

Admission

This program will start to accept students in April 2019, and will be implemented as a degree program across several graduate schools. See the Applicant Guidelines for details.

Economic assistances

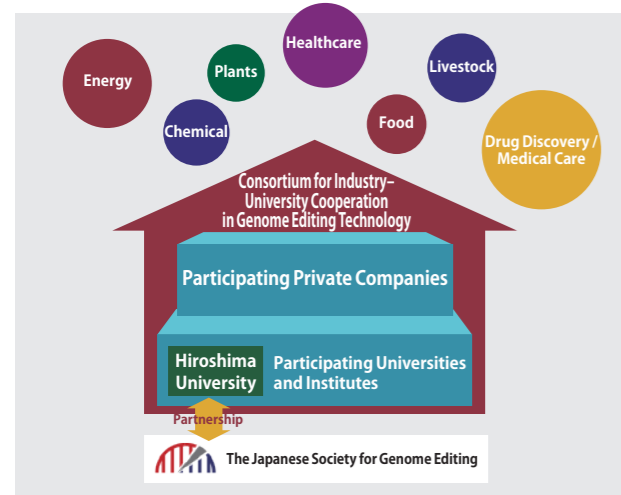
- (1) 50,000 yen per month (600,000 yen per year) will be provided for up to three students per year starting the year after entering the school. Those who are recognized as having excellent academic performance and making outstanding achievements in academic activities after entering the school will be eligible for this program. (Details of the application, including timing, will be announced after admission.)
 - (2) Free tuition will be provided for third and later years of the Life Science Course and all years of the Medical Course (some students may be ineligible due to their academic performance).
 - (3) Ikenoue Student Dormitory is available for 2 years for a charge (monthly boarding fee is 4,700 to 15,000 yen; in addition, students must pay common expenses and utility expenses).
- *The forms for economic assistance described in (1), (2), and (3) are up to date as of April 1, 2019, but may be changed in the future. The assistance is provided only within the standard course term.

Consortium Hiroshima University Consortium for Industry-University Cooperation in Genome Editing Technology

One of the features of this program is that students are trained to conduct cutting-edge and practical research through collaboration with companies participating in the Program on Open Innovation Platform with Enterprises, Research Institutes, and Academia and partner institutes.

The Program on Open Innovation Platform with Enterprises, Research Institutes, and Academia (adopted in 2016)

Development of innovative genome editing technologies for creating useful cells and living organisms

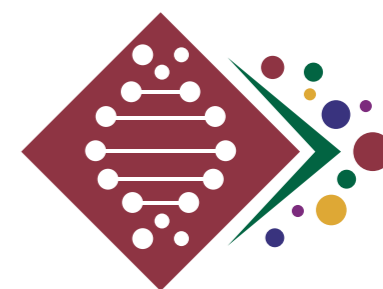


Participating Universities and Institutes (10 institutes)

- HIROSHIMA UNIVERSITY (Secretarial Institute)
- 大阪大学 OSAKA UNIVERSITY
- 東京工業大学 Tokyo Institute of Technology
- 理化学研究所
- 国立行政法人 酒類総合研究所 National Research Institute of Brewing
- 神戸大学
- 九州大学
- 徳島大学 Tokushima University
- 農研機構 NARO
- 甲南大学

Participating Private Companies (23 companies)

- Mazda
- TORAY Innovation by Chemistry
- KOHJIN Life Sciences
- mirco frc POLA ORBIS GROUP
- ニフ Nihon Filter Co., Ltd.
- TOPPAN
- Energia 中国電力
- Nipponham
- Otsuka 株式会社大塚製薬工場
- Phoenix Bio
- FASMAC
- 出光
- FUJIFILM
- E4TH EditForce
- kewpie
- BioPalette genome editing
- セツロテック
- kao
- 大日本住友製薬
- NAGASE 長瀬産業株式会社
- BIO-TEC IWATA
- 特殊免疫研究所 Institute of Biotechnology Co., Ltd.



Doctoral Program for World-leading Innovative & Smart Education

The Frontier Development Program for Genome Editing



Akihide Takami
General Manager, Technical Research Center
Mazda Motor Corporation



In collaboration with Hiroshima University and Tokyo Institute of Technology, Mazda is making efforts to research bio-based liquid fuels produced from renewable biomass as an alternative for fossil fuels, such as gasoline and diesel oil. The goal is to considerably reduce Well-to-Wheel CO₂* emissions in order to achieve a sustainable automobile society. We believe that genome editing technology will drive innovation in dramatically improving the productivity of biomass-derived liquid fuel, and we eagerly anticipate its further development.

* Well-to-Wheel CO₂: Cumulative CO₂ emissions generated from to dig the oil well to consumption by cars.

Satoshi Hirakawa
Principal Investigator, Frontier Research Center
POLA CHEMICAL INDUSTRIES, INC.



Under the philosophy of "Sensitize the world to beauty", the POLA ORBIS Group aims to quickly apply genome editing technology to cosmetics and to advance dermatological research remarkably so that we can continuously provide various unique forms of value. By developing culture models of skin problems and studying the underlying mechanisms of these disorders, we should be able to identify the causes of skin problems that have not been revealed by previous studies, and to promote innovation in the field of cosmetics.

Hidetada Yamaura
General Manager, Social Innovation Center,
Information and Communication Division
TOPPAN PRINTING CO., LTD.



TOPPAN PRINTING has cultivated information processing technology based on our own printing technology. Because a large amount of genetic information must be processed in genome editing, technologies for correctly and safely managing large amounts of data, as well as for data analysis using AI, are useful in this field. Therefore, we are currently conducting collaborative research with Hiroshima University on genome editing databases using AI. We hope that this research will contribute to the application of genome editing to a wide range of industries, creating innovative products and services, and solving various social problems.

Contact
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Issued in January 2019



Opening up the Future with Genome Editing

Greetings

In 2019, Hiroshima University will launch the Frontier Development Program for Genome Editing, an integrated Master's-PhD course, with the aim of training PhD students to introduce innovations to society.

Genome editing is a new biotechnology that makes it possible to rewrite the genomic information of various living organisms at will, using an artificial DNA-cutting enzyme (genome editing tool). Basic genome editing research has advanced considerably. As it is just a matter of time before we see the industrial and medical application of genome editing in the field of biofuel, breeding, and drug discovery, the ethical aspects of genome editing should be considered when scientists conduct cutting-edge R&D in this area of biotechnology.

Hiroshima University is one of Japan's leading research institutions in the genome editing field and employs a number of leading researchers who have strong track records in this research field and are responsible for managing the Japanese Society for Genome Editing. In addition, in collaboration with various enterprises in the basic materials, energy, IT, and pharmaceutical industries, Hiroshima University has been conducting projects aimed at developing basic technology to utilize genome editing in industry within the framework of the Program on Open Innovation Platform with Enterprises, Research Institute and Academia (OPERA) led by the Japan Science and Technology Agency (JST). This academic-industrial collaboration is aimed at developing young researchers and providing them with support for career paths in research and development.

In our efforts to develop new industries, I hope that new students will join us at Hiroshima University, which provides a great environment for fostering distinguished PhD students, who will lead the world in genome editing technology.



Mitsuo Ochi
Program Director,
President,
Hiroshima University



Takashi Takata
Program Director

**Executive and Vice President
(Industry-Academia-Government and Community
Collaboration)
Hiroshima University**

The Frontier Development Program for Genome Editing is based on curricula led by world-class domestic and overseas genome editing researchers. Its purpose is to train specialists who can adapt to changes in industrial structures and social trends as new biological industries emerge.

We will establish the five-year Life Science Course to develop new industries and the four-year Medical Course to study diseases and develop genome editing-based therapies and drugs. In these courses, students will learn the basic and applied knowledge and technology of genome editing. A wide variety of curricula will be provided in advanced technologies, including training at the Center for iPS Cell Research and Application, Kyoto University, and Harvard University; collaborative research with Tokushima University, which has outstanding research achievements in the agricultural, fisheries, and livestock field; and education by enterprises participating in the Consortium for Industry-University Cooperation in Genome Editing Technology.

Genome editing will be the core of future industrial structure, and will contribute to the development of new industries that lead to economic growth. We hope that PhD students who finish this program will lead the world in their field and play important roles in its future development.



Takashi Yamamoto
Program Coordinator

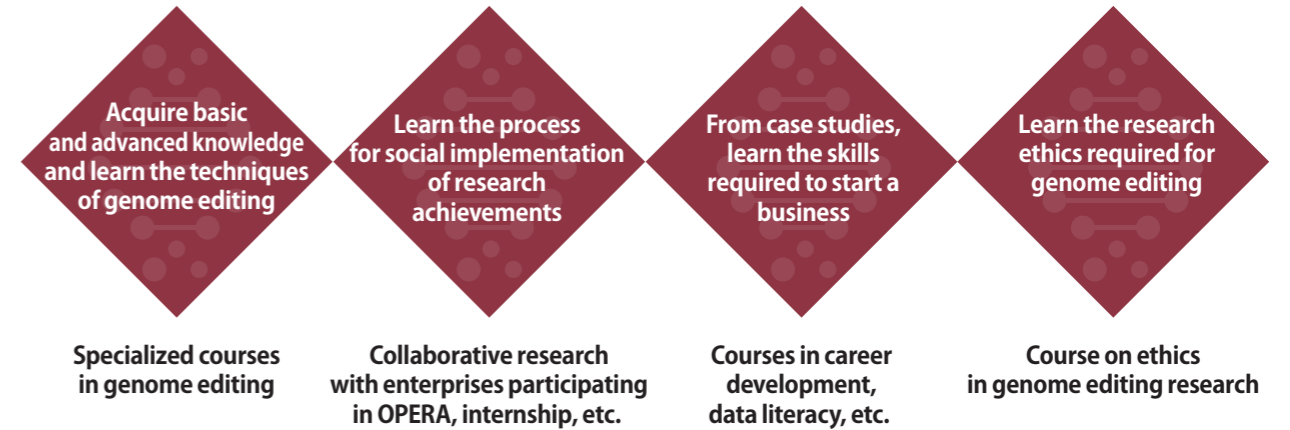
**Professor,
Hiroshima University Graduate School**

Genome editing technology needs to be actively utilized in order for industries to solve fundamental human problems related to food, energy, and diseases. Hiroshima University has led the genome editing field over the years. In 2012, it established the Genome Editing Consortium, and in 2016, the Japanese Society for Genome Editing, centered around Hiroshima University's researchers.

The global market of genome editing is expected to rapidly grow in many fields, including life science research, the biotechnology industry, breeding of animals and plants, medical care, and drug discovery. The competition to develop these technologies is getting more intense. Thus, Hiroshima University is one of the best places in Japan to learn genome editing because it has served as the domestic base of genome editing research and can collaborate with a wide range of organizations. Why don't you join us in advancing genome editing technology?

Program overview

This program will establish the Life Science Course (5-year curriculum) and the Medical Course (4-year curriculum) in order to provide students with opportunities to acquire basic and applied knowledge and to learn techniques of genome editing. This program enables students to master genome editing technology and connect it directly to industry.



Specialized courses in genome editing	Collaborative research with enterprises participating in OPERA, internship, etc.	Courses in career development, data literacy, etc.	Course on ethics in genome editing research
Life Science Course (5-year curriculum)	In the first and second years, students will learn basic and advanced genome editing techniques. From the third year, they will conduct research utilizing the knowledge they have acquired. Through basic courses on social implementation of technologies and internships, they will be trained to become experts able to work at the cutting edge of genome editing technology.		
Medical Course (4-year curriculum)	After systematically learning the basic and advanced genome editing technologies in the first and second years, students will conduct research for their doctoral thesis, utilizing knowledge that they have acquired. In addition, through internships at domestic and overseas partner institutes, they will be trained to be able to work at the cutting edge of genome editing in the medical field.		

