewpoint of education and psychology.	HIRASHIMA Tsukasa HAYASHI Yuusuke
Foundation of Computer Science	Cryptography and information security. In particular, privacy-enhancing authentications and network services, and implementations based on elliptic curve cryptosystems. Mobile and ubiquitous computing. In particular, communication, activity recognition, and location sensing using wireless devices. Theoretical studies on future computing systems. In particular, cellular automata and reversible computing	NAKANISHI Toru KITASUKA Teruaki IMAI Katsunobu
Dependable Systems	Reliability and Maintenance, Dependable computing, Fault tolerant computing, Computer security, Performance evaluation, Operations research, Software reliability engineering, Formal engineering methods for software development, Software testing and formal verification, Intelligent software engineering environment	DOHI Tadashi OKAMURA Hiroyuki LIU Shaoying
Pattern Recognition	Development of pattern recognition algorithms including deep learning. Image understanding, video recognition, image retrieval, etc. Real time processing for multimedia and embedded media software.	KURITA Takio MIYAO Jun-ichi
Social Computing	Algorithm for processing and utilizing “big data”. Data mining for SNS, Web, IoT, GPS, etc. Recommendation System, Personalization, Database marketing, Privacy-preserving information retrieval, Parallel and Distributed Algorithms, Biomedical statistics, etc.	MORIMOTO Yasuhiko KAMEI Sayaka MONDEN Rei
Informatics and Mathematical Science	System theory and intelligent information processing, Stabilization and optimization for stochastic systems, Numerical analysis and optimal design for mechatronic systems. Stochastic processes, especially going around fractals. Spectral analysis of the generators associated with the stochastic processes on fractals.	MUKAIDANI Hiroaki SHIMA Tadashi FURUI Akira
Computational Complexity Theory	Computational complexity theory, hierarchies of complexity classes, combinational computational geometry, visibility problems and art gallery theorems, design and analysis of algorithms.	IWAMOTO Chuzo
Data Analytics and Modeling	Large-scale, complex and dynamic data analysis (including text analysis & information retrieval, network analysis, and financial data analysis). Probabilistic modeling, statistical inference, and machine learning (including Bayesian modeling and deep learning).	EGUCHI Koji ANDRADE SILVA DANIEL GEORG
Advanced Information Networks	Research on the technologies of the Internet architecture and network applications, based on the keywords of mobility technology, virtualization / cloud infrastructure technology, IoT, cyber security, operation management, etc.	KONDO Tohru
Information Security	Research on the application of information security technologies to network systems and computer systems, the construction of management system and its operation to maintain information security, and the education for administrators and users to operate and use them properly.	NISHIMURA Kouji
Leaning Analytics	Statistical growth model, Information system supporting education and learning	SUMIYA Takahiro

Supervisor below in charge of plural programs takes charge of the program in the following table, including this program.

Graduate School /Program	Research Fields	Academic Staff
Graduate School of Advanced Science and Engineering / Mathematics Program	Statistical Science: Theory for Multivariate Data Analysis and its Applications, Statistical Inference, Asymptotic Expansion for Statistical Distributions, Resampling Methods, Biostatistics, Mathematical Statistics.	YANAGIHARA Hirokazu IMORI Shinpei FUKUI Keisuke
Transdisciplinary Science and Engineering Program	Research on Media Communication Services	KODAMA Mei
	Cybersecurity, Confidential Computing	WATANABE Hidenobu
	Nuclear Theory, Information System	IWASAWA Kazuo
Graduate School of Humanities and Social Sciences / Economics Program	Econometrics (Time series econometrics, Spatial econometrics), Signal Processing on Graphs	YAMADA Hiroshi
Graduate School of Humanities and Social Sciences / Psychology Program	Social psychological research on human behavior. Especially, research on inter-personal communication using indirect meanings.	HIRAKAWA Makoto

Smart Innovation Program

(Applied Chemistry)

Specialty	Research Fields	Academic Staff
Element-Based Organic Materials Chemistry	Education and research on element-based materials, in particular synthesis and applications of polymers with inorganic elements, and development of functional materials with epoch-making optoelectronic characteristics .	OHSHITA Joji ADACHI Yohei
Computational Materials Science	Education and research on computational chemistry, in particular understanding of chemical and physical phenomena based on molecular simulation and applications using data science.	ISHIMOTO Takayoshi KANEMATSU Yusuke

Supervisor below in charge of plural programs takes charge of the program in the following table, including this program.

Program	Specialty	Research Fields	Academic Staff
Applied Chemistry Program	Organic Supramolecular Chemistry	Education and research on development of synthetic reactions and supamolecular complexes applied for creating functional organic molecules in everyday life, medicinal field, and high technology.	IKEDA Atsushi KAWASAKI Riku
	Polymer Chemistry	Education and research on polymer chemistry, especially, precision polymerization catalyzed by transition metal complex and development of new polymers from renewable biomass.	SHIONO Takeshi NAKAYAMA Yuushou TANAKA Ryo
	Organic π-Conjugated Materials Chemistry	Education and research on novel organic functional and semiconducting materials such as π-conjugated polymers, and their application to energy and/or electronic devices such as organic solar cells. Education and research on novel organic synthetic methodology by developing new reactions, reagents, and catalyst, and their application to syntheses of various organic functional materials and pharmaceuticals.	OSAKA Itaru SAITO Masahiko
	Materials Analytical Chemistry	Education and research on analytical chemistry, especially, development and application of new methods in x-ray spectroscopy and electron spin resonance spectroscopy.	HAYAKAWA Shinjiro KOMAGUCHI Kenji
	Functional Dye Chemistry	Development of novel functional dye and polymer materials with epoch-making optoelectronic characteristics, fluorescence sensing ability and therapeutic activity. Education and research on new functions of organic/inorganic materials and their applications to novel electronic/optoelectronic devices	OOYAMA Yousuke IMAE Ichiro IMATO Keiichi
	Inorganic and Hybrid Materials Chemistry	Research and education on ceramics, with main interests on molecular design, synthesis, characterization, and applications of new inorganic or inorganic-organic hybrid materials having functional nano-structures.	INUMARU Kei KATAGIRI Kiyofumi FUKUOKA Hiroshi TARUTANI Naoki
	Catalytic Materials Chemistry	Synthesis and characterization of novel functional metal oxide materials such as metal oxide clusters, zeolites, and related materials, and their application to catalysts and adsorbents in environmental and energy research fields.	SADAKANE Masahiro TSUNOJI Nao MINATO Takuo

(Electrical, Systems, and Control Engineering)

Specialty	Research Fields	Academic Staff
Control Systems Engineering	Research and education on system control technology and digital signal processing. Specifically, adaptive & learning control system technology for industrial systems, Cyber-Physical Systems(CPS), Model Based Development (MBD) and digital signal processing for communication systems and image processing.	YAMAMOTO Toru WAKITANI Shin NAKAMOTO Masayoshi KINOSHITA Takuya
Smart Robotics	Research on hyper-human robotics technology exceeding man's capability, and its real world applications. For example, high-speed robot vision, robot mechanism design, mobile robot, sensor-based manipulation, multimedia applications, industrial applications, medical applications, bio-applications, etc.	ISHII Idaku TAKAKI Takeshi

Supervisor below in charge of plural programs takes charge of the program in the following table, including this program.

Program	Specialty	Research Fields	Academic Staff
Electrical, Systems, and Control Engineering Program	Social Informatics	Research interest of Social Informatics Lab covers decision analysis for organizations with competitive or cooperative relationships, data analysis of business activities, modeling of artificial agents with psychobehavioral preferences and so forth. Our researches also relate to the following disciplines: game theory, optimization, decision analysis, simulation analysis, artificial agent modeling, network analysis, machine learning, evolutionary computation, nonlinear data analysis, and applications to electricity power systems.	NISHIZAKI Ichiro HAYASHIDA Tomohiro SEKIZAKI Shinya
	Production Systems Engineering	Research on design, planning and control techniques of large-scale, complicated manufacturing systems and supply chains. Some research topics are the utilization of human capability as a fundamental element of the production system, the development of manufacturing systems which adapt to the change of manufacturing environment, the application of optimization and simulation techniques for planning facility, production-distribution-inventory systems, and service systems, and the development of scheduling techniques.	TAKAHASHI Katsuhiko MORIKAWA Katsumi NAGASAWA Keisuke
	Mathematics	Research on inverse problems and the eigenvalue problems of differential equations. Mathematical analysis of linear PDEs. Dynamical systems and ergodic theory. Research on nonlinear elliptic and parabolic differential equations, and applications to the dynamical system and phenomenological theory. Statistical physics of neural networks.	IKEHATA Masaru SHIBATA Tetsutaro KAWASHITA Wakako SANO Megumi YONG Moo Chung WAKASUGI Yuta UCHIYAMA Satoki
	Electric Power and Energy System	Research on large-scale, complex and nonlinear electric power systems, including problems of operation, planning, stability analysis, and control. Recent topics include the construction of smart microgrid using new type of converter under development (hardware) and its control technologies (software). Keywords: renewable energy, distributed power generation, battery, vehicle-to-grid, optimization technique, artificial intelligence (AI) application, control system design, analysis technology, reliable ICT application, algorithm development.	ZOKA Yoshifumi SASAKI Yutaka TAOKA Satoshi
	Biological Systems Engineering	The main subject of research is the measurement, analysis and modeling of biological functions with its engineering applications. The research area covers human motion analysis, bioelectric signal processing, welfare robotics, artificial life, soft computing, electric circuit design and medical electronics engineering, physical assist devices, haptics, virtual reality, human augmentation, and human interaction, etc.	TSUJI Toshio KURITA Yuichi ZU Soh
	Applications of Cybernetics	Research on the modeling and application of a complicated phenomenon. For example, measurement and diagnosis for the living body information and system integration, engineering application, etc.	MATSUMOTO Yoshio KOMINE Hidehiko MIYATA Natsuki