

# Developing Global Researchers in Drug Discovery

“How to Foster Researchers in Asia through Open Innovation”  
APAC Conference 2016

**Dr. Hiroko ISODA**

**Program Leader**

**Ph.D. Program in Life Science Innovation**

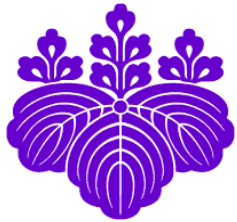
**Professor**

**Faculty of Life and Environment Sciences**

**University of Tsukuba**



# The TSUKUBA LIFE SCIENCE INNOVATION ACADEMIC PROGRAM was jointly established with the Life Science Promotion Association of Tsukuba



筑波大学  
*University of Tsukuba*



**Tsukuba Life Science  
Academic Program**



# Life Science Promotion Association of Tsukuba



**Professor Makoto Asashima**  
Executive Director

**Has 22 member organizations, includes private companies (pharmaceutical companies) and national research institutes located in Tsukuba area**



## Current Members

Astellas Pharma Inc.  
Eisai Co., Ltd.  
Ono Pharmaceutical Co., LTD.  
Kyowa Hakko BIO Co., LTD.  
Taiho Pharmaceutical Co., LTD. Tsukuba Research Center  
JSR Life Sciences Corporation  
Cell-Medicine, Inc.  
Kirin Co., LTD  
Sobio Technology Co., LTD.  
University of Tsukuba  
High Energy Accelerator Research Organization  
Research Center for Medicinal Plant Resources,  
National Institute of Biomedical Innovation  
Tsukuba Primate Research Center, National Institute of  
Biomedical Innovation  
Japan Aerospace Exploration Agency  
National Museum of Nature and Science, Tokyo  
National Institute for Environmental Studies  
National Institute of Advanced Industrial Sci and Tech  
National Agriculture and Food Research Org  
National Food Research Institute  
National Institute of Agrobiological Sciences  
National Institute for Materials Science  
Riken BioResource Center

## Master's/Ph.D. in LIFE SCIENCE INNOVATION

### Goals:

- To enable researchers and engineers, as graduate students, to actively engage in world class level food and medicine innovation;
- To develop globally competent and proficient human resource, integrating biological resources analysis such as molecular biological techniques, whole genome-wide association study, proteomics analysis, analysis, and metabolomics analysis, with diverse fields that includes environmental studies and geology studies;
- Holistic studies on how bioresources can be commercialized and the bioresearch results processed for the benefit of society



# Significance of the Ph.D. Program in Life Science Innovation

## Reform of National University

- Creating an original educational research platform (graduate school system) beyond restructuring national university to be jointly developed by national university, research institutes, and private enterprises  
⇒ Joint graduate school program (new program)
- Establishing an original graduate school program based on industry-government-academia collaboration adopting a problem-solving approach rather than accumulation of knowledge style  
⇒ Promote job opportunities to business companies for doctoral resources (Independent graduate school)
- Promoting continuous involvement of private-sector resources (within and outside the country) in the education of national university  
⇒ Education and research developed with the participation of human resources from research institute and private enterprises

## Development of Tsukuba Science City

- Showing the potential of Tsukuba Science City to the world with concrete results and outcomes
- Creating innovative and unique graduate school educational system and contribute to the development of university system founded on Tsukuba Science City
- Promoting the creation of graduate school scheme that inspires and attracts the interest of competent faculty resources and trainees overseas

## Fostering of human resources to promote life science Innovation

In Japan, population aging has been progressing rapidly.

Cultivate globally competent and proficient human resources that can strongly promote life science innovation, in order to achieve a society in which the people are physically and mentally healthy and can enjoy a sense of fulfillment and abundance.

# Distinguished Features of the Ph.D. Program in Life Science Innovation

## Original Organization and Management System

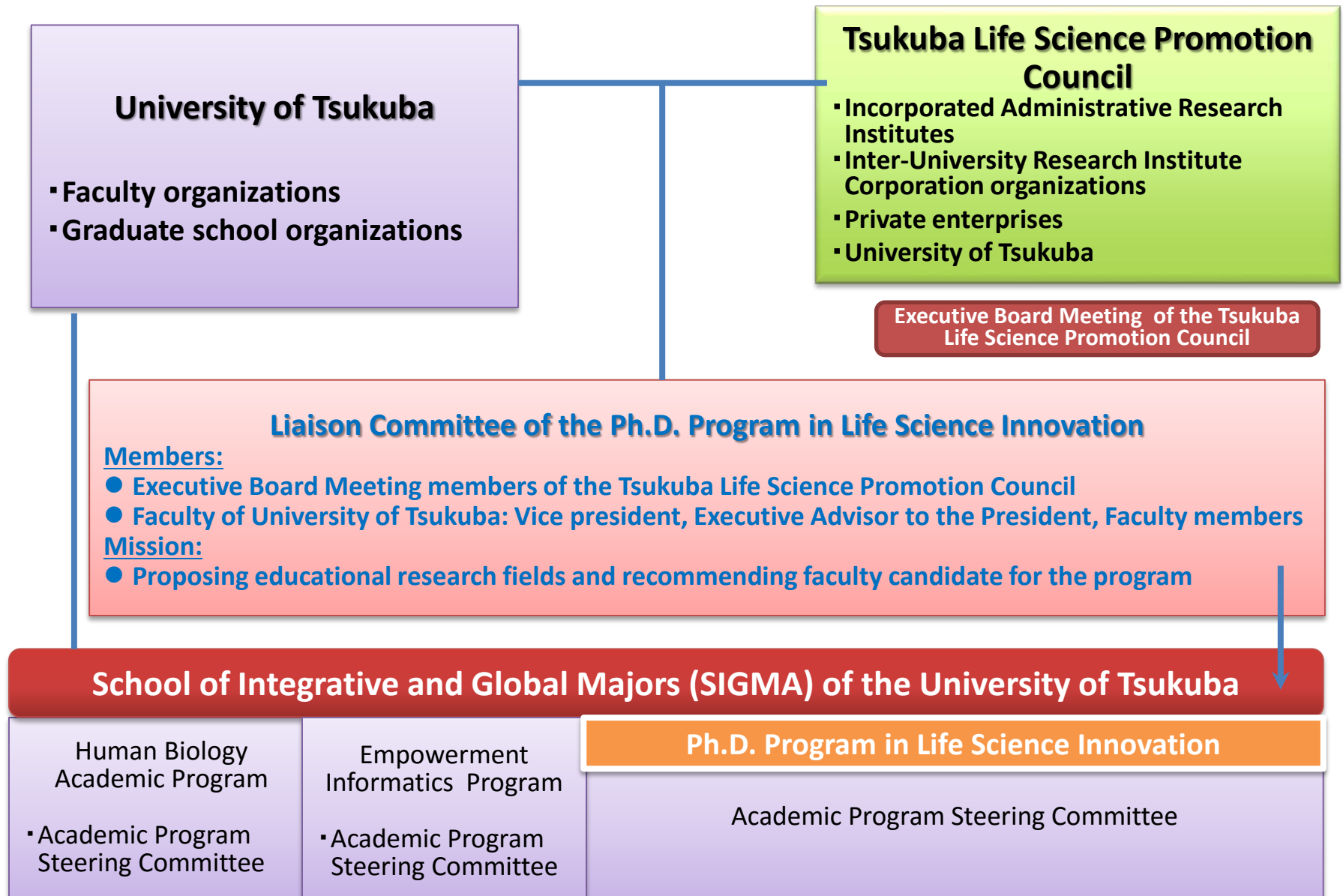
- Delegating researchers from the Tsukuba Life Science Promotion Council (incorporated administrative research institutes, private enterprises, and inter-university research institute corporation organizations) to the faculty of graduate school of University of Tsukuba (as a professors or an assistant professor of the joint graduate school)
- Establishing academic program organized and managed by the faculty of both University of Tsukuba and the joint graduate school of University of Tsukuba
  - Fundamental educational research organization (Graduate School of Life and Environmental Sciences and Graduate School of Comprehensive Human Sciences)
  - Organized and managed under the School of Integrative and Global Majors which was established in parallel to other graduate schools of the University of Tsukuba

### Faculty Placement

Pursue the establishment of an inspiring graduate school by placing:

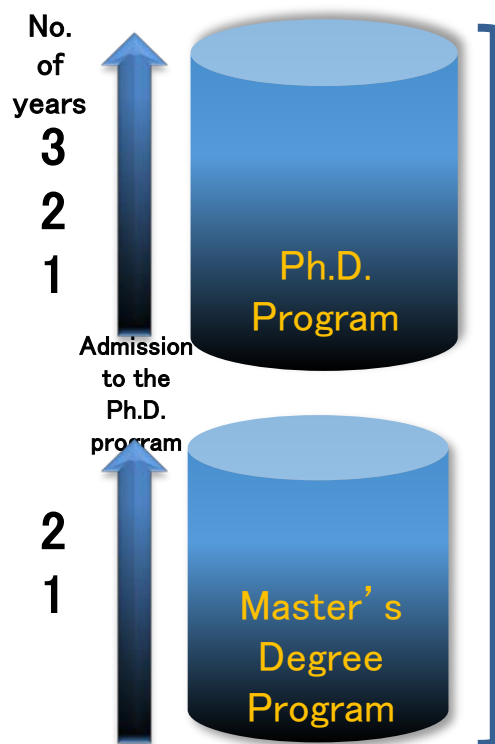
1. Classes conducted in English
2. Human resources with adequate research achievements
3. Foreign faculty resources
4. Female faculty resources up to 30% or more of the total

# Organizational Chart of the Ph.D. Program in Life Science Innovation





## Program Outline



Academic Program Leader

M.S./Ph. D in Disease Mechanism

M.S./Ph.D. in Drug Discovery

M.S./Ph.D. in Food innovation

M.S./Ph.D. in Environmental Management

■ Admission started in Oct 2015

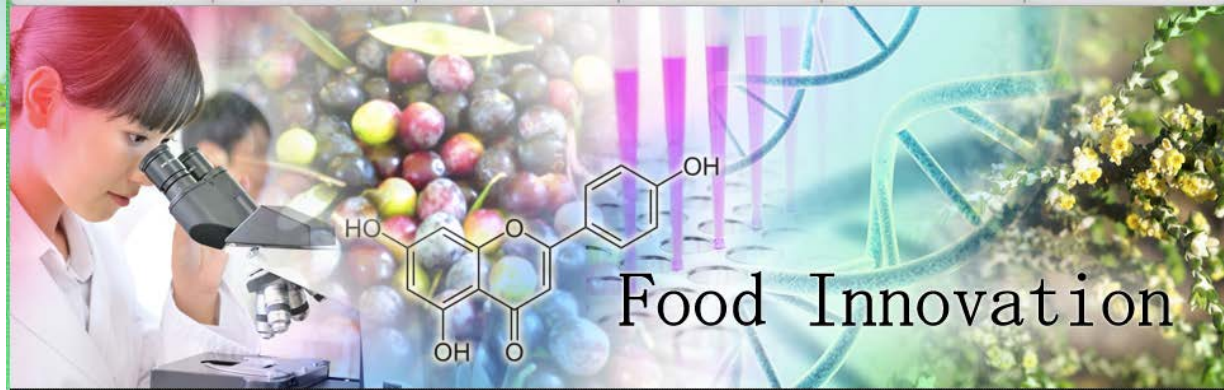


# FIELDS OF SPECIALIZATION

Environmental  
Management



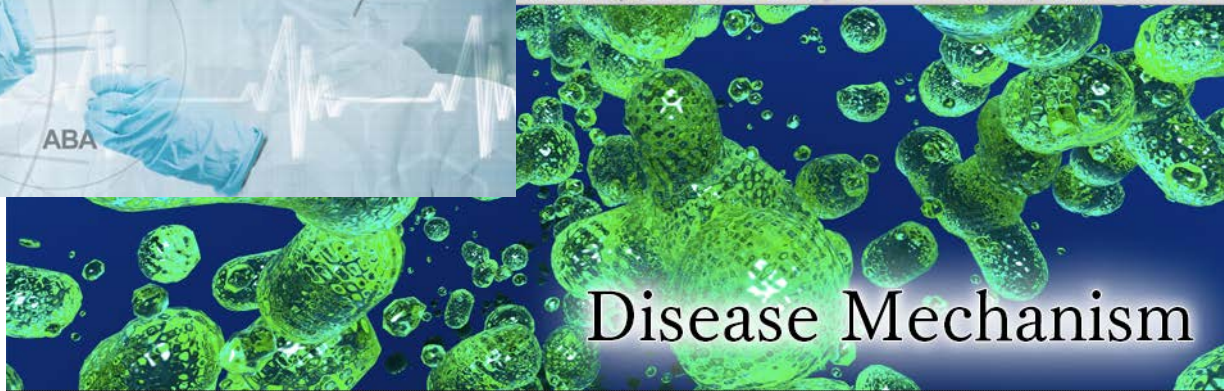
Food Innovation



Drug Discovery



Disease Mechanism



# PROGRAM CURRICULUM

## Disease Mechanism

- Fundamentals of Cancer Biology (e-Learning)
- Prominent Discoveries in Neuroscience
- Molecular Pathology
- Basic Bone Biology
- Advances in Cellular Regulation
- Bioresource for Disease Research

## Drug Discovery

- Medicinal Chemistry/Pharmacology
- Organic Chemistry
- Drug Design Engineering
- Translational Science in Drug Discovery (Astellas Pharma)
- Drug Discovery Research & Project Management (Eisai)

Univ. of Oxford

Univ. of Rey Juan Carlos

Univ. of Wageningen

Univ. of Oxford

- Food Functionality
- Food Business
- Food Security
- Food Process Engineering
- Nutritional genomics

## Food Innovation

### Required Subjects

- Introduction to Medicine
- Introduction to Drug Discovery
- Introduction to Food Functionality
- Introduction to Environmental Science
- Introduction to Life Science Innovation
- Practices in Life Science Innovation
- Team Learning in Life Innovation Science
- Business Development in Life Science Innovation
- Regulatory Science (Japanese/International)
- Intellectual Property Management
- Bioinformatics

Univ. of Montpellier

Univ. of Oxford

UC San Diego

CBBC Tunisia

- Biomass Science
- Environmental Algology
- Habitat and Functional compound
- Environmental Health Perspective
- Water Environment and Life Science

## Environmental Management

# Classes and Research Guidance of the Ph.D. Program in Life Science Innovation

## Classes

- Conducted in English
- 1 credit requiring 10 units of 75-minute class (lecture)
- Classroom lecture including some practical training and experiments

## Research guidance to be provided

**For**

1. Internship to be ranged from a minimum of several days to a maximum of three months
2. Master's thesis and Ph.D. thesis

**At**

The facility of each research institute or the Open Laboratory of the Tsukuba University

## Curriculum Proposed by Participating Organization in the Ph.D. Program in Life Science Innovation

### ***Suggested Curriculum by Astellas Pharma Inc.***

- ① **Company A alone is basically responsible for the one course of one our of the four areas, “Drug Discovery Research.”**

**Course title : Drug Discovery Translational Science**

- Course content/outline : Same as that of the Cooperative Graduate School
- Credits : 1.5 credits requiring 15 units of 75-minute class (lecture) for the half-year
- Includes some practical training and experiments

- ② **Research Guidance**

When assuming the responsibility of research manager, research guidance is to be provided basically at the Open Laboratory of the Tsukuba University

# Drug Discovery Translational Science

## ➤ **Advanced Course in Drug Discovery Translational Science**

1. History of pharmaceutical products development
2. Necessity of new pharmaceutical products
3. Process of development of new pharmaceutical products
4. Correlation between state-of-the-art technology and research development of new pharmaceutical products
5. Successful implementation of research development of new pharmaceutical products
6. Drug discovery and bio-imaging

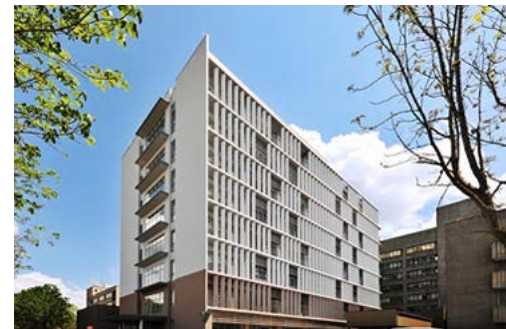
## ➤ **Drug Discovery Translational Science Research**

1. Introduction to bio-imaging technology
2. Animal and clinical research with PET
3. Animal and clinical research with MRI
4. Image data analysis

## ➤ **Drug Discovery Translational Science Experiments**

1. Synthesizing diagnostic agents
2. Pharmacokinetics study with bio-imaging technology
3. Pharmacology study of drug efficacy with bio-imaging technology
4. Image data analysis exercise with bio-imaging technology





# **Distinctive Research Centers and Programs**

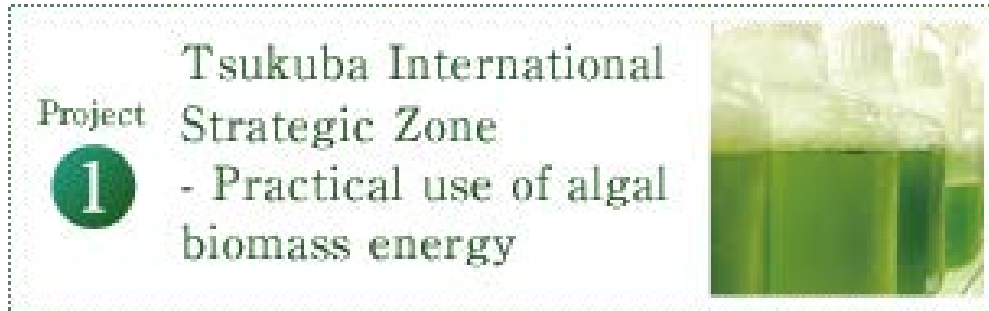
## **International Institute for Integrative Sleep Medicine (IIIS)**

**IIIS Director:** Professor Masashi Yanagisawa,  
Center for Behavioral Molecular Genetics, University of Tsukuba  
**Organic Chemistry:** Professor Hiroshi Nagase

IIIS was established on December 1, 2012, after being accepted to the World Premier International Research Center Initiative (WPI) program by the Ministry of Education, Culture, Sports, Science and Technology (MEXT.)



## Core Laboratory for algal Biomass and Energy System



**Biomass Science : Professor Makoto M. Watanabe**

**Bioresource Science : National Institute for Environmental Studies (NIES)**

Several species of algae can efficiently produce oil. For example, the potential hydrocarbon-oil production of microalga, *Botryococcus braunii* is estimated to be 118 t per 1 ha per year, which is much greater than 0.2 t for maize and 6.1 t for palm. *Aurantiochytrium* has only one third of hydrocarbon content of *Botryococcus braunii*, but grows 36 times faster and thus produces 12 times more hydrocarbon than *Botryococcus braunii*.

These biofuels will improve the low oil self-sufficiency of Japan and help mitigate climate change.

# Professors from universities abroad



*Professor **COLIN GODING***

*University of Oxford*

*Research Area: Developmental and Stem Cell Biology*



*Professor **CUSTODIA GARCIA JIMENEZ***

*Universidad Rey Juan Carlos*

*Research Area: Molecular mechanisms for nutrient remodeling of cancer signaling*



*Professor **PANAGIS FILIPPAKOPOULOS***

*University of Oxford*

*Research Area: Developmental and Stem Cell Biology*

# Professors from universities abroad



Professor **REMKO BOOM**

*University of Wageningen*

*Research Area: Food Process Engineering*



Professor **MICHEL LARROQUE**

Université Montpellier 1

Faculté de Pharmacie

Disease Mechanism: Professors Lionel Larue, Eirikur Steingrimsen

Drug Discovery : Professors Panagis Filippakopoulos, Jane Mellor, Mads Gyrd-Hansen

Food Innovation : Professors Custodia Garcia, Eric O'neil, Remko Boom, Michel Larroque

Environmental Management: Professors Benjamin Pina, Stephen Mayfield

Program Outline

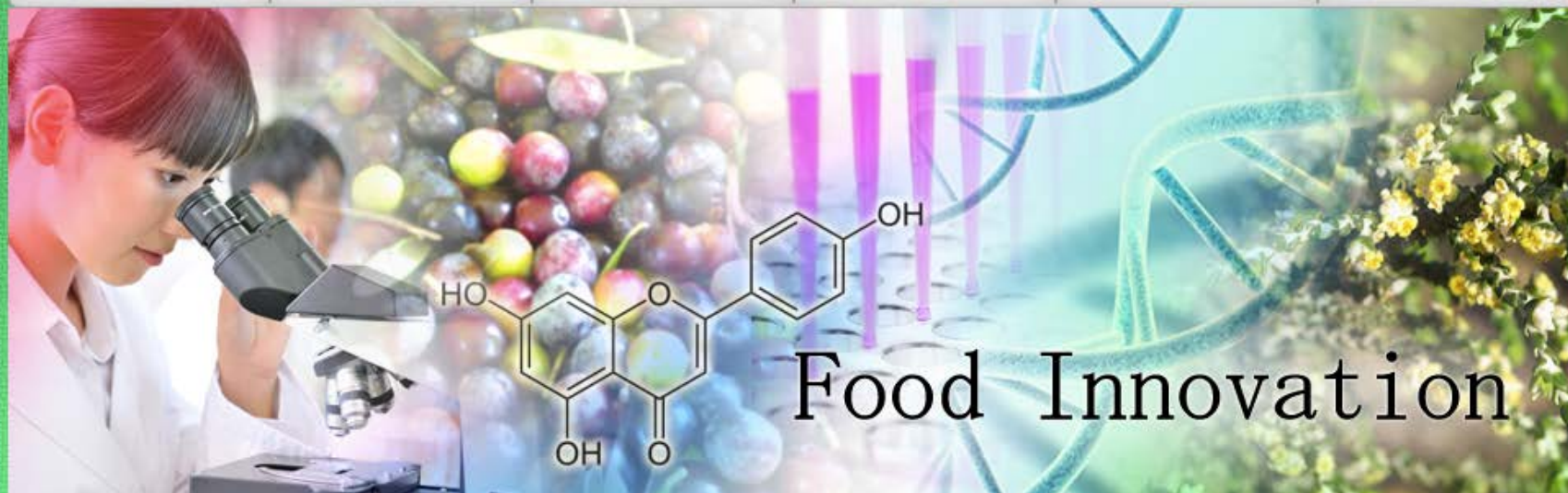
Educational Policy  
and Curriculum

Education and  
Cooperative System

Student Support

Faculty Voices

Admissions



## FOR INQUIRIES:

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Website: <http://tlsi.tsukuba.ac.jp/>

***THANK YOU FOR YOUR  
ATTENTION***



ご清聴ありがとうございました