

SYLLABUS:

Date / Revision 23 May 2015 / 02 May 2017 / PP
Faculty Life Sciences (LS)
Study Program Food Technology (FTE)

SUBJECT: Food Chemistry

1 Basic Information

1.01	Subject Name	Food Chemistry
1.02	Semester	3
1.03	Level	1
1.04	SKS	3
1.05	Mandatory / Curriculum	D-02
1.06	Subject Code	FOCH
1.07	Subject Code	FOCH
1.08	Year	2017 (7)
1.09	Quality Control	Final Test, OFSE, see evaluation
1.10	Limitations	Min 12 and Max 32 students in one class
1.11	Combined with	None
1.12	Pre-requisite	Chemistry, Chemistry Laboratory, Organic Chemistry
1.13	Responsible	Dr. Tutun Nugraha
1.14	Revision	15-05-2017/pp

2 Description of Subject

Food Chemistry is one of the major aspects of food science, and it deals with the composition and properties of food, as well as the chemical changes that occur during handling, processing & storage. Food nutrition is one of the fundamental courses required for students specializing in food technology. The content will be in continuation with various topics given in chemistry and organic chemistry, as well as topics given in parallel in the class of biochemistry. The topics in Food Chemistry will also be relevant to the courses given in the field of food nutrition, as well as the course in anatomy and physiology which will link the chemistry and how this will impact human health and well being.

3

Objectives

This course will introduce students to the chemical properties of food materials, their functions, and the phenomena that will occur to these materials as they undergo processing in the factory. The impact of the processing on the functionality of the food products will be introduced as well. This course will prepare the students to face the more advanced courses in food technology department, including food processing technology, food nutrients, and sensory analysis.

4

Competency

Through this subject students will understand various concepts relevant to food chemistry currently used in the food industries, which includes :

- Understand the general principal of food chemistry
- Chemistry of food materials: water, ice, carbohydrates, lipids, amino acids, peptides & proteins, enzymes, vitamins, minerals, colorants, flavors, food additives.
- Apply learned food chemistry skills to new situations
- Demonstrate an understanding of food chemistry

5

Learning Approach / Methodology

- Lectures/ Class contact (time-tabled) supplemented with interactive questions and answers to build the projects;
- Tutorial/Laboratory/Practice Classes: preview of materials, revision and/or reports writing;
- Student Study Effort: homework/assignment; preparation for test/quizzes/ examination.
- Writing assignments/presentations

6

Evaluation

5.1	Absence maximum	25%
5.2	Participation in Discussion	10 Points
5.3	Homework / Classwork	10 Points
5.4	Presentation /Simulation	-
5.5	Daily Quiz	20 Points
5.6	Final Examination	60 Points
	Total	100 Points

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Text Book and Reference

1 Main Text Book:

- Fennema's Food Chemistry 4th edition. 2008. Srinivasan Damodaran, Kirk L. Parkin, Owen R. Fennema

2	Supplement Textbooks:
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8 Content / Topics of Lecture

Week	Content/ Topics of Lecturing	Text Book	Remark
1	<p>Introduction to Food Chemistry</p> <ul style="list-style-type: none"> • What is Food Chemistry? • History of Food Chemistry • Approach to the Study of Food Chemistry • Societal Role of Food Chemists <p>Water & Ice</p> <ul style="list-style-type: none"> • The Physical Properties of Water & Ice • The Water Molecule • Association vs Dissociation of Water Molecule • Structures in Food Water Systems • Phase Relationship of Pure Water • Water in the Presence of Solute • Water Activity & Relative Vapor Pressure • Molecular Mobility & Food Stability • Moisture Sorption Isotherms • Temperature Dependence & Hysteresis of MSI • Relative Vapor Pressure & Food Stability • Comparisons & Conclusion 	<p>Damodran, Parkin, Fennema, Chapter 1</p> <p>Damodran, Parkin, Fennema, Chapter 2</p>	1 x 3 x 50 minutes
2	<p>Carbohydrates</p> <ul style="list-style-type: none"> • Monosaccharides • Oligosaccharides • Polysaccharides • Dietary Fiber & Carbohydrate Digestibility 	Damodran, Parkin, Fennema, Chapter 3	1 x 3 x 50 minutes
3	<p>Lipids</p> <ul style="list-style-type: none"> • Introduction • Major Lipid Components • Physicochemical Properties of Lipids • Lipid Processing: Isolation, Purification & Modification • Functionality of Triacylglycerols in Foods • Chemical Deterioration of Lipids: Hydrolytic Reactions • Chemical Deterioration of Lipids: Oxidative Reactions • Food Lipids & Health • Summary 	Damodran, Parkin, Fennema, Chapter 4	1 x 3 x 50 minutes

4,5	Amino Acids, Peptides & Proteins <ul style="list-style-type: none"> • Introduction • Physicochemical Properties of Amino Acids • Protein Structure • Protein Denaturation • Functional Properties of Proteins • Protein Hydrolysates • Nutritional Properties of Proteins • Processing-Induced Physical, Chemical, Nutritional Changes in Proteins • Chemical & Enzymatic Modification of Proteins 	Damodran, Parkin, Fennema, Chapter 5	2 x 3 x 50 minutes
6,7	Enzymes <ul style="list-style-type: none"> • Introduction • General Nature of Enzymes • Uses of Exogenous Enzymes in Foods • Environmental Influence on Enzyme Action • Enzymes Endogenous to Foods & Their Control 	Damodran, Parkin, Fennema, Chapter 6	2 x 3 x 50 minutes
8	MIDTERM SEMESTER BREAK		
9, 10	Vitamins <ul style="list-style-type: none"> • Introduction • Addition of Nutrients to Foods • Dietary Recommendations • Analytical Methods & Sources of Data • Bioavailability of Vitamins • General Causes of Variation/Loses of Vitamins in Food • Fat-Soluble Vitamins • Water-Soluble Vitamins • Conditionally Essential Vitamin-Like Compounds • Optimization of Vitamin Retention • Summary 	Damodran, Parkin, Fennema, Chapter 7	2 x 3 x 50 minutes
11	Minerals <ul style="list-style-type: none"> • Introduction • Principles of Mineral Chemistry • Nutritional Aspects of Minerals • Mineral Composition of Foods • Chemical and Functional Properties of Minerals in Foods • Summary 	Damodran, Parkin, Fennema, Chapter 8	1 x 3 x 50 Minutes
12	Colorants <ul style="list-style-type: none"> • Introduction • Pigments in Animal & Plant Tissue • Food Colorants 	Damodran, Parkin, Fennema, Chapter 9	1 x 3 x 50 Minutes

13	<p>Flavors</p> <ul style="list-style-type: none"> • Introduction • Taste & Other Saporous Substances • Vegetable, Fruit & Spice Flavors • Flavors from Lactic Acid-Ethanol Fermentations • Flavor Volatiles from Fat & Oils • Flavor Volatiles in Muscle Foods & Milk • Development of Process or Reaction Flavor Volatiles • Future Directions of Flavor Chemistry & Technology 	Damodran, Parkin, Fennema, Chapter 10	1 x 3 x 50 minutes
14	<p>Food Additives</p> <ul style="list-style-type: none"> • Introduction • Acids • Bases • Buffer Systems & Salts • Chelating Agents • Intensely Sweet Non-Nutritive & Low-Calorie Sweeteners • Polyols: Sweeteners, Texturizers & Emulsifiers • Stabilizers & Thickeners • Fat Replacers 	Damodran, Parkin, Fennema, Chapter 11	1 x 3 x 50 minutes
15	Wrap up the whole semester course / Review the Semester		1 x 3 x 50 minutes
16, 17	Final Examination		