

Osaka University  
**Biotechnology Global Human  
Resource Development Program**

A five-year program for master's and doctor's degrees sponsored  
by the Japanese Government (Monbukagakusho)

Program Start Date :

**October 1, 2016**

Application Deadline :

**December 15, 2015**

for scholarship slot

**November 19, 2015 and May 28, 2016**

for non-scholarship slot

### Number to be Admitted

Ten for Monbukagakusho scholarship slot\*  
Ten for non-scholarship slot

### Application Requirements

1. Nationality : must be of the countries whose citizens are eligible for a Monbukagakusho Scholarship (Japanese Government Scholarship).
2. Age : must be less than 35 years as of April 1, 2016 (born on or after April 2, 1981).
3. Education : must have graduated from a university or college and completed 16 years of formal study by September 30, 2016
4. Language ability : must have a good command of English.

### \*Scholarship Benefits

1. 147,000 JPY per month (subject to change)
2. Air ticket (to and from Japan)
3. Tuition fee exempted

### ACCESS

International Students Section, Academic Affairs Division,  
Graduate School of Engineering, Osaka University

2-1 Yamadaoka, Suita, Osaka 565-0871  
E-mail : iso-staff@eng.osaka-u.ac.jp Fax : +81-6-6879-7229

[http://www.bio.eng.osaka-u.ac.jp/gh\\_resour\\_prog/index.html](http://www.bio.eng.osaka-u.ac.jp/gh_resour_prog/index.html)

## Abstract of Program

**Aim:** The program is 5-year program for master's and doctor's degree. The aim of this program is to expose young scientists to state-of-the-art research techniques and in-depth knowledge of advanced biology, chemistry, physics and bioengineering, so that they may harness the potential of biotechnology applicable to Japanese industry as well as academia.

**Features:** In the Basic Courses, students will acquire a solid background in advanced biotechnology. In the Project-based Training Course, students will acquire the ability to design and execute research in a critical manner. In the Frontier Research Proposal Course, students will acquire the ability to propose original research plans independently as a scientist. Through immersion in Special Research, students will have ample time during the remaining four years to attain their Master's and Doctor's Degrees in Engineering.

**Number to be admitted:** Number to be admitted is 10 for Japanese Government (Monbukagakusho) Scholarship Students (Term of Scholarship is 5 years (2 years+3 years)) and 10 for Privately Financed International Students.

### Five-Year Course of Global Human Resource Development Program



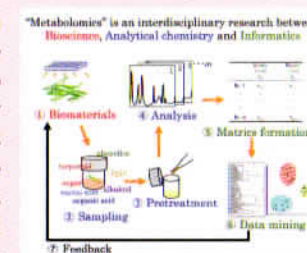
## Curriculum

Courses	<b>Biology and Life Science</b> <ul style="list-style-type: none"> <li>Dynamic Cell Biology</li> <li>Molecular Genetics</li> <li>Bio-environmental Science</li> <li>Microbiology Adv.</li> <li>Molecular Microbiology</li> </ul>	<b>Biotechnology</b> <ul style="list-style-type: none"> <li>Molecular Biotechnology</li> <li>Biotechnology Adv.</li> <li>Biotechnology Seminar</li> <li>Nanobiotechnology Adv.</li> <li>Biotechnology Exercise</li> </ul>	
	<b>Bioengineering</b> <ul style="list-style-type: none"> <li>Cell Technology Adv.</li> <li>Bioprocess Engineering</li> <li>Bioresource Engineering</li> <li>Biotechnology and Bioengineering</li> </ul>	<b>Others</b> <ul style="list-style-type: none"> <li>Japanese for Engineering</li> <li>Project-based Training Course</li> <li>Safety of Engineering</li> <li>Frontier Research Proposal</li> </ul>	
Organization	Division of Advanced Science and Biotechnology Graduate School of Engineering	Institute of Scientific and Industrial Research	International Center for Biotechnology
Employment (including Japanese students)	<p><b>Academic Profession:</b> Gadjah Mada Univ (Indonesia), Korea Food &amp; Drug Administration (Korea), Korea Research Institute of Bioscience and Biotechnology (Korea), King Mongkut's Institute of Technology (Thailand), Kyushu Univ (Japan), Mahidol Univ (Thailand), Nagoya Univ (Japan), National Univ of Singapore (Singapore), Osaka Univ (Japan), Univ of Arizona (USA), Univ of Yangon (Myanmar), Univ of Dhaka (Bangladesh), Univ of Indonesia (Indonesia), Univ of Massachusetts (USA), Univ of the Philippines Los Banos (Philippines), Vietnam National Univ – Ho Chi Minh City (Vietnam)</p> <p><b>Private Companies:</b> Ajinomoto Co., Ltd. (Thailand), Astellas Pharma Inc. (Japan), Dow Agro Sciences Ltd. (Thailand), Merck Ltd. (Thailand), Panasonic Co. (Japan), Prima Scientific Co., Ltd. (Thailand), PTT Public Co., Ltd. (Thailand), Springer Japan (Japan), Sumitomo Chemical Co., Ltd. (Japan), Suntory Holdings Ltd. (Japan), Takeda Pharmaceutical Co., Ltd. (Japan)</p>		

## Laboratory Introduction (6 leading biotechnology labs)

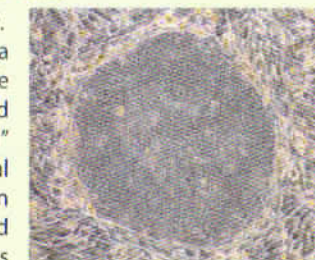
### Laboratory of Bioresource Engineering (Fukusaki Lab)

Bioresource Engineering is a technology in search of a "core biological agent", and to evaluate its practicality. Our laboratory challenges the issues utilizing 'Metabolomics' as our core competence. 'Metabolomics' is the newest 'Omics' science based on a total profiling of whole metabolites in living organisms. In fact, 'Metabolomics' is a killer technology for high resolution phenotype analysis. In addition, the newest 'Mass Imaging' technology is also studied. A combination of 'Metabolomics' and 'Mass Imaging' will create a novel world for real useful bio-marker seeking. Through our study, students can learn the latest analytical technology and bio-informatics particularly about big-data operation. Our research targets include 'medical', 'agriculture', 'food', 'fermentation' and the related fields.



### Laboratory of BioProcess Systems Engineering (Kino-oka Lab)

Toward to "Stem Cell Industries". Our missions are (1) to bring a good fortune in human life through the elucidation and utilization of "bio-potential" by understanding sequential biological events (BioProcess) in the reaction field (Systems), and (2) to develop human resources of biochemical engineers. Our targets are the analysis, simulation, forecasting and control of various bioprocesses related to mammalian cells, and establishing methodologies for the utilization and application of the principles of such processes. We also concern medical contribution, such as regenerative medicine including the production of cultured tissues.



### Laboratory of Bio-environmental Systems Engineering (Watanabe Lab)

The research interest of the laboratory is to understand the mechanism of how animals and molecules recognize or respond to various chemical compounds and apply the obtain knowledge to sense and resolve environmental problems. Many chemicals have been released into the environment as a result of the advances in synthetic chemistry that support our modern society. However, despite much concern about possible harmful effects of these chemicals, their actual biological effects on humans and wildlife remain unclear. Our laboratory studies the biological responses elicited by environmental chemicals and are establishing a new system for evaluating how these chemicals affect humans and wildlife.



### Cell Technology Laboratory (Muranaka Lab)

We are at the leading edge of research on plant biotechnology to fully utilize cellular function and genetic resources of plants for social and industrial activities. Our discovery will contribute to promote health, increase in food production and save the environment. One of research interests of our laboratory is discovery of genes for biosynthesis of specialized metabolites in plants, and reconstruction of metabolic pathway in microorganisms to produce these useful compounds. To fully exploit metabolic potential and biomass of crop plants, we also try to manipulate metabolic function of crop plants using genome editing technologies.



### Laboratory of Applied Microbiology (Fujiyama Lab)

Production systems of human pharmaceutical proteins have been developed in various "bioreactors" such as plants, insects and microorganisms with their advantages. However, recombinant products have host-specific glycans, not human-type. Sometimes the difference of glycosylation pattern causes immunogenicity and reduction of the bioactivity. To solve this problem, we "optimize" the glycosylation pathway in "bioreactors". Our challenge is to produce human friendly-recombinant pharmaceuticals with glyco-science and -engineering. We are also in progress toward discovery of microorganisms with new and remarkable potentials with international cooperation among Southeast Asian countries in the aspects of research and educational advancement.



### Laboratory of Biomolecular Science and Engineering (Nagai Lab)

In order to understand the principles of biological functions that lead drug discovery or tailor-made medicine, information about spatiotemporal dynamics of each biomolecule is indispensable. To this end, our laboratory is developing genetically encoded functional indicators based on fluorescent proteins or chemiluminescent proteins. We are also developing new optical microscopes based on totally different concept than conventional one. Furthermore, by applying these new technologies we are studying "small number issue" to give theoretical explanation for biological phenomena induced by countable number of molecules. The new principles established through the study will provide the clue to the answer for "What is life?"

