附件4：The Course Syllabus for Overseas Postgraduate Students

**Course code ： 083200C1801**

**Food Microbiology**

**Ⅰ**. scheduled total hours： 2 （experiments: 0 hours） credits： 2 term： Ⅰ,Ⅱ

Teaching form： Class teaching, Assessment method： Essay Report, Oral presentation

**Ⅱ.**Compatible Major：Food science and engineering, Microbiology

**Ⅲ**.prerequisite course：Microbiology, Biochemistry

**Ⅳ.**OBJECTIVE：

Describe the characteristics and sources of predominant microorganisms in food. Describe the causative agents, suspect foods, signs and symptoms of some major foodborne diseases, with an emphasis on staphylococcal food poisoning, salmonellosis, cholera, *Escherichia coli* gastroenteritis, hepatitis, etc. Apply appropriate principles and approaches for the detection of various pathogenic microorganisms e.g. *Escherichia coli*, *Bacillus cereus*, *Campylobacter*, *Listeria monocytogenes*, *Salmonella*, *Clostridium*, *Vibrio* and *Statphylococcus aureus*. Compare and contrast the pathological effects and detection methods for common food indicator microorganisms, foodborne pathogens e.g. fungi, viruses and parasites.

**Ⅴ.**Content of the Syllabus and the Scheduled Study Hours:

**Chapter 1 History of microorganisms in food （2 hours）**

1．Food microbes in human welfare

2．The more significant dates and events in the history of food preservation, food spoilage, food poisoning, and food legislation

**Chapter 2 Taxonomy, role, and significance of microorganisms in foods （4 hours）**

1．BacteriaL taxonomy

2．Primary sources for microorganisms found in foods

3．Synopsis of common foodborne bacteria

4．Synopsis of common genera of foodborne molds

5．Synopsis of common genera of foodborne yeasts

**Chapter 3 Intrinsic and extrinsic parameters of foods that affect microbial growth （2 hours）**

1．Intrinsic parameters

2．Extrinsic parameters

**Chapter 4 Culture, microscopic, and sampling methods （4 hours）**

1．Conventional standard plate count

2．Membrane filters

3．Microscope colony counts

4．Agar droplets

5．Dry film and related methods

6．Most probablenumbers methods

7．Dye reduction

8．Roll tubes

9．Direct microscopic count

10．Microbiological examination of surfaces

11．Viable but nonculturable organisms

**Chapter 5 Indicators of food microbial quality and safety （2 hours）**

1．Some indicators of product quality

2．Indicators of food safety

3．The possible overuse of fecal indicator organisms

4．Predictive microbiology

**Chapter 6 Foodborne pathogens （4 hours）**

1．Foodborne illness cases

2．Host invasion

3．Quorum sensing

4．Biofilms

5．Sigma factors

6．Pathogenesis

**Chapter 7 Mycotoxins （4 hours）**

1．Aflatoxins

2．Alternaria toxins

3．Citrinin

4．Ochratoxins

5．Patulin

6．Penicillic acid

7．Sterigmatocystin

8．Fumonisins

9．Sambutoxin

10．Zearalenone

11．Control of production

**Chapter 8 Viruses and some other proven and suspected foodborne biohazards（2 hours）**

1．Viruses

2．Bacteria

3．Prion diseases

4．Toxigenic phytoplanktons

**Chapter 9 Industrial application of microorganisms: some examples （2 hours）**

1．Industrial scale bioproduction

2．World-expert companies producing biochemicals in industrial scale: Mitsubishi Rayon, Tanabe Seiyaku, Hoffmann La-Roche, DSM, BASF

**Chapter 10 Industrial Media and Nutrition of Microorganisms （4 hours）**

1．The basic nutrient compistions of industrial media

2．Criteria for the choice of raw materials used in industrial media

3．Some raw materials used in compounding industrial media

**Chapter 11 Industrial Bioprocess Engineering （2 hours）**

1．Types of bioprocess

2．Requirements of bioprocess equipments

3．Control of bioprocess parameters

**Ⅵ.**Teaching Materials and Reference Books：

1．Modern Food Microbiology, Edited by James M. Jay, Martin J. Loessner, David A. Golden, Published in 2005 Springer.

2．Industrial Biotechnology: Sustainable Growth and Economic Success, Edited by Wim Soetaert and Erick J. Vandamme, Published in 2010 WILEY-VCH Verlag GmbH & Co. KGaA,Weinheim.

3．Modern Industrial Microbiology and Biotechnology, Edited by Ndoka Okafor. Published in 2007 Science Publishers.

**Ⅶ.**Lecturer(s)：Cui Henglin Cui Fengjie

**Ⅷ**.the Author who write the Syllabus：Cui Henglin Cui Fengjie

**Course code ：083200C1802**

**Advanced Food Chemistry**

**Ⅰ**. scheduled total hours： 32 （experiments: 0 hours） credits： 2 term：Ⅰ,Ⅱ

Teaching form： Class teaching Assessment method ： Exam (Open)

**Ⅱ.**Compatible Major：Food science and engineering

**Ⅲ**.prerequisite course：Biological chemistry, Organic chemistry, Physical chemistry

**Ⅳ.**OBJECTIVE：

The objectives of this course are to (1) introduce the structure, properties and functions of the main components in food materials, (2) reveal the interactions between these components and changes of these components during food processing and storage, (3) represent the effects of these reactions and changes on food color, aroma, taste, texture, nutrition and preservation characteristics, and (4) describe the toxic substances in food materials and occuring toxic substances during food processing and storage. This course highlights the relationship between food component and food quality, which provides a broad theoretical basis for students who engage in the food processing, preservation and new product development.

**Ⅴ.**Content of the Syllabus and the Scheduled Study Hours:

**Chapter1 Introduction （2 hours）**

1．History of food chemistry

2．Role of food chemistry in the food industry

3．Content and direction of food chemistry

4．Approach and technology to the study of food chemistry

**Chapter2 Water and ice （2 hours）**

1．Structure and properties of water and ice

2．Moisture sorption isotherms and role

3．Distribution, morphology, and control of water and ice in foods

4．Relationship of water activity and food quality

**Chapter3 Carbohydrates （4 hours）**

1．Structure and properties of carbohydrates

2．Distribution and morphology of carbohydrates in foods

3．Changes of carbohydrates in food processing and storage

4．Relationship of carbohydrates and food quality

**Chapter4 Lipids （4 hours）**

1．Structure, properties and morphology of lipids

2．Changes of lipids in food processing and storage

3．Regulation and control of lipids in foods

4．Relationship of lipids and food quality

**Chapter5 Amino acids, peptides, and proteins （4 hours）**

1．Structure and properties of amino acids, peptides, and proteins

2．Changes of amino acids and proteins in food processing

3．Regulation and control of amino acids and proteins in foods

4．Relationship of amino acids and proteins and food quality

**Chapter6 Vitamins （2 hours）**

1．Structure and properties of vitamins

2．Distribution and morphology of vitamins in foods

3．Changes of vitamins in food processing and storage

4．Regulation and control of vitamins in foods

5．Relationship of vitamins and food quality

**Chapter7 Minerals （2 hours）**

1．Structure and properties of minerals

2．Distribution and morphology of minerals in foods and processed goods

3．Changes of minerals in food processing and storage

4．Regulation and control of minerals in foods

5．Relationship of minerals and food quality

**Chapter8 Enzymes （4 hours）**

1．Structure and characteristics of enzymes

2．Kinetic reaction and effect factors of enzymes

3．Changes of enzymes in food processing and storage

4．Regulation and control of enzymes in foods

5．Relationship of enzymes and food quality

**Chapter9 Colorants （2 hours）**

1．Classification, structure and properties of colorants

2．Formation pathway of food colorants

3．Changes of colorants in food processing and storage

4．Regulation and control of colorants in foods

5．Relationship of colorants and food quality

**Chapter10 Flavors （4 hours）**

1．Characteristics and classification of flavors

2．Formation pathway of food flavors

3．Changes of flavors in food processing and storage

4．Regulation and control of flavors in foods

5．Relationship of flavors and food quality

**Chapter11 Food toxic substances （2 hours）**

1．Characteristics and structure of food toxic substances

2．Distribution and morphology of toxic substances in foods

3．Removal of toxic substances in food processing

4．Safety evaluation of food toxic substances

**Ⅵ.**Teaching Materials and Reference Books：

 1．Owen R. Fennema. Food Chemistry. New York, Marcel Dekker, Inc., 1996

2．Belitz, H. D., Grosch, W. Food Chemistry. New Yolk: Springer verlag, Berlin Heidelberg, 1999

**Ⅶ.**Lecturer(s)：Qu Wenjuan

**Ⅷ**.the Author who write the Syllabus：Qu Wenjuan

**Course code ：083200C1803**

**Novel** **Instrumental Analysis**

**Ⅰ**. scheduled total hours： 2 （experiments: 0 hours） credits： 3 term：Ⅰ,Ⅱ

Teaching form： Class teaching Assessment method ：Essay Report

**Ⅱ.**Compatible Major：Food science and technology

**Ⅲ**.Prerequisite course：Analytic chemistry, Biochemistry

**Ⅳ.**OBJECTIVE：

Novel Instrumental Analysis aimed at graduate students in the science, technology and engineering of food who have completed an advanced course in food analysis. The major topics of this course included can chromatographic techniques, spectroscopic techniques, mass spectrometric techniques and electrophoretic techniques, immunochemical techniques as well as others. After learning the major concepts of instrumental analysis and to some of the instrumental techniques most commonly used in analytical and bioanalytical chemistry, the students are hoped to expand their knowledge of the instruments they come into contact with during the future scientific career, and obtain the ability of use modern, commercial instrumentation to perform quantitative and qualitative analyses of the physical properties and chemical composition of samples.

**Ⅴ.** Content of the Syllabus and the Scheduled Study Hours:

**Chapter 1 Electrophoretic techniques （4 hours）**

1．General principles

2．Support media

3. Polyacrylamide gel electrophoresis

4. Two-dimensional electrophoresis

5. Western blotting

6. Immunoassay (enzyme linked immunosorbent assay)

**Chapter 2 Biological mass spectrometry （2 hours）**

1．Introduction

2．The mass spectrometer

3. Ionization methods (MALDI and ESI)

4. Analysers

5. Tandem mass spectrometry

6. MS-based protein identification

**Chapter 3 Gas Chromatography Analysis （4 hours）**

1．Introduction to Chromatography

2．Introduction to GC

3. Instrumentation

4. Injection methods

5. Columns

6. Detectors

7. Applications

**Chapter 4 Classic LC and HPLC （2 hours）**

1． Introduction

2．Types of Separations

3. Usage of HPLC

4. Injection in HPLC

5. Detection in HPLC

**Chapter 5 AAS and ICP （4 hours）**

1．Introduction

2．Characters of the atomic absorption spectrum

3. Theory of AAS

4. Atomic Absorption Spectroscopy

5. Determination

6. Inductive Coupled Plasma Emission Spectrometer

**Chapter 6 Fluorescence spectrometry （4 hours）**

1. Principles of fluorescence spectrometry

2. Fluorescence quantum yield

3. Factors of the fluorescence spectrometry

4. Fluorescence spectroscopy instrument

5. Application of fluorescence spectrometry in biochemical analysis

**Chapter 7 Infrared absorption spectrometry （4 hours）**

1. Principles of infrared absorption spectrometry

2. Relationships of infrared spectra and molecular structures

3. Infrared spectroscopy instrument

4. Preparation of sapmles

 5. Application ofinfrared spectrometry in food analysis

**Chapter 8 UV-Vis absorption spectrometry （4 hours）**

1. Principles of UV-Vis spectrometry

2. Absorption law (Beer's Law)

3. Factors of the instrument

4. UV-Vis spectrometry instrument

5. Application ofUV-Vis spectrometry in food analysis

**Chapter 9** Basic principles of mass spectrometry **（4 hours）**

1．Introduction of mass spectrometry

2．Principles of mass spectrometry

3．Constitutes of mass spectrometer

4．Mass spectrum

5．Basic operation of mass spectrometer

**Chapter 10 Biological mass spectrometry （4 hours）**

1．Raman principle

2．Laser Raman spectrometer

3. Application

**Chapter 11 PCR, quantitative PCR, fluorescence differential display （2 hours）**

1．The principal of PCR and qPCR

2．Application of PCR and qPCR

**Experiment：**

 1．**Identification if the fragment of DNA had inserted into the plastid with PCR approach** **（2 hours）**

**Ⅵ.**Teaching Materials and Reference Books：

 1．Principles and Techniques of Practical Biochemistry. Keith Wilson and John Walker, Cambridge Press, 2000

**Ⅶ.**Lecturer(s)：Wang Yun, He Ronghai, Luo Lin, Han En, Zhao Yansheng, Zhang Xinai, Tan Xiaoli

**Ⅷ**.the Author who write the Syllabus：Wang Yun, He Ronghai, Luo Lin, Han En, Zhao Yansheng, Zhang Xinai, Tan Xiaoli

**Course code ： 083200D1804**

**Physical Properties of Foods**

**Ⅰ**. scheduled total hours： 32 （experiments: 6 hours） redits： 2 term：Ⅰ,Ⅱ

Teaching form：Classroom teaching and Discussion Assessment method ：Dissertation

**Ⅱ.**Compatible Major：Food science and technique

**Ⅲ**.prerequisite course：

**Ⅳ.**OBJECTIVE：

At the completion of this course the student should be able to learn the physical properties of food and staple agricultural products. It also includes examination of the Optics, Mechanics, Electricity, Thermal and Rheology properties of food. In the procedure of food processing and preservation, make use of the physical properties for food quality assurance. This course enables students to broaden knowledge, broaden their thinking, inspire innovation, and make use the principle of food physics for their research.

**Ⅴ.**Content of the Syllabus and the Scheduled Study Hours:

**Chapter 1 Introduction （6 hours）**

1．To understand the basic principle of food of physics, the main content of physical characteristics about food.

2．Association of food physics and other courses

3. To understand the physical properties of the universal, basic characteristics of food physics, and its application in food detection and processing.

4. The classic case analysis about food detection and processing related to its physical prosperities.

**Chapter 2 The basic physical property of food （ 3 hours）**

1．The basic concept and theory of physical shape, size, density, porosity and other characteristics of food materials.

2．Principle and method of determining porosity

3. The application in engineering using basic physical properties.

**Chapter 3 Mechanical properties of food （ 4 hours）**

1．The basic concept and theory of physical shape, size, density, porosity and other characteristics of food materials.

2．Principle and method of determining porosity

3. The application in engineering using basic physical properties.

4. The rheological properties and its application in food engineering

**Chapter 4 Food texture evaluation （ 4 hours）**

1．The basic concepts of food texture, as well as the evaluation method of food texture.

2．Classification of texture evaluation method.

3. Food sensory evaluation, and its application in quality evaluation.

**Chapter 5 Optical properties of food （ 6 hours）**

1．The basic principle of characterization and detection of food color.

2．The basic concept, principle and method of transmittance, optical properties and delayed luminescence prosperity of food.

3. The application in engineering using basic physical properties.

4. The relationship between the optical properties and quality of material and its application in engineering.

5. The relationship between the color and quality of the food material.

6. The application of optical technology in food quality detection and controlling.

**Chapter 6 Thermoelectric properties of food （3 ours）**

1. The basic characteristics of wet material adsorption, thermal physics and its application of thermal characteristics in engineering.
2. Basic concept and principle of the electric field in the ion, microwave, nuclear magnetic resonance, ionizing radiation, magnetic properties and its application in food engineering.

**Experiment：**

1．Analysis of food mechanical properties.  **（ 2 hours）**

2．Analysis of food optical properties. **（ 2 hours）**

3. Detection of food porosity. **（ 2 hours）**

**Ⅵ.**Teaching Materials and Reference Books：

 1．Food physics, Southeast University press, Tukan

**Ⅶ.**Lecturer(s)：Lin Hao

**Ⅷ**.the Author who write the Syllabus：Lin Hao

 **Course code: 083200D1805**

 **Food Biotechnology**

**Ⅰ**. Scheduled total hours： 32 (experiments: 0 hours) Credits： 2 term： Ⅰ,Ⅱ

Teaching form： Class teaching and Seminar Assessment method: Essay Report **Ⅱ.**Compatible Major: Food Science and Engineering

**Ⅲ**.Prerequisite course：Microbiology; Biochemistry and Molecular Biology

**Ⅳ.**OBJECTIVE：

This course discusses the application of biotechnology in food industry, which covers microbial technology, enzyme technology, genetic engineering technology, protein engineering, the use of microbial technology in food processing and preservation, the use of enzyme technology in food processing and preservation, the use of genetic engineering technology in food processing and preservation, the use of protein engineering in food processing and preservation, the research progress of food biotechnology. This course is designed to develop students’ capability of using these biological techniques in food processing and preservation.

**Ⅴ.** Content of the Syllabus and the Scheduled Study Hours:

**Chapter 1 Introduction (4 hours)**

1. Background and history of biotechnology

2. Introduction to main biotechnologies

**Chapter 2 Microbial technology (8 hours)**

1．Microbial technology

2. The use of microbial technology in food processing

3. The use of microbial technology in food preservation

4. The research progress of microbial technology

**Chapter 3 Enzyme technology (6 hours)**

1．Enzyme technology

2. The use of enzyme technology in food processing

3. The use of enzyme technology in food preservation

4. The research progress of enzyme technology

**Chapter 4 Genetic engineering technology (6 hours)**

1．Genetic engineering technology

2. Genetically modified food and it’s safety

3. The use of Genetic engineering technology in the preservation of fruits and vegetables

4. The research progress of genetic engineering technology

**Chapter 5 Protein engineering (6 hours)**

1．Protein engineering

2. The use of protein engineering in food industry

3. The research progress of protein engineering

**Seminar (2 hours)**

Topic： 1. Basic understanding to food biotechnology.

2. Introducing one of the latest research finds of food biotechnology.

**Ⅵ.Teaching Materials and Reference Books：**

1. Food Biotechnology (Advances in Biochemical Engineering/ Biotechnology), Edited by Ulf Stahl, Published in 2008 by Springer Press.
2. Fermentation Processes Engineering in the Food Industry, Edited by Carlos Ricardo Soccol, Ashok Pandey and Christian Larroche. Published in 2013 by CRC Press.

**Ⅶ.**Lecturer(s)： Zhang Hongyin.

**Ⅷ**.the Author who write the Syllabus： Zhang Hongyin.

**Course code ：083200D1806**

**The State of the Art in Food Science and Technology Research Industry**

**Ⅰ**. scheduled total hours： 24 （experiments: 0 hours） credits： 2 term：Ⅰ,Ⅱ

Teaching form： Seminar Assessment method ：Essay Report

Major：Food Science，Food Engineering

**Ⅲ**.prerequisite course： Food Chemistry；Principle of Food Engineering; Food Processing Technology

**Ⅳ.**OBJECTIVE：

a. Development the abilities of summarizing the literatures and skills of oral presentation

b. Learn and master the latest academic research progress in food science

c. Learn the recently and advanced scientific techniques in food industry

**Ⅴ.**Content of the Syllabus and the Scheduled Study Hours:

**Chapter One Separation Processes in the Food Industry （4 hours）**

1．Developments in food separation, extraction and concentration techniques

2．Separation technologies in the processing of particular foods and nutraceuticals

**Chapter Two Modern Detection Techniques in Food Science （4 hours）**

1．Nondestructive Detection Techniques for food

2．Instrumental Analysis Techniques for food

3．Biological Methods in Food Analysis

**Chapter Three Non-thermal Processing Technology in Food Science （4 hours）**

1．Physical Processes-High pressure and Ultrosonic

2．Electromagnetic Processes

3．Other Nonthermal Processes

 **Chapter Four Food Biotechnology**  **（4 hours）**

1．Molecular Nutrition

2．Plant Food Application and Functional Foods

3．Probiotics

4． Food Safety

**Chapter Five Nanotechnology in Food Science （4 hours）**

1．Nature Food Nanostructures

2．Food Nanotechnology and Society

3．Food Application of Nanotechnology

**Chapter Six Energy-Saving Drying Technology in Food Industry （4 hours）**

1．Heat Pump Assisted Drying Technology

2．Far Infrared Heating in Drying Process

**Experiment： None**

**Ⅵ.**Teaching Materials and Reference Books：

1.Syed S. H. Rizvi. Separation, extraction and concentration processes in the food, beverage and

nutraceutical industries. Woodhead Publishing Limited, 2010

2．Anthony Pometto. Food Biotechnology (Second Edition).Taylor & Francis Group, 2006

3. Howard Q. Zhang. Nonthermal Processing Technologies for Food. John Wiley &Sons Ltd, 2011

**Ⅶ.**Lecturer(s)： Ma Haile

**Ⅷ**.the Author who write the Syllabus： Ma Haile

**Course code: 083200D1807**

**Nondestructive Detection Techniques for Food Quality**

**Ⅰ**. Scheduled total hours： 24 (experiments: 0 hours) Credits： 2 term：Ⅰ,Ⅱ

Teaching form： Class teaching Assessment method: Essay Report

**Ⅱ.** Compatible Major: Food Science and Engineering

**Ⅲ**. Prerequisite course：Physics; computer application basis; electrical electronics; food analysis; food chemistry

**Ⅳ.**OBJECTIVE：

In this course, learners will find out how to use the nondestructive detection techniques to detect the quality of food, and also they can master the some brief principle of the nondestructive detection techniques. The learners can discuss briefly the principal approaches used in this area, e.g. computer vision, electronic nose (E-nose) & electronic tongue (E-tongue) and so on.

**Ⅴ.**Content of the Syllabus and the Scheduled Study Hours:

**Chapter 1 Introduction (4 hours)**

1. Concept of nondestructive detection technique;

2. Function of nondestructive detection technique to food engineering.

**Chapter 2 Near infrared (NIR) spectroscopy technique (6 hours)**

1. Concept of NIR spectroscopy

2. Instrument / equipment of NIR spectroscopy

3. NIR spectral data processing and modeling

4. Applications

**Chapter 3 Computer vision technique (6 hours)**

1. Concept of computer vision

2. Components of computer vision system

3. Commonly used image processing algorithms

4. Applications

**Chapter 4 Hyper/Multi-spectral imaging technique (4 hours)**

1. Concept of hyper/multi-spectral imaging technique

2. Principle and system of hyperspectral imaging

3. Principle and system of multispectral imaging

4. Spectral image processing algorithms

5. Applications

 **Chapter 5 Biosensors technique (4 hours)**

1. Introduction of olfactory sensors technique (electronic nose)

2. Introduction of gustatory sensors technique (electronic tongue)

3. Other biosensors techniques

4. Applications

**Ⅵ.Teaching Materials and Reference Books：**

1. Modern detection technologies in the Food Industry, Edited by Zhao JieWen and Sun Yong Hai, Published in 2008 by Chinese Light Industry Press.
2. Chemometrics Methods, Edited by Xu Lu and Shao XueGuang, Published in 2004 by Science Press.

**Ⅶ.**Lecturer(s)：Chen Quansheng.

**Ⅷ**.the Author who write the Syllabus：Chen Quansheng.

**Course code ： 083200D1808**

**Introduction to Food Science**

**Ⅰ**. scheduled total credits： 24 （experiments: credits） credits： 2 term：Ⅰ,Ⅱ

Teaching form：Class teaching and Seminar Assessment method ：Essay Report **Ⅱ.**Compatible Major：Food Science and Engineering

**Ⅲ**.prerequisite course：Food Chemistry, Biological Chemistry, Microbiology

**Ⅳ.**OBJECTIVE：

At the completion of this course, the students should understand the development and the most frontier professional knowledge concerning food science; understand the quality, component and nutrition of food; understand the relation between food and health; have some knowledge of food machinery and plant design; the students should also master food processing technology which includes common technology and new ones; properly understand food safety and food sensory evaluation; learn research methods of Food Science.

**Ⅴ.**Content of the Syllabus and the Scheduled Study Hours:

**Chapter 1 Introduction and Background （4 credits）**

1．Overview of Food Science

2．Chemistry of foods

3．Food Composition

4．Quality factors in foods

**Chapter 2 Preservation （8credits）**

1．Heat and cold preservation

2．Drying and dehydration

3．Radiant and Electrical Energy

4．Fermentation, Microorganisms and Biotechnology

**Chapter 3 Foods and Food Products （8credits）**

1．Milk, Meat, Poultry and Eggs

2．Aquatic products

3．Cereal Grains, Legumes, and Oilseeds

4．Fruits and Vegetables

5．Candy and Confectionery

6．Beverages

**Chapter 4 Related information of Foods （4 credits）**

1．Environmental concerns and Processing

2．Food Safety

3．World Food Needs

**Experiment：none**

**Ⅵ.**Teaching Materials and Reference Books：

 1．Rick Parker. Introduction to Food Science[M]. Beijing: China Light Industry Press, 2005

**Ⅶ.**Lecturer(s)：Ma Yongkun

**Ⅷ**.the Author who write the Syllabus：Ma Yongkun

**Course code ：083200D1809**

**The Experimental design and data Processing**

**Ⅰ**. scheduled total hours： 24 （experiments: 0 hours）credits： 2 term：Ⅰ,Ⅱ

Teaching form：Classroom teaching and Discussion Assessment method ：Dissertation

**Ⅱ.**Compatible Major：Food science and technique

**Ⅲ**.prerequisite course：

**Ⅳ.**OBJECTIVE：

At the completion of this course the resident should be able to scientific design experiment and effective process the test data obtained from the experiment. This includes examination of reasonable experimental design, effective access to reliable statistics, reliability analysis of these statistics and reasonable relationship between the experimental data obtained. Furthermore, using appropriate method to analyze the reliable and significant of obtain data and provide data support for further experiment.

**Ⅴ.**Content of the Syllabus and the Scheduled Study Hours:

**Chapter 1 Introduction （2 hours）**

1. Definition, objectives and requirements in experimental design.

2. Basic terminology of experimental design

3. error theory and processing method

4. Judgment and elimination of abnormal value in the measurement.

**Chapter 2 Comparison and evaluation of test results （ 3 hours）**

1．kinds of distribution statistics

2．Data expression and its application

3. Sampling distribution of normal population of various statistics

4. Comparison of two treatments

5. Parameter estimation and hypothesis testing

**Chapter 3 Analysis of variance （ 4 hours）**

1．Characteristic of variance analysis;

2．Variance analysis of single factor;

3. Multiple comparisons in single factor variance analysis.

4. Variance analysis of two factors

**Chapter 4 Regression and correlation （ 4 hours）**

1．regression and correlation;

2．principle of partial latest squares;

3. Line regression;

4. Multiply line regression;

5. Significant test of regression coefficient;

6. Significant test of regression equation.

**Chapter 5 Experimental design （ 6 hours）**

1．The task and significance experimental design;

2．General term of experimental design;

3. Experimental design and program development.

4. The basic principle of experimental design.

**Chapter 6 Orthogonal design and uniform design （3 ours）**

1. Characteristics and selection method of orthogonal table;
2. Visual analysis method of orthogonal test design;
3. Orthogonal experiment design and analysis with interaction;
4. Experimental results of multi index analysis method;
5. Orthogonal experiment with mixed level;
6. The uniform design and analysis

**Experiment：**

**Ⅵ.**Teaching Materials and Reference Books：

 1．Design and analysis of experiments, Douglas C. Montgomery

**Ⅶ.**Lecturer(s)：Lin Hao

**Ⅷ**.the Author who write the Syllabus：Lin Hao

**Course code ：083200D1810**

**Bio-separations and Extraction Technique in Food Industry**

**Ⅰ**. scheduled total hours： 24 credits： 2 term：Ⅰ,Ⅱ

Teaching form：Class teaching and Seminar Assessment method ：Essay Report

**Ⅱ.**Compatible Major：Food Engineering, Agricultural Products Processing and Storage Engineering, Biochemistry and Molecular Biology, Food Oils and Vegetable Protein Engineering, Food Separation Technique

**Ⅲ**.prerequisite course：Food Chemistry, Biochemistry, Food Testing and Analysis

**Ⅳ.**OBJECTIVE：

As we know, purification enriches biological molecules, cells and parts of cells into purified fractions, which are the end products of bioprocessing.This course is intended to offer the basic and relatively advanced skills in bioseparation and extraction science, as frequently used by researcher in the fields of Biotechnology. This includes the introduction of membrane separation technique, capillary electrophoresis separation techniques, aqueous two-phase extraction technology, supercritical fluid extraction technology, ultrasonic assisted extraction technology and so on. At the completion of this course the researcher should be able to efficiently separate and extract substance, especially some high valueable products: diagnostic biomarkers in biological materials, therapeutic proteins in microbial fermentation or cell culture, bioactive peptides in plant and animal tissues.

**Ⅴ.**Content of the Syllabus and the Scheduled Study Hours:

**Chapter 1 . Class teaching**  (1 credits)

1. Learn the basic theory of bioseparations and extraction Technique (4 hours)

2. Learn the characteristics of products to be separated: molecular size, charge, conformation, hydrophobic character and so on，which effect the bioseparation and extraction of products .

 (4 hours)

3. Learn curriculum-related instrument (high performance liquid chromatography , capillary electrophoresis separation, enzyme membrane coupling )operation: (4 hours)

4. Learn to choose a proper approach to separate and extract the subtract*.* (4 hours)

**Chapter 2. Seminar** **group discussions**  (1 credits)

1．Everyone must read a large amounts of data, make full preparations. (4 hours)

2．The discussions is related to the course content and the five pairs, everyone is free to express their views. (4 hours)

**Ⅵ.**Teaching Materials and Reference Books：

Modern Food Separation Technology, Membrane Separation Technology, Food Separation Technology, Modern Separation Techniques in Food Industry

**Ⅶ.**Lecturer(s)：Wang Zhenbin

**Ⅷ**.the Author who write the Syllabus：Wang Zhenbin

**Course code ：083200D1811**

**Food Physical Chemistry**

**Ⅰ**. scheduled total hours： 24 （experiments: 0 hours） credits： 2 term：Ⅰ,Ⅱ

Teaching form：Class teaching and Seminar Assessment method ：Essay Report**Ⅱ.**Compatible Major：Food Science

**Ⅲ**.prerequisite course：Physical Chemistry; Food Chemistry

**Ⅳ.**OBJECTIVE：

a. Gain knowledge of food physical chemistry and understanding of the relevant principles through a variety of guided readings and lectures.

b. Apply knowledge of food physical chemistry in critical discussions of primary research articles.

c. Use the knowledge gained in a research project where they will be asked to explain the physics associated with a specific food product or process.

**Ⅴ.**Content of the Syllabus and the Scheduled Study Hours:

**Chapter One Introduction （2 hours）**

1．Physical Chemistry in Food Science and Technology

2．About the content

**Chapter Two Proteins （2hours）**

1．Description

2．Conformational Stability and Denaturation

3．Solubility

**Chapter Three Polymers （2 hours）**

1．**Introduction**

2．**Very Dilute Solutions**

3．**Polyelectrolytes**

**4**．**More Concentrated Solutions**

**5**．**Phase Separation**

 **Semina 1 \（2 hours）**

**Chapter Four** Dispersed Systems **（2 hours）**

1．Structure

2．Importance of Scale

3．Particle Size Distributions

 **Chapter Five Surface Phenomena in Food Processing （2 hours）**

1．Surface Tension

2．Adsorption

3．Surfactants

**4**．Interfacial Rheology

**Chapter Six Formation of Emulsions and Foams （2 hours）**

1．Introduction

2．Foam Formation and Properties

3．Breakup of Drops and Bubbles

**4**．Role of Surfactant

**Semina 2 （2 hours）**

**Chapter Seven Colloidal Interactions （2 hours）**

1．General Introduction

2．DLVO Theory

3．Role of Polymers

**4**．Other Interactions

**Chapter Eight Changes in Dispersity （2 hours）**

1．Overview

2．Aggregation

3．Sedimentation

**4**．Coalescence

 **5**．Partial Coalescence

 6．Ostwald Ripening

**Chapter Nine Soft Solids （2 hours）**

1．Rheology and Fracture

2．Gels

3．Plastic Fats

**4**．Closely Packed Systems

**Semina 3 （2 hours）**

**Experiment： None**

**Ⅵ.**Teaching Materials and Reference Books：

1．Pieter Walstra. Physical Chemistry of Foods. Marcel Dekker, Inc. New York, NY, 2003

**Ⅶ.**Lecturer(s)：Cheng Yu

**Ⅷ**.the Author who write the Syllabus：Cheng Yu

**Course code ：083200D1812**

**Food Processing Technologies and Equipments**

**Ⅰ**. scheduled total hours： 24 （experiments: 0 hours）credits： 2 term：Ⅰ,Ⅱ

Teaching method： Class teaching Assessment method ： Essay Report

**Ⅱ.**Compatible Major：Food science and engineering

**Ⅲ**.prerequisite course：Food technology, Food equipment

**Ⅳ.**OBJECTIVE：

The objectives of this course are to (1) introduce the background knowledge of modern food processing technologies, (2) represent the most commonly used equipments in food physical processing, separation and purification, drying and sterilization, fermentation, analysis and determination, and sensory evaluation, and (3) describe the applications of these technologies and equipments.

**Ⅴ.**Content of the Syllabus and the Scheduled Study Hours:

**Chapter1 Physical processing technology and equipment （4 hours）**

1．Ultrasound technology, equipment and application

2．Microwave technology, equipment and application

**Chapter2 Separation and purification technology and equipment （4 hours）**

1．Ultrafiltration technology, equipment and application

2．Column chromatography technology, equipment and application

**Chapter3 Drying and sterilization technology and equipment （4 hours）**

1．Spray drying technology, equipment and application

2．Infrared drying and sterilization technology, equipment and application

**Chapter4 Fermentation technology and equipment （4 hours）**

1．Anaerobic digestion technology, equipment and application

2．Microbiological fermentation technology, equipment and application

**Chapter5 Analysis technology and equipment （4 hours）**

1．HPLC technology, equipment and application

2．NIR spectroscopy technology, equipment and application

**Chapter6 Sensory evaluation technology and equipment （4 hours）**

1．Electronic tongue technology, equipment and application

2．Colorimeter technology, equipment and application

**Ⅵ.**Teaching Materials and Reference Books：

1．Niir Board. Modern Technology of Agro Processing and Agricultural Waste Products. National Institute Of Industrial Re, 2000

2．[Carl W. Hall](http://www.bookdepository.com/author/Carl-W-Hall). Processing Equipment for Agricultural Products. Avi Publishing Co Inc., 1963

**Ⅶ.**Lecture(s)：Qu Wenjuan

**Ⅷ**.the Author who write the Syllabus：Qu Wenjuan

**Course code ：083200D1813**

**Conspectus of Functional Foods**

**Ⅰ**. scheduled total hours： 24 （experiments: 0 hours） credits：2 term：Ⅰ,Ⅱ

Teaching form：Class teaching and Discussion Assessment method ：Course paper

**Ⅱ.**Compatible Major：Food Science and Engineering

**Ⅲ**.prerequisite course：Advanced Food Chemistry

**Ⅳ.**OBJECTIVE：

At the completion of this course the student should be able to understand the basic concepts, general development, existing problems and future development direction of functional foods, to grasp the characteristics and functions of functional components, to grasp the production process of different functions of functional foods, and to grasp the basic knowledge and technology of assessment, management, formulation, processing and detection of functional foods. During this course the student should be enable to lay a good foundation of theory and technology about being engaged in functional foods research, development, production and sales for the future.

**Ⅴ.**Content of the Syllabus and the Scheduled Study Hours:

**Chapter One Introduction （2 hours）**

1．The basic concept of functional foods

2．Overview of the development of functional foods

3．Development of functional food in China

**Chapter Two Proteins and active peptides （2 hours）**

1．Immunoglobulin

2．Lactoferrin

3．Lysozyme

4．Other proteins of bioactive substances

5．Bioactive peptides

6．Seasoning of peptide

7．Some other valuable active peptides

**Chapter Three Active polysaccharides （2 hours）**

1．Dietary fiber

2．Polysaccharides from fungi

**Chapter Four Functional sweeteners （2 hours）**

1．Functional monosaccharide

2．Functional oligosaccharide

**Chapter Five Free radical scavenger, minerals, vitamins and functional oil （2 hours）**

1．The theory of free radical and free radical scavenger

2．Major elements and trace elements

3．The fat-soluble vitamins and water-soluble vitamins

4．Polyunsaturated fatty acid, phospholipid and fat substitute

**Chapter Six Functional foods of Anti-aging and physical fatigue-relieving （2 hours）**

1．Summary

2．Substances of Anti-aging

3．Substances of physical fatigue-relieving

**Chapter Seven Weight-reducing functional foods （2 hours）**

1．Summary

2．Weight-reducing substances

**Chapter Eight Anti-tumor and immunity-enhancing functional foods （2 hours）**

1．Summary

2．Anti-tumor functional foods

3．Immunity-enhancing functional foods

**Chapter Nine Hypolipidemic, blood pressure-reducing and blood sugar-regulating functional foods （2 hours）**

1．Summary

2．Hypolipidemic substances

3．Blood pressure-reducing substances

4．Blood sugar-regulating substances

**Chapter Ten Intestinal flora-regulating functional foods （2 hours）**

1．Summary

2．Intestinal flora-regulating substances

**Chapter Eleven Sleep-improving and memory-improving functional foods （2 hours）**

1．Summary

2．Sleep-improving substances

3．Memory-improving substances

**Chapter Twelve Evaluation, management, formula, processing and testing techniques of functional foods（2 hours）**

1．Toxicological and functional evaluation

2．Formula of functional foods

3．Management of functional foods

4．Processing techniques of functional foods

5．Testing techniques of functional foods

**Ⅵ.**Teaching Materials and Reference Books：

 1．Functional foods, Yaoguang Zhong, Chemical industry press, 2011.

 2．The science of functional foods, Jianxian Zheng, China light industry press, 2003.

3．Research and application of functional food, Moucheng Wu, Chemical industry press, 2004.

**Ⅶ.**Lecturer(s)：He Ronghai, Guo Danzhao

**Ⅷ**.the Author who write the Syllabus：Guo Danzhao, He Ronghai

**Course code ：083200D1814**

**Advanced Food Nutrition**

**Ⅰ**. scheduled total hours： 24 （experiments: 0 hours） credits： 2 term： Ⅰ，Ⅱ

Teaching form： Class teaching and Seminar Assessment method：Essay Report**Ⅱ.**Compatible Major：Food Science and Engineering

**Ⅲ**.prerequisite course：Organic Chemistry, Biochemistry

**Ⅳ.**OBJECTIVE

Master the basic theory and main content of modern food nutrition; Learn the development trend of food nutrition; Apply the theory of modern food nutrition to guide for scientific research, production practice and health care;

**Ⅴ.**Content of the Syllabus and the Scheduled Study Hours:

**Chapter 1 Protein and Amino acid （3 hours）**

1．Protein

2．Amino acid

**Chapter 2 Carbohydrate and Dietary Fiber （3 hours）**1．Carbohydrate

2．Amino acid

**Chapter 3 Lipids （3 hours）**1．Absorption and Transporting of Lipid

2．Cell Metabolism of Lipid

**Chapter 4 Vitamin （2 hours）** 1. Lipid Soluble Vitamin

2．Water Soluble Vitamin

**Chapter 5 Minerals and Microelements （2 hours）**1．Macroelement

2．Microelement

**Chapter 6 Food nutrition in different life cycle （3 hours）**1．Pregnancy and Lactation

 2．Nutrition Requirement in Infancy

 3. Adolescaria

 4. Aging

**Chapter 7 Food nutrition and Chronic Disease （4 hours）**1．Food nutrition and Obesity

 2．Food nutrition and Atherosclerotic Cardiovascular Disease

 3. Food nutrition and Diabetes

 4. Food nutrition and Osteoporosis

 5. Food nutrition and Cancer

**Chapter 8 Biology Engineering Technology and Food Nutrition （2 hours）**

1. Genetic Modification and Food Nutrition
2. Genetic Modification and Food Safety

**Seminar （2 hours）**

**Ⅵ.**Teaching Materials and Reference Books：

1．Yin shian, Wang zhixu, etc. Translation. «Present knowledge in nutrition» Beijing: Chemical Industrial Press, 2004

 2. Liu zhigao, Etc. Edit. «Food Nutriology». Beijing：China Light Industry Press, 2004

 3. Journal of Food Science America（original edition）

**Ⅶ.**Lecturer(s)：He Wensen

**Ⅷ**.the Author who write the Syllabus：He Wensen

**Course code ： 083200D1815**

**Digital Image Processing**

**Ⅰ**. scheduled total credits： 2 （experiments: 0 credits） credits： 2 term：Ⅰ,Ⅱ

Teaching form： Class Teaching Assessment method ：Report with PPT

**Ⅱ.**Compatible Major：Food Science & Engineering

**Ⅲ**.prerequisite course：Basis of computer science

**Ⅳ.**OBJECTIVE：

The principal objectives are to provide an introduction to concepts and methodologies for digital image processing. And to develop a foundation that can be used as the basis for further study and research in this field. Students who once finish this course should master middle level technique about digital image processing. They should be able to solve certain variety of problems in detection on external quality of food and agricultural product based on computer vision.

**Ⅴ.**Content of the Syllabus and the Scheduled Study Hours:

**Chapter 1** Introduction  **(2** hours**）**

1.1 The arrangement of this course；

1.2 What is digital image processing?

1.3 The origins of digital image processing

1.4 Examples of fields that use digital image processing

**Chapter** 2 Digital image fundamentals  **（6** hours**）**

 2.1 Components of an image processing system

2.2 Fundamental steps in digital image processing

2.3 Image sensing and acquisition

2.4 Image sampling and quantization

2.5 Some basic relationships between pixels

**Chapter 3. Image enhancement (6** hours**）**

3.1 Image enhancement in spatial domain

3.1.1 Background

3.1.2 Some basic gray level transformations
3.1.3 Histogram processing
3.1.4 Enhancement Using Arithmetic/Logic Operation
3.1.5 Spatial Filtering

3.2 Image enhancement in the frequency domain

**Chapter 4. Color image processing (2** hours**）**

4.1 Color fundamentals

4.2 Color models

4.3 Basics of full color image processing

4.4 Color image processing

**Chapter 5. Image segmentation (6** hours**）**

5.1 Detection of discontinuities

5.2 Edge linking and boundary detection

5.3 Thresholding

5.4 Segmentation

**Chapter 6. Representation，description and Object recognition (2** hours**）**

6.1 Representation

6.2Description

6.3 Object recognition

**Experiment：(not included in class hours, homework)**

1. Gray level transformations （2 hours）

2. Histogram processing （2 hours）

3. Image segmentation （2 hours）

**Ⅵ.**Teaching Materials and Reference Books：

1. Digital Image Processing. (Third Edition) Rafael C. Gonzalez & Richard E. WoodsPublishing House of Electronics Industry

2. Digital Image Processing. Kenneth R. Castleman 2011

1. Papers recently published

**Ⅶ.**Lecturer(s)：Huang xingyi

**Ⅷ**.the Author who write the Syllabus：Huang xingyi

**Course code ： 083200D1816**

**Spectral Analysis of Food**

**Ⅰ**. scheduled total hours： 24 （experiments: 0 hours） credits： 2 term：Ⅰ,Ⅱ

Teaching form： Class teaching and Seminar, Assessment method ：Essay Report

**Ⅱ.**Compatible Major：Food Science

**Ⅲ**.prerequisite course：Analytical Chemistry, Food Chemistry

**Ⅳ.**OBJECTIVE：

At the completion of this course the students should be able to interpret both the basic theories and the applications of the optical spectrum instruments. This includes examination of UV visible spectroscopy，fluorescence spectroscopy, infrared spectroscopy，atomic absorption spectroscopy and some of nuclear magnetic resonance etc. Especially，The students should be able to understand the application method and how to use the instruments in the food analysis.

**Ⅴ.**Content of the Syllabus and the Scheduled Study Hours:

**Chapter 1 Introduction （2 hours）**

1．History of spectral analysis

2．Classification of spectral analysis

3．Basic principle of spectral analysis

4．Application of spectral analysis in food analysis

**Chapter 2 UV-Vis absorption spectrum （6 hours）**

1．Molecular absorption spectrum

2．UV-Vis absorption spectrum of organic compounds

3．Measurement of absorption spectrum

4．UV-Vis absorption spectrophotometer

5．Condition of analysis

6．Application of UV-Vis absorption spectra in food analysis

**Chapter 3 Fluorescence spectrum （2 hours）**

　1．Basic principle of fluorescence spectrum

　　2．Quantitative analysis method of fluorescence spectra

　　3．Fluorospectro photometer

**Chapter 4 Infrared absorption spectrum （4 hours）**

 1．Introduction of IR

 2．Basic principle of IR

 3．Infraed spectrometer

 4．Sample preparation of IR

 5．Application of IR in food analysis

**Chapter 5 Atomic absorption spectrum （6 hours）**

1．Introduction of AAS

 2．Basic principle of AAS

 3．Atomic absorption spectrometer

 4．Interference and eliminating method

 5．Application of AAS in food analysis

**Chapter 6** Nuclear magnetic resonance spectrum **（4 hours）**

 1．Instroction of NMR

 2．Basic principle of NMR

 3．Nuclear magnetic resonance spectrometer

 4．Application of NMR in food analysis

**Ⅵ.**Teaching Materials and Reference Books：

1. Handbook of Instrumental Techniques for Analytical Chemistry, by Frank A. Settle

2. Principles and Practice of Analytical Chemistry, By F. W. Fifield, D. Kealey,

3. Modern Analytical Chemistry, By David T Harvey

**Ⅶ.**Lecturer(s)：Zhao Yansheng

**Ⅷ**.the Author who write the Syllabus：Zhao Yansheng

**Course code: 083200D1817**

**Food Fermentation Technology**

**Ⅰ**. Scheduled total hours： 18 (experiments: 0 hours) Credits： 2 term：Ⅰ,Ⅱ

Teaching form： Class teaching and Seminar Assessment method: Essay Report **Ⅱ.**Compatible Major: Food Science and Engineering

**Ⅲ**.Prerequisite course：Microbiology; Chemical Engineering

**Ⅳ.**OBJECTIVE：

This course discusses the application of fermentation technology in food industry, which covers principles and history of fermentation, microbial metabolisms and regulation, fermentation techniques and conditions and their application in the mixed fermentation commonly implemented in food industries. This course is designed to enable students develop a food fermentation process using microorganisms and local based substrate.

Upon successful completion of this course, students are expected to be able to design a food fermentation process starting from selection of microorganisms and the fermentation conditions to produce required modification in fermented food matrix.

**Ⅴ.**Content of the Syllabus and the Scheduled Study Hours:

**Chapter 1 Introduction (1.50 hours)**

1. Background and history of food fermentations

2. Different type of fermentations in food area

**Chapter 2 Fermentation Equipment Selection: Laboratory Scale Bioreactor Design Considerations (3.0 hours)**

1．Types of Bioreactor

2. Construction Aspects

3. Vessel Design

4. Drives/Coupling

5. Probes and Sampling

6. Control and Actuation

**Chapter 3 Modes of Fermenter Operation (4.5 hours)**

1. Batch Culture

2. Fed-batch Culture

3. Continuous Culture

**Chapter 4 The Design and Preparation of Media for Bioprocesses (3.0 hours)**

1. Where Do We Start?

2. Media Types

3. Medium Components

4. Medium Formulation

5. Sterilisation of Media

6. Designing Media for Specific Functions

**Chapter 5 Preservation of Cultures for Fermentation Processes (1.5 hours)**

1. Water, Ice, and Preservation of Life

2. Specialized Cell Banks for Industry

3. Microbial Cell Cultures

**Chapter 6 Examples of different kind of food fermentations (3.0 hours)**

1. Traditional fermented foods: Soy, Vinegar, Distillate spirits, Beer, Wine.

2. Modern fermented foods: Amino Acids, Food additives.

**Seminar (1.5 hours)**

Topic： 1. Basic understanding to Food Fermentation Technology.

2. Introducing your interested fermentation technology and its application to food products.

**Ⅵ.Teaching Materials and Reference Books：**

1. Practical Fermentation Technology, Edited by Brian McNeil and Linda M. Harvey, Published in 2008 John Wiley & Sons, Ltd.
2. Fermentation Processes Engineering in the Food Industry, Edited by Carlos Ricardo Soccol, Ashok Pandey and Christian Larroche. Published in 2013 by CRC Press.

**Ⅶ.**Lecturer(s)：Sun Wenjing; Cui Fengjie.

**Ⅷ**.the Author who write the Syllabus：SuWenjing n; Cui Fengjie.

**Course code ： 083200D1818**

**Food Physical Processing**

**Ⅰ**. scheduled total hours： 24 （experiments: 4 hours） credits： 2 term：Ⅰ,Ⅱ

Teaching form：Class teaching and Seminar Assessment method ：Essay Report

**Ⅱ.**Compatible Major：Food Science and Engineering

**Ⅲ**.Prerequisite course：Advanced Food Chemistry、Modern Processing Equipment for Agricultural Products

**Ⅳ.**OBJECTIVE：

At the completion of this course the resident should be able to interpret both the conventional and other newer (ultrasound, microwave, electromagnetic fields, infrared heating, high pressure processing) food processing. This includes of ultrasound, microwave, electromagnetic fields, infrared heating, high pressure processing pretreatment of the substrate or catalyst and treatment of extraction, drying, hydrolysis, enzyme reaction. Ultrasonics-sonochemistry, thermal and non-thermal microwave effects, etc should be learned during the courses, and he/she should be able to perform and interpret studies using physical processing technology.

**Ⅴ.**Content of the Syllabus and the Scheduled Study Hours:

**Chapter 1 *Ultrasound processing*  （4 credits）**

1．The uses of ultrasound in food technology

2．Ultrasonics-sonochemistry

**Chapter 2 *Microwave processing*  （4 credits）**

1．The uses of microwave in food technology

2．Thermal and non-thermal microwave effects

**Chapter 3 *Infrared heating processing*  （4 credits）**

1．The uses of infrared heating in food technology

**Chapter 4 *Electromagnetic fields processing*  （4 credits）**

1．The uses of electromagnetic fields in food technology

**Chapter 5 *High pressure processing*  （4 credits）**

1．The uses of high pressure processing in food technology

**Experiment：Effects ofultrasound treatment on extraction of protein、polysaccharide from food material （4 credits）**

 1．Temperature、pH

 2. Power、frequency

**Ⅵ.**Teaching Materials and Reference Books：

 Journal of Agricultural and Food Chemistry、Food Chemistry、Ultrasonics Sonochemistry.

Ⅶ. Lecturer(s)：Zhou Cunshan

Ⅷ.the Author who write the Syllabus：Zhou Cunshan

**Course code ：083200D1819**

**Food Sensory Science**

**Ⅰ**. scheduled total hours： 24 （experiments: 0 hours）credits： 2 term：Ⅰ,Ⅱ

Teaching form： Class teaching Assessment method ： Essay Report

**Ⅱ.**Compatible Major：Food science and engineering

**Ⅲ**.prerequisite course：Food chemistry, Experimental design and data processing

**Ⅳ.**OBJECTIVE：

The objectives of this course are to (1) introduce the basic concept and background knowledge of sensory science, (2) master three kinds of sensory evaluation conditions and methods, (3) represent the specific applications of sensory science in food fields, and (4) describe the development trend of man-machine integration sensory evaluation technology.

**Ⅴ.**Content of the Syllabus and the Scheduled Study Hours:

**Chapter1 Introduction （3 hours）**

1．Concept, classification and characteristics

2．Sensory evaluation and physical and chemical analysis

3．History of food sensory science

4．Trends and prospects of food sensory science

**Chapter2 Food sensory evaluation foundation （3 hours）**

1．Properties of sensory evaluation

2．Taste, smell, visual, hearing and other senses

**Chapter3 Food sensory evaluation conditions （3 hours）**

1．Rules and programs of food sensory evaluation

2．Personnel and conditions of food sensory evaluation

3．Sample preparation methods

**Chapter4 Difference test method （3 hours）**

1．Overall difference test method

2．Property difference test method

**Chapter5 Descriptive test method （3 hours）**

1．Simple descriptive test method

2．Quantitative descriptive test method

**Chapter6 Emotional test method （3 hours）**

1．Overview of the emotional test

2．Emotional test methods

**Chapter7 Application of sensory evaluation （3 hours）**

1．Sensory quality control in food production

2．Application in food research and development

**Chapter8 Man-machine integration technology （3 hours）**

1．Trends of man-machine integration technology

2．Application of man-machine integration technology

**Ⅵ.**Teaching Materials and Reference Books：

1. [Harry T. Lawless](http://www.amazon.com/Harry-T.-Lawless/e/B001KI9H5A/ref%3Ddp_byline_cont_book_1), [Hildegarde Heymann](http://www.amazon.com/s/ref%3Ddp_byline_sr_book_2?ie=UTF8&field-author=Hildegarde+Heymann&search-alias=books&text=Hildegarde+Heymann&sort=relevancerank). Sensory Evaluation of Food. Springer, 2010.

2. [Herbert Stone](http://www.amazon.com/Herbert-Stone/e/B001HMT4Q6/ref%3Ddp_byline_cont_book_1), [Rebecca Bleibaum](http://www.amazon.com/s/ref%3Ddp_byline_sr_book_2?ie=UTF8&field-author=Rebecca+Bleibaum&search-alias=books&text=Rebecca+Bleibaum&sort=relevancerank), [Heather A. Thomas](http://www.amazon.com/s/ref%3Ddp_byline_sr_book_3?ie=UTF8&field-author=Heather+A.+Thomas&search-alias=books&text=Heather+A.+Thomas&sort=relevancerank). Sensory Evaluation Practices. Elsevier Inc., 1985.

**Ⅶ.**Lecturer(s)：Qu Wenjuan; Wang Ning

**Ⅷ**.the Author who write the Syllabus：Qu Wenjuan

**Course code ：083200D1820**

**Food Safety Analysis**

**Ⅰ**. scheduled total hours： 24 （experiments: 0 hours） credits：2 term：Ⅰ,Ⅱ

Teaching form： Class teaching and Seminar, Assessment method ：Essay Report

**Ⅱ.**Compatible Major：Food Quality and Safety / Food Science and Engineering

**Ⅲ**.prerequisite course：Introduction to Food Safety / Food Microbiology / Analytical Chemistry,

**Ⅳ.**OBJECTIVE：

The purpose of this course is to enable students know some concepts of modern food safety (for example, illegal food additives, food bacteria, fungi and mycotoxins), know some food safety analysis techniques. Such as high performance liquid chromatography (HPLC), gas chromatography (GC), enzyme-linked immunosorbent assay (ELISA), latest nanotechnology used in detection of heavy metal ions and mycotoxins, and so on.

Specifically, at the completion of this course, students should be able to:

a. understand the concept of food safety, factors that impact food quality and safety, the importance of food safety all over the world.

b. understand some major food safety analysis techniques.

c. propose some integrated methods, to qualitatively and quantitatively analyze the unsafe or contaminated food.

**Ⅴ.**Content of the Syllabus and the Scheduled Study Hours:

**Chapter 1 Food safety introduction**  **（2 hours）**

1. The basic definition of food safety analysis

1.1 The importance of food safety to public health

1.2 The issues that food safety analysis discipline studied

2．Overview of food safety all over the world

2.1 Food safety management and issues in developed countries (*e.g.*, Europe and America)

2.2 Food safety issues in Africa and other developing countries

3. Food safety problems and risk assessment

4. The importance of food safety analysis to social and economic development

**Chapter 2 Analysis of foodborne** **diseases** **（2 hours）**

1. Introduction to foodborne diseases

2. Foodborne disease classification

3. The concept and characteristics of food poisoning

4. Classification of bacterial food poisoning and bacterial detection and analysis

4.1 Detection of Salmonella

4.2 Detection of Staphylococcus aureus

4.3 Detection of Clostridium botulinum

4.4 Detection of Hemolytic vibrio

**Chapter 3 The impact of environmental pollution on food safety and the detection methods （2 hours）**

1．Types of environmental pollution

2．Classification of the impacts of environmental pollution on food safety

2.1 Types of water pollution and their impact on food safety

2.2 Types of air pollution and their impact on food safety

2.3 Types of marine pollution and their impact on food safety

2.4 Types of soil pollution and their impact on food safety

2.4.1 Heavy metal pollution

2.4.2 Pathogenic microbial contamination

2.4.3 Pesticide and fertilizer pollution

3. The research methods and research progress of food safety analysis to environmental pollution

**Chapter 4 The impact of pesticide and veterinary drug residues on food safety and their detection methods（4 hours）**

1. Classification of pesticides

2. The way of pesticide contamination

3. Common pesticides and their toxicity

3.1 Organochlorine pesticides

3.2 Organophosphorus pesticides

3.3 Carbamate pesticides

3.4 Pyrethroid pesticides

4. Classification of veterinary drugs and the impact of their residues on food safety

4.1 Antibiotics

4.2 Anti-parasitic class

4.3 Hormones

4.4 Banned feed additive

5. The detection and analysis methods of pesticide and veterinary drug residues in food

**Chapter 5 The impact of heavy metal pollution on food safety and their detection methods （2 hours）**

1. Common heavy metal pollution in food

1.1 The impact of excessive Pb2+, Hg2+, As3+, Cd2+, Cr5+ on food safety

 2. The detection methods of heavy metal ions in foods

3. Application of nanotechnology in the detection of heavy metal elements

4. The solution to prevention of heavy metal pollution in food

**Chapter 6 Mycotoxins on** **food safety and their （4 hours）**

1．Classification of common mycotoxin

2. Environment to produce mycotoxins and the way of food contamination

3. Aflatoxin

3.1 Aflatoxin toxicity and its hazard tofood safety

3.2 Aflatoxin limits in food

3.3 The detection methods of Aflatoxin

4. Ochratoxin

4.1 Ochratoxin contamination sources

4.2 Ochratoxin toxicity and its hazard to food safety

4.3 Ochratoxin limits in food

4.4 Ochratoxin detection method

4.4.1. Conventional chromatographic techniques used in the detection of ochratoxin in food

4.4.2 Nanotechnology/fluorescence spectroscopy/ultraviolet-visible spectroscopy/ electrochemical techniques used in the detection of ochratoxin in food

5. Zearalenone

5.1 Zearalenone contamination sources

5.2 Zearalenone toxicity and its hazard tofood safety

5.3 Zearalenone limits in food

5.4 Zearalenone hazards prevention and control methods

6. Patulin and citrinin

6.1 Patulin and citrinin contamination sources

6.2 Patulin and citrinin toxicity and its hazard tofood safety

6.3 Patulin and citrinin limits in food

6.4 Patulin and citrinin hazards prevention and control methods

7. The application and development trends of ELISA related methods in the detection of mycotoxins

**Chapter 7 Food additives and food safety （2 hours）**

1．Food additives category

2. The role of food additives in food products, and the requirements should bare in mind when using it

3. Issues in the use of food additives

4. Prohibited and illegal used food additives on food safety

5. The detection methods of prohibited, excessive, illegal used food additives

**Chapter 8 The impact of product packaging on food safety （2 hours）**

1. The impact of plastic, metal, paint, wrapping paper on food safety

1.1The research of bisphenol A detection in plastics

**Chapter 9 Overview of genetically modified (GM) foods （2 hours）**

1. Definition of genetically modified foods

2. The types of genetically modified food at present

3 The safety of genetically modified food to the agricultural, food and environment

4 The methods to assess genetically modified food safety

5. The studies of genetically modified food safety in animal experiments and clinical trials

**Chapter 10 Food safety analysis technology （2 hours）**

1. Chromatography / Mass Spectrometry / ELISA method

2. The latest nanotechnology and other technologies used in the assessment of food safety

**Experiment：**

 ……………

**Ⅵ.**Teaching Materials and Reference Books：

1．Schmidt, R. H.; Rodrick, G. E., *Food Safety Handbook.* John Wiley & Sons: 2003.

2. Hutter, B. M., *Managing Food Safety and Hygiene: Governance and Regulation as Risk Management.* Edward Elgar Publishing: 2011.

3. Knechtges, P. L., *Food Safety: Theory and Practice.* Jones & Bartlett Publishers: 2011.

4. D'Mello, J. F., *Food Safety: Contaminants and Toxins.* CABI: 2003.

5. Wu Y, Chen Y. *Food Safety in China*. J Epidemiol Community Health. 2013; 67(6): 478-9.

6. Yotova, L.; Grabchev, I.; Betcheva, R.; Marinkova, D., *Smart Biosensors for Determination of Mycotoxines. In Detection of Bacteria, Viruses, Parasites and Fungi*, Springer: 2010; pp 389-414.

7. Yongning Wu, *Present Knowledge in Food Safety.* Chemical Industry Press: 2005.

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