

## 1-1-1. Infrastructure Development

### **Hiroshima University (National) Graduate School of Innovation and Practice for Smart Society**

◆ **Program name**

Research Area: Smart Mobility, Smart Energy, Smart Agriculture,  
Social Innovation Science

◆ **Degrees:**

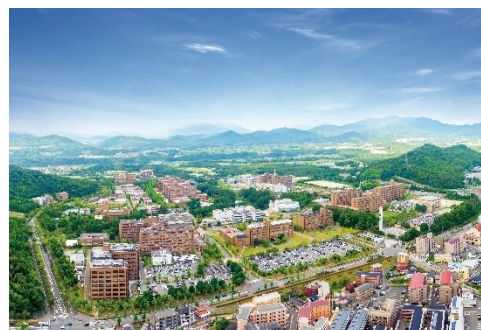
Master of Philosophy

◆ **Credit and years needed for graduation:**

30 credits, 2 years

◆ **Address:**

1-5-1 Kagamiyama, Higashi-Hiroshima-shi, Hiroshima,  
739-8529, Japan



### **Features of University** <http://www.hiroshima-u.ac.jp/en>

Hiroshima University (HU) was established by combining eight existing institutions in May 1949 under the National School Establishment Law. Later in 1953, the Hiroshima Prefectural Medical College was also added to the new HU. Some of these higher educational institutions already had brilliant traditions and histories of their own. Although these educational institutions suffered a great deal of damage due to the atomic bomb, which was dropped on Hiroshima on August 6, 1945, they were reconstructed and combined to become the new HU. In addition, Graduate Schools were established in 1953. The new HU has risen from the ruins of war like a phoenix, which is in fact the University's symbol.

HU has a long history of accepting international students. This commenced before World War II. As of May 2023, HU has over 13,000 students including approximately 1,700 international students from about different 80 countries. For details about education and student's life at Hiroshima University, please visit the following websites.

Education and Students Life: [https://www.hiroshima-u.ac.jp/en/explore\\_hu](https://www.hiroshima-u.ac.jp/en/explore_hu)

- Learning: [https://www.hiroshima-u.ac.jp/en/explore\\_hu/learning](https://www.hiroshima-u.ac.jp/en/explore_hu/learning)

- Timeline: [https://www.hiroshima-u.ac.jp/en/explore\\_hu/timeline](https://www.hiroshima-u.ac.jp/en/explore_hu/timeline)

- Support: [https://www.hiroshima-u.ac.jp/en/explore\\_hu/support](https://www.hiroshima-u.ac.jp/en/explore_hu/support)

- Life: [https://www.hiroshima-u.ac.jp/en/explore\\_hu/life](https://www.hiroshima-u.ac.jp/en/explore_hu/life)

- Photos: [https://www.hiroshima-u.ac.jp/en/explore\\_hu/photo](https://www.hiroshima-u.ac.jp/en/explore_hu/photo)

- Videos: [https://www.hiroshima-u.ac.jp/en/explore\\_hu/videos](https://www.hiroshima-u.ac.jp/en/explore_hu/videos)

### **Features of Graduate School** [https://www.hiroshima-u.ac.jp/en/smart\\_society](https://www.hiroshima-u.ac.jp/en/smart_society)

In April 2023, Hiroshima University launched a new graduate degree program, the Graduate School of Innovation and Practice for Smart Society to foster human resources who can design, develop, and implement systems and technologies to achieve a smart society to flexibly respond to social issues among diverse human societies from the range of the entire earth to local communities.

● **Integrated knowledge of learning and practice**

- A degree that balances interdisciplinary and expertise
- Participation of many leaders and institutions with practical experience from international industry, government and academia

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- Supervision to realize interdisciplinary education and research
  - Supervisors from multiple disciplines from four graduate schools give students advice on how to promote interdisciplinary perspectives in six cross-disciplinary research areas to realize a Smart Society
- Educational modules designed for flexible learning
  - Students can choose their subjects systematically from given modules based on their own strengths and specialities to foster integrated knowledge and practical knowledge

### **Features of the Program** [https://www.hiroshima-u.ac.jp/en/smart\\_society/main-fields](https://www.hiroshima-u.ac.jp/en/smart_society/main-fields)

Education and research at the Graduate School of Innovation and Practice for Smart Society is centered on the six areas of research that have been highlighted as the main research fields for Society 5.0: Cyber Physical System, Smart Mobility, Smart Energy, Smart Agriculture, Global Health and Medical Science, and Social Innovation Science. JDS candidates can apply for one of the following five areas of these six areas above:

#### **(1) Smart Mobility**

This research area analyzes AI big data that combines various spatiotemporal real-time information transmitted and collected from moving objects, ranging from cars and public transportation to pedestrians, as well as historical data on driving behavior, traffic jams, CO2 emissions, accidents, and disasters. It also examines systems and planning for mobility associated with socially optimal solutions for regional economic development and quality of life improvements.

Through interdisciplinary collaboration with other research fields, this research area addresses topics related to practical scientific approaches, including MaaS system development in collaboration with regional medical care, operating sustainable modes of transportation using biofuels, and the development of methods for achieving consensus in policymaking based on traffic flow simulations.

#### **(2) Smart Energy**

This research area covers energy control and planning that can generate socially optimal solutions with the aim of improving regional economic development and quality of life, by improving the efficiency of energy usage systems, converting and storing fluctuating energy, effectively using biomass energy, and understanding energy and environmental issues from a social science perspective, in order to achieve carbon neutrality in terms of energy use.

Through interdisciplinary collaboration with other research fields, this research area addresses topics related to practical scientific approaches, including the development of energy fluctuation absorption systems linked with MaaS systems by electric vehicles, local systems for production and consumption of nitrogen fertilizers linked with solar sharing, and the development of methods for achieving consensus in policymaking based on low environmental impact energy use simulations.

#### **(3) Smart Agriculture**

This research area deploys mechanical engineering and robotics technologies to devise new technological systems for food resources, centered on biology and environmental science that incorporates sensors and analytics through information and AI technology. Research in this area specifically develops technologies to facilitate real-time monitoring of livestock and crops in agricultural production, and to increase the production of livestock and crops based on that information. In the context of fisheries, this will involve research to facilitate the sustainable use of marine resources by monitoring and simulating both aquaculture and resource management. In the context of food products, research entails the development of safe food production and foods with health-improving properties.

In addition to the perspectives detailed above, adding socio-economic perspectives to the agricultural field will enable researchers to engage with research topics that can contribute to a vertically integrated understanding of food resources and resolve issues related to sustainable global food production.

#### **(4) Social Innovation Science**

This research area includes new policymaking, development, implementation, analysis, and evaluation backed by evidence-based policymaking to ensure social innovation, and the implementation of governance on the basis of that research. Research in this area seeks to leverage digital information analysis technologies, such as AI and machine learning, as researchers acquire expertise in immediate and quantitative decision-making science-based methodologies.

This research area addresses topics related to practical science with a strong connection to social innovation,

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through interdisciplinary collaboration with other research fields and through seeking to change human behavior relating to energy selection and consumption, food resource management, and health maintenance and promotion.

### **Necessary Curriculum to Obtain the Degrees**

[https://www.hiroshima-u.ac.jp/en/smart\\_society/curriculum](https://www.hiroshima-u.ac.jp/en/smart_society/curriculum)

To obtain a Master's degree, JDS Fellows need to satisfy the following requirements:

Minimum of 30 credits through program work;

Submission of a master's thesis.

All students need to decide a research topic and supervisors (one head-supervisor and two sub-supervisors) at the beginning of the first semester. Under the head-supervisor's advice, students will choose subjects to enroll and start preparations for a master's thesis.

List of subjects to be offered in 2024 academic year is attached. After enrolment, students are required to take courses according to their research topics in consultation with their supervisor.

(URL: [https://momiji.hiroshima-u.ac.jp/syllabusHtml\\_en/2024\\_EE\\_en.html](https://momiji.hiroshima-u.ac.jp/syllabusHtml_en/2024_EE_en.html) )

### **List of faculty members capable of guiding JDS Fellows**

[https://www.hiroshima-u.ac.jp/en/smart\\_society/faculty](https://www.hiroshima-u.ac.jp/en/smart_society/faculty)

Students need to decide their research topic and supervisors (one head-supervisor and two sub-supervisors) at the beginning of the first semester. Under the head-supervisor's advice, students will choose subjects to enroll and start preparations for their master's thesis.

#### **【Smart Mobility】**

Position	Name	Research Subject
Professor	FUJIWARA, Akimasa	Transportation planning methods, evaluation of transport policies, and sustainable development and transport
Professor	FENG, Tao	Urban planning, smart mobility, travel behavior, transport network analysis, data driven technology, mobility in built environment, spatial planning, urban environment analysis, decision making in smart energy, big data & machine learning for urban research
Professor	CHIKARAISHI, Makoto	Smart urban infrastructure, transportation planning, urban planning, travel behavior analysis, travel survey design, transport network analysis, resilience research, risk analysis
Associate Professor	KASHIMA, Saori	"Environmental Health Science Research" on environmental factors and human health, and "Environmental Epidemiological Research" for engaging "Planetary Health"
Associate Professor (Special Recognition)	SEIKE, Miho	Large enclosed-space fire safety: evacuation behavior, disaster prevention plan, thermal fume behavior, risk analysis, decision making of evacuation start

#### **【Smart Energy】**

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Position	Name	Research Subject
Professor	ICHIKAWA, Takayuki	Research and development of energy conversion materials which are in particular related to: Secondary battery materials; Fuel cell with non-conventional mechanisms, energy conversion systems, and/or solid state hydrogen storage materials; Energy recovery from waste and biomass.
Professor	MATSUMURA, Yukihiko	Production of hydrogen from biomass using supercritical water; Heat transfer and chemical reactions in supercritical water; Hydrothermal pretreatment of biomass; Hydrothermal carbonization; Chemical heat pump; Application research of carbon nanotube.
Professor	KUBOTA, Tetsu	Building and urban environmental science for achieving sustainable development in the Global South
Professor	LEE, Han Soo	Renewable energy resource (wind, solar and ocean energy) evaluation and management, Numerical models for coastal hazards, and disaster prevention and mitigation, Evaluation of climate changes impacts on natural hazards and renewable energy resources
Professor (Special Recognition)	MIYAOKA, Hiroki	Research on hydrogen production, hydrogen storage, ammonia synthesis, and material conversion based on functional properties of light elements. Understanding reaction mechanism by original sample synthesis methods and various analyses from wide points of view.

#### **【Smart Agriculture】**

Position	Name	Research Subject
Professor	TRAN, Dang Xuan	Development of biomass energy technologies and application to developing countries Agricultural ecology and development of sustainable agricultural technologies
Professor	HOSAKA, Tetsuro	I have been working on the diversity and ecological functions of insects in various ecosystems including forests, agricultural lands, wetlands, and urban green spaces. Also, I am interested in the interactions between human and nature, such as nature-based tourism, children's nature play and conflicts with wildlife, from the perspective of biodiversity conservation.
Associate Professor	WATANABE, Sonoko	Research and education on vegetation and landscape ecology of SATOYAMA ecosystems with a wide range of conservation issues. -Geographic distribution patterns of rural landscapes -Biodiversity conservation in SATOYAMA
Assistant Professor	NGUYEN Van Quan	Our group focuses on researching natural products and their applications in agriculture and human health protections, specifically in preventing chronic diseases such as diabetes, obesity, and cancer. In addition, we conduct metabolomic studies to decode the reaction mechanisms of crop varieties under various weather and environmental pressures.

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### 【Social Innovation Science】

Position	Name	Research Subject
Professor	ICHIHASHI, Masaru	Quantitative Comparison for Asian Economy, International and Regional Studies of Economy, Analysis for Industrial Development, Japanese Economic System, Economics Statistics Analysis
Professor	△ MAHARJAN, Keshav Lall	Rural Economics; issues related to agricultural economy and rural dynamics South Asian Studies; issues related to socio-economy of South Asia
Professor	KANEKO, Shinji	Study on Sustainable Development for Developing Countries Environmental Policy Studies in Asia
Professor	GOTO, Daisaku	Applied Microeconomics for Development and Environmental Policy Studies Field Experiments in Development and Environmental Economics Design and Evaluation of Social and Behavioral Change Communication
Professor	TAKAHASHI, Yoshi	Human Resource Development / Management, Management of Technology, Management of Small and Medium-sized Enterprises
Professor	SHARIFI, Ayyoob	Urban Planning and Policy Development, Environmental Planning and Management, Climate Policy, Smart City, Sustainable Cities
Associate Professor	JOSHI, Niraj Prakash	Agricultural Economics, Farming under Changing Climate, Adoption of Innovative Farm Practices, and Poverty and Rural Development in Developing Countries
Associate Professor	SIMANGAN, Dahlia Collado	International Relations Theory, Peacebuilding Theory, United Nations Peacekeeping Operations, Peace-Sustainability Nexus, Anthropocene
Associate Professor	KONDO, Masayuki	Evaluation of climate change countermeasures, analysis of greenhouse gas dynamics, land use change research in tropical regions, and theoretical research on Earth's climate regulation.
Assistant Professor	KHAN, Ghulam Dastgir	Social and Economic Impact Assessment of Development Policies.
Assistant Professor	CARO- BURNETT Johann	Political economy, voting behavior, international agreements, peace and conflict Behavioral economics, experimental economics, development economics

△Professors who will cease regular teaching within the standard completion period of the thesis.

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### **Academic Schedule**

(Reference)

#### **Fall Semester (October 1 - March 31) <In case of the schedule in AY2024>**

October 1	Entrance Ceremony, Orientation
October 3 - February 5	Classes
Early October	Deadline of Class Registration
Mid October	International Student Orientation (University-wide)
November 5	University Anniversary Day
December 26 - January 5	Winter Vacation
February 6 - March 31	End-of- Academic-Year Holidays

#### **Spring Semester (April 1 - September 30) <In case of the schedule in AY2024>**

April 1 - April 7	Spring Vacation
April 8 - August 1	Classes
Mid April	Deadline of Class Registration
End of July	Thesis Submission
Early-August	Thesis Defense
August 2 - September 30	Summer Vacation
September 20	Graduation Ceremony

**Facilities** <https://www.hiroshima-u.ac.jp/en/centers>

#### **Residence**

We provide apartments for international students at a reasonable rent. Students can get support in English from Hiroshima University Co-op when they apply for the apartments, have troubles and so on.

Also, a public apartment called "Sun Square Higashi-Hiroshima" is available to international students.

#### **Library**

Our library has nearly a collection of 30,000 titles of books and journals. Our collection is mainly focused on economics of development, education development, international relations and Asia regional culture development. "World Bank Information Kiosk" is placed for the purpose of introducing active discussions in academic area about the policy and actions of the World Bank. Students can access to "World Development Indicators Online" in our library. Flag ship publications, project reports, brochures and publications from the World Bank Tokyo Office are also available.

JDS fellows have full access to 5 other libraries on campus which has approximately 3,300,000 materials in its collection. Holding a huge collection of books and electronic journals, with a total combined area of 26,000 square meters, Hiroshima University Library System comprised of 5 libraries is one of the largest in the country.

#### **Other facilities**

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Within the campus, we have welfare facilities such as various cafeterias, a travel agency office, stores, book shops and a barber shop. Hiroshima University also has a post office and university health service center on the campus. The International Center provides mental counseling service to international students in English.

### ***Message for Applicants***

Japan has an excellent track record in the technologies and operations that make up social infrastructure, including railroads, airports, water and sewage systems, telecommunications, and cyber technologies.

A safe, secure, and peaceful society is also a hallmark of Japanese society.

Society 5.0 is the future sustainable society that Japan is aiming for.

The Graduate School of Innovation and Practice for Smart Society was newly established for the purpose of education, research, and human resource development to realize the vision of Society 5.0, and to share it with the world.

Due to the strong demand for human resource development to achieve this goal in today's global society, there are high expectations for the new graduate program, and it has received offers of collaboration and participation from stakeholders in various fields.

We look forward to receiving applications for admission from anyone around the world that is interested in joining us.