

# **FOOD SCIENCE AND TECHNOLOGY**

## **1. PURPOSE OF THE COURSE**

The purpose of this course is to develop food scientists and food technologists, who will create the new ways to transform their indigenous agricultural commodities to the value-added products and eventually contribute to formation of new market, farmer's income generation and successive improvement of agricultural productivity for Social Well-being.

The course has six sub courses that are administered by each of six experts of training institution (Food Sciences Department of the University) and will cover the following fields; DNA technology, food analysis for quality and safety, food functional components toward new food products, enzymology, novel food technology such as Ohmic heating and food engineering.

There will be excellent opportunity for laboratory research experiences as a circulating short training program in the above fields as the occasion demands.

## **2. TRAINING PROGRAM**

### **(1) General Orientation and Japanese Language Program**

The General Orientation and Japanese Program are organized at the Osaka International Center (OSIC) of JICA prior to the technical training, to assist participants in understanding Japan and adjusting themselves to life in Japan, and thus to facilitate effective training.

### **(2) Technical Training**

#### **Sub course 1. DNA Technology**

##### 1-1. Purpose

The aim is to understand current techniques based on polymerase chain reaction (PCR), and to learn how to detect suspicious food for food safety. The applicants would be supposed to have an awareness of the issues in food safety, including genetically modified food and suspicious food.

##### 1-2 Training content

###### 1-2-1 Basic technology

- a) Molecular cloning of the genes
- b) Detection and screening of the genes
- c) PCR technology in food science

###### 1-2-2 Applied technology for food science

- a) Detection of genetically modified organisms (GMO)
- b) Detection and quantification of bacteria for food quality control
- c) Detection of suspicious food by RAPD method
- d) Cloning of DNA marker to distinguish genetic diversity among species.

## **Sub course 2. Food Analysis**

### 2-1. Purpose

The aim is to understand the principle of some selected methods to detect heavy metals, pesticides and allergenic compounds in food, and to learn the recent techniques for quantification of these residue levels in food.

### 2-2 Training content

#### 2-2-1. Analysis of heavy metals

- a) Principle of Atomic Absorption Analysis
- b) Detection of heavy metals in food

#### 2-2-2. Analysis of pesticides

- a) Principle of GC/MS and LC/MS/MS
- b) Detection of pesticides in vegetables

#### 2-2-3. Analysis of allergenic compounds

- a) Principle of ELISA (Enzyme-Linked Immunosorbent Assay)
- b) Detection of allergenic compounds in food

## **Sub course 3. Food Functional Components**

### 3-1. Purpose

Food has a function such as not only nutrition, taste, flavor and color, but also controlling high blood pressure, antioxidation, prevention of diabetes, improvement of I-type allergic symptom, anticancer and so on. In preventing a lifestyle-related diseases, it is important to utilize this food function positively. This course is aimed for understanding food function and for acquiring its experimental methods.

### 3-2 Training content

#### 3-2-1. Analysis of general food ingredients

3-2-2. *In vitro* experiments related to food function (controlling high blood pressure, antioxidation, prevention of diabetes, improvement of I-type allergic symptom, anticancer and so on. )

3-2-3. *In vivo* experiments related to food function (controlling high blood pressure, antioxidation, prevention of diabetes, improvement of I-type allergic symptom, anticancer and so on. )

3-2-4. Purification and identification of bioactive materials from food

## **Sub course 4. Enzymology**

### 4-1. Purpose

The purpose of this course is to develop enzymology experts, who create the applied techniques for food and health care.

#### 4-2. Training content

##### 4-2-1. Role of enzyme in environment

- a) Outline of the degradation of hazardous materials by enzymes
- b) Overview of bioremediation

##### 4-2-2 Enzymology

- a) General steps in enzyme purification
- b) Characterization of enzyme
- c) Synthesis of novel compound
- d) Analysis of product

### **Sub course 5. Novel Food Technology**

#### 5-1. Purpose

The aim is to understand the principle of some selected technologies for food processing and to learn the recent developed new technology with emphasis on heat treatment. Ohmic heating is one of promising heat technology and generates the heat energy homogeneously in the foods by passing the alternating current.

#### 5-2. Training content

##### 5-2-1. Lecture and supporting materials

- a) Extrusion Cooking
- b) High Pressure Cooking
- c) Micro Wave Heating
- d) Superheated Steam

##### 5-2-2. Experiment (Ohmic heating)

- a) Liquid materials (sol gel transformation)
- b) Wheat dough

### **Sub course 6. Basic Food Engineering**

#### 6-1. Purpose

The aim of the course is to understand the basic principle of food engineering from the view point of water. To this end, description of water state in food and its effects on physical properties and enzyme functions and some other topics are learned in the lecture and related experimental course will be provided.

#### 6-2. Training content

#### 6-2-1. Lecture and supporting materials

- a) Description of water state water in food.
- b) Effect of water state on physical properties of food.
- c) Effect of water state on enzyme functions.
- d) General principles of separation and purification

#### 6-2-2. Experiment

- a) Measurement of water state in food.
- b) Measurement of physical properties of food and its relationship with water state.
- c) Measurement of enzyme functions and its relationship with water state.
- d) Progressive freeze-concentration as a newly developed method for high-quality concentration of liquid food.

### **3. NUMER OF PARTICIPANTS TOBE ENROLLED**

Up to 2 persons as a whole sub-course

### **4. TRAINING DURATION**

From March 7, 2010 to December 5, 2010

(1)Briefing

March 8, 2010

(2)General Orientation

From March 10, 2010 to March 12, 2010

(3) Japanese Language Program

From March 15, 2010 to April 30, 2010

(4)Technical Training

From May 6, 2010 to December 5, 2010

### **5. TRAINING INSTITUTION**

(1)General Orientation / Japanese Language Program

Osaka International Centre (OSIC), JICA

No.25-1, Nishi-Toyokawa-cho, Ibaraki-shi, Osaka 567-0058, Japan

Tel: +81(\*)-72(\*\*)-641-6900 Fax: +81(\*)-72(\*\*)-641-6910

URL: <http://www.jica.go.jp/worldmap/english.html#osaka>

(2)Technical Training

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URL: <http://www.pref.ishikawa.jp/ishikawa-pu/>

(\*)country code of Japan(\*\*) area code

## **6. CONDITION OF APPLICATION**

- (1) Applicants must be experts working in either governmental organization, university, research Institute or business enterprise which take active roles in the area of Food Science and Technology.
- (2) Applicants must be university graduate or equivalent.
- (3) Applicants must have an adequate ability in English conversation to be able to perform satisfactorily in the course.
- (4) Applicants must be of sound mind and body. (pregnant women can not be accepted.)
- (5) Applicants must not be presently serving in the military.
- (6) Applicants must attach a research report (summary) together with the application form.