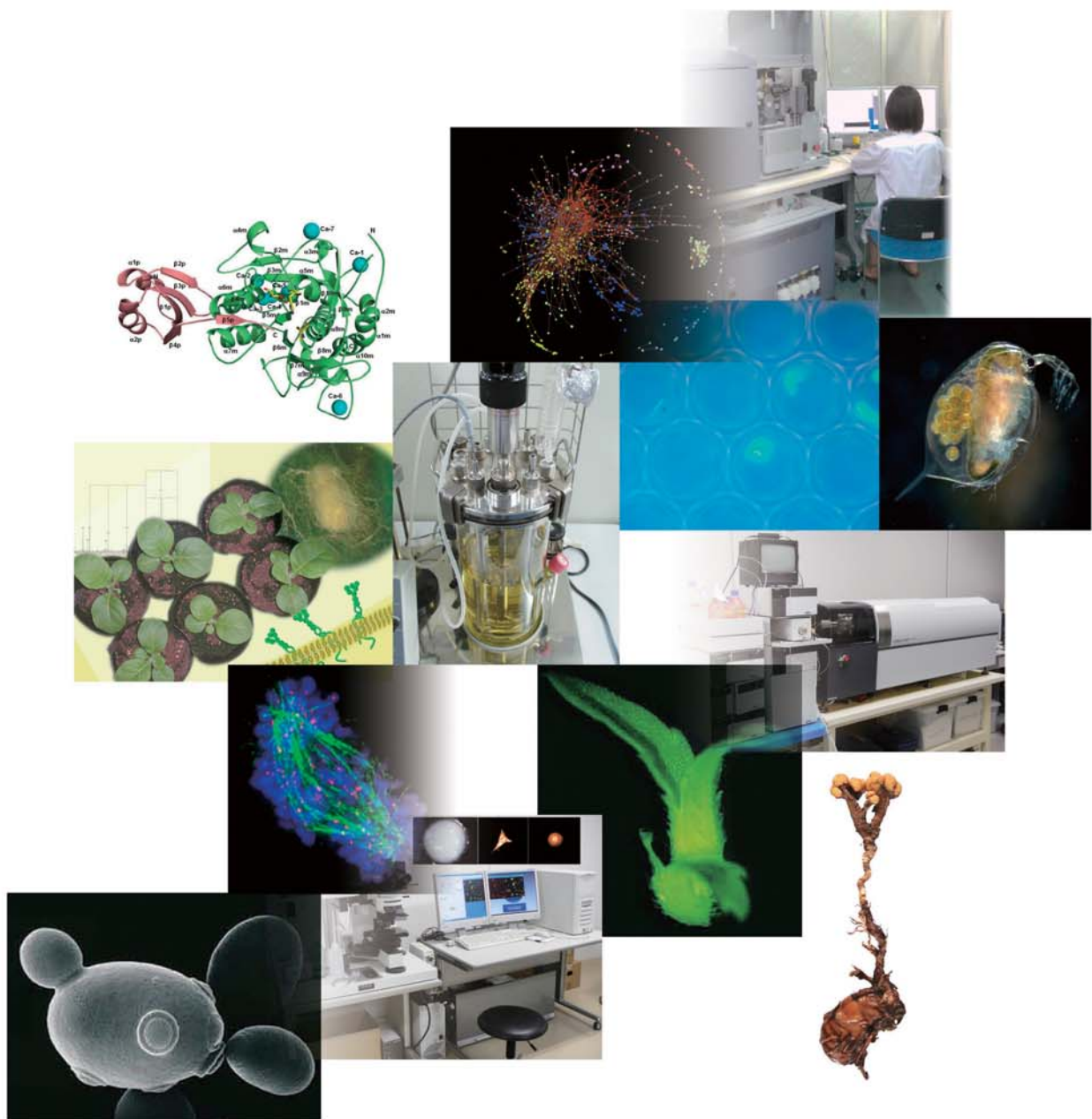


Osaka University



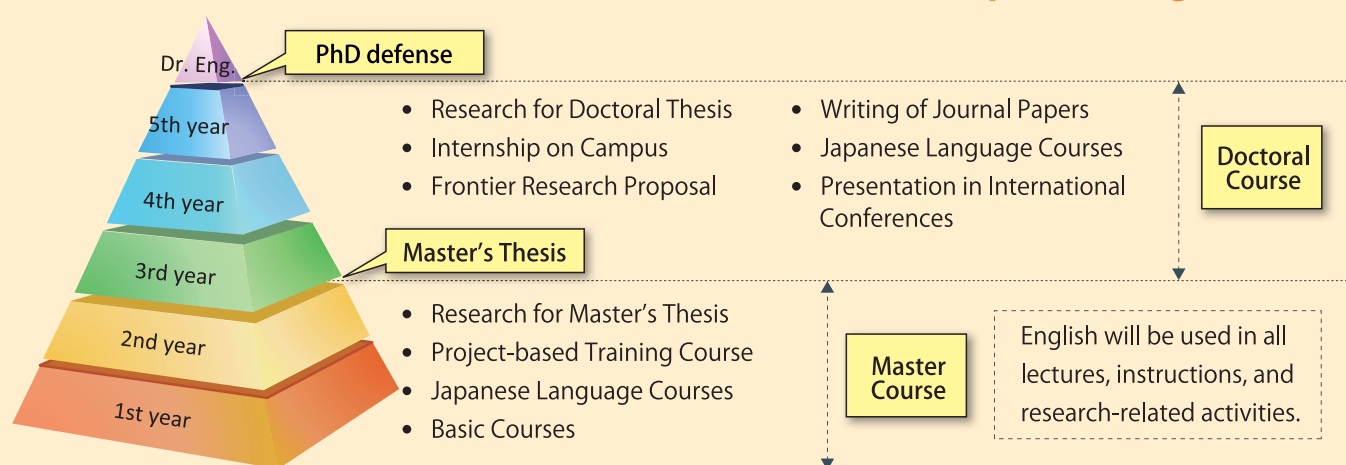
## Program Summary

**Aim:** The Global Human Resource Development Program is an integrated master-doctor (5-year) program. The aim of this program is to provide young scientists necessary state-of-the-art research skills and in-depth knowledge of advanced biology, chemistry, physics and bioengineering applicable to biotechnology industry as well as academia.

**Features:** The program is designed to provide students the basics skills during the first year; a solid background in advanced biotechnology (Basic Courses), and the ability to design and execute research in a critical and independent manner (Project-based Training Course, Frontier Research Proposal Course). Students can join one of our seven leading biotechnology labs and during the remaining four years they will have ample time to focus on their own research works (Special Research) to attain their Master and Doctor Degrees in Engineering.

**Number to be admitted:** 10 Japanese Government (Monbukagakusho) Scholarship Students (Scholarship term 2+3 years) and 10 privately financed international students.

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



## Curriculum

Courses	<b>Biology and Life Science</b>		<b>Biotechnology</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>		<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>		<b>Others</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>		<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)	<b>Academia:</b> Gadjah Mada Univ (Indonesia), 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) <b>Industry:</b> Ajinomoto Co., Ltd. (Thailand), Astellas Pharma Inc. (Japan), Dow Agro Sciences Ltd. (Thailand), Korea Food & Drug Administration (Korea), 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)			

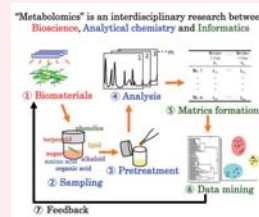
## Program Labs (7 leading biotechnology labs)

### Laboratory of Bioresource Engineering (Fukusaki Lab)

Bioresource Engineering is a technology to search of a "core biological agent", and to evaluate its practicality.

We challenge the issues using 'Metabolomics' as core competence. 'Metabolomics' is a killer technology for high-resolution phenotype analysis. In addition, we started studying 'Imaging mass spectrometry (IMS)'. A combination of 'Metabolomics' and 'IMS' will create a novel world for real useful biomarker seeking. Our research targets include 'medicine', 'agriculture', 'food', 'fermentation' and the related fields. In our laboratory, students can learn the latest analytical technology and bioinformatics by big-data operation.

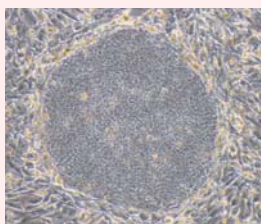
Contact person: Prof. Eiichiro Fukusaki, [fukusaki@bio.eng.osaka-u.ac.jp](mailto:fukusaki@bio.eng.osaka-u.ac.jp)



### 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 the principles of such processes. We also concern medical contribution, such as regenerative medicine including the production of cultured tissues.

Contact person: Prof. Masahiro Kino-oka, [kino-oka@bio.eng.osaka-u.ac.jp](mailto:kino-oka@bio.eng.osaka-u.ac.jp)



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

Many chemicals have been released into the environment but their harmful effects on humans and ecosystems remain unclear. Our laboratory is trying to understand molecular mechanisms of the biological responses elicited by environmental chemicals. We are also establishing new biomonitoring systems using genetically engineered organisms. In parallel, we are working on engineering membrane proteins to develop biosensors for environmental chemicals without using the organisms. Through these researches, students can study wide range of skills including genetic engineering, protein engineering and genome engineering.

Contact person: Prof. Hajime Watanabe, [watanabe@bio.eng.osaka-u.ac.jp](mailto:watanabe@bio.eng.osaka-u.ac.jp)



### Laboratory of Cell Technology (Muranaka Lab)

Plants produce a huge variety of specialized metabolites with different biological activities. Our primary interest is to understand the regulation and the synthesis of these compounds in plants; identifying the genes involved in its biosynthesis and producing them using genetically modified organisms (bacteria, yeast, algae and model plants). More recently, we are promoting the study of valuable crops in a changing environment by combining genomics, metabolomics and genome editing technologies. Our goals and findings may contribute to promote health and increase food production in a climate-changing world.

Contact person: Prof. Toshiya Muranaka, [muranaka@bio.eng.osaka-u.ac.jp](mailto:muranaka@bio.eng.osaka-u.ac.jp)



### Laboratory of Applied Microbiology (Fujiyama Lab)

Production systems of human pharmaceutical proteins have been developed in plants, CHO, insects and microorganisms as "bioreactors". However, recombinant products have host-specific glycans, not human-type. The difference of glycosylation pattern reduce 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 Southeast Asian countries in the aspects of research and educational advancement.

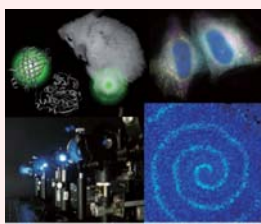
Contact person: Prof. Kazuhito Fujiyama, [fujiyama@icb.osaka-u.ac.jp](mailto:fujiyama@icb.osaka-u.ac.jp)



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

Imaging orchestration of biomolecules in live cells and organisms should be the most powerful approach to decipher biological enigma. To this end, we are inventing genetically encoded optical probes and microscopes. Currently we are focusing on making photo-switchable fluorescent proteins for super resolution functional imaging in small cellular compartments (< 1fL), and super-duper chemiluminescent proteins applicable to detect malignant tissue in small animals. Furthermore we are challenging to develop an electricity-free street light by expressing the twinkle luminescent protein in trees which would change our future life style.

Contact person: Prof. Takeharu Nagai, [ng1@sanken.osaka-u.ac.jp](mailto:ng1@sanken.osaka-u.ac.jp)



### Laboratory of Industrial Biochemical and Cellular Engineering (Omasa Lab)

Biochemical engineers are required to possess an integrated knowledge of governing biological properties and principles of chemical engineering methodology and strategy. We deal with the design, operation, and optimization of bioprocesses concerned with the production of biological product by microbial and mammalian cells, including up- and down-stream processing working with industries. Current topics are mammalian and microbial cell and cell culture engineering for the production of biologics. Target biologics are enzymes, cytokines, therapeutic antibodies, vaccines and stem cell for cell therapy and drug evaluation.

Contact person: Prof. Takeshi Omasa, [omasa@bio.eng.osaka-u.ac.jp](mailto:omasa@bio.eng.osaka-u.ac.jp)





## Voice of Students

### Why did you choose this English course program?

**Student A**  from Thailand

I chose this English course program because the ranking of Osaka University is in the high rank of Asian Universities.

**Student B**  from Philippines

Not all globally-competing universities offer English program for foreign students and it is a great opportunity to be a member of this graduate school.

### How did you decide which lab is the best one?

**Student B**  from Philippines

My basis for choosing the laboratory to join is the uniqueness and novelty of the researches conducted in my current lab.

**Student C**  from Vietnam

Based on my background, interest and getting information on the website of each lab., I chose a suitable and the best laboratory for myself to study.

### Is it necessary to learn Japanese?

**Student A**  from Thailand

Yes. I think it is very good idea that our program provides a tutor to help foreign students in the first year.

**Student D**  from Indonesia

Yes, it is necessary, but don't worry. You will get used to learn from your friends here. Osaka University also supports us by providing Japanese language classes.

### Any advice on how to smoothly adjust to Japan?

**Student E**  from Malaysia

Talk to people and interact! Don't be afraid to challenge yourself to live in different environment and learn different culture. It will be an exciting journey in your life experience.

### How does it feel to live in Japan?

**Student F**  from Thailand

Japan is a safe place to live and it's convenient and easy to go around by train and bus. You can easily visit many interesting places like Kyoto, Kobe, Nara. I think Kansai people is funny, friendly and kind. The foods are delicious!

### What do you do on a holiday?

**Student G**  from Belize

On a holiday, I visit a famous city, village or world heritage site, go to the beach or go hiking on a mountain to see the landscape. Every place I have visited in Japan so far is impressive.



## Voice of Graduates



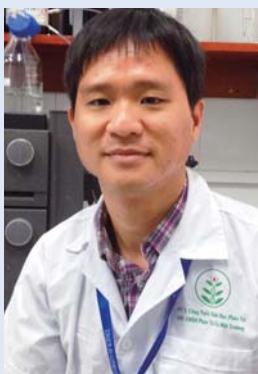
Being an international student in the biotechnology program at Osaka University was a great change in my life. This program not only well prepares their students with fundamental knowledge and specialized skills required in sciences, but also embraces ones with internationally collaborative working environment that is interestingly combined with Japanese teamwork and cultures. We were taught to exchange and appreciate differences, and also to open-mindedly value others' ways of thoughts. The program also provides caring supervisions and valuable resources to students to fulfill their research goals. Years of endeavour and hardworking under this program have sharpened our skills and trained us to think rationally and to proceed prudently with confidence. Experiences and connections we gained not only have opened a number of avenues towards successful careers in sciences, but more importantly, have encouraged us to competently contribute to scientific communities.

**Ratklao Siriwach (2007-2012)**

**Thai**

**Product management executive**

**Merck Ltd., Thailand**



I had studied this five-year program from 2008 to 2013. And I am grateful that all the foundational knowledge gained from the Master course and all the skills, techniques and specialized knowledge gained from the Doctor course have been used effectively in many aspects of my career. You certainly can also get those benefits if you choose this program, because there are a variety of fundamental biology and biotechnology classes that you can take, and many different laboratories specialized in various fields which can mostly meet any scientific interest of yours. Plus, there are many interesting leisure activities on the campus throughout the year which really spice up your study life.

**Nguyen Tri Nhan (2008-2013)**

**Vietnamese**

**Vice Dean of the Faculty of Biology**

**Vietnam National University  
– Ho Chi Minh City, Vietnam**

### Inquiries

**Division of Advanced Science and Biotechnology, Graduate School of Engineering, Osaka University**

2-1 Yamadaoka, Suita Osaka 565-0871 TEL:+81-6-6879-4229 FAX:+81-6-6879-7448 [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)