SCHOOL OF AGRO-INDUSTRY MAE FAH LUANG UNIVERSITY

Course code: 1402307 **Course title: Food Chemistry**
Credits: 3 (2-3-5) **Semester: 1 Academic year: 2022**

Time:

Lecture	**Monday**	**10:00-12:00**	**Room: C1-312**
Lab (sec. 01)	**Monday**	**13:00-16:00**	**Room: S4-114**
Lab (sec. 02)	**Tuesday**	**09:00-12:00**	**Room: S4-114**

Coordinator:

Dr. Sirirung Wongsakul (SW)
Building: E3A, Room: 210, Phone: 6749
Email: sirirung@mfu.ac.th

Instructors:

Assoc.Prof.Dr. Saroat Rawdkuen (SR)
Asst.Prof. Prinya Wongsa (PW)
Dr. Sirirung Wongsakul (SW)

Course Description:

Chemical composition of food; water, carbohydrates, lipids, proteins, vitamins and minerals; chemical and functional properties of these components; biochemical reactions affecting food qualities during processing and storage; food additives and contaminants; chemical hazards; pigments; enzymes in foods.

Course Objectives:

After completing this course, students should be able to:

1. Define, draw and classify the components in foods.
2. Describe chemical, physical and functional properties of food components.
3. Demonstrate how changes food components affect to food quality.
4. Select and explain the suitable food additive for application.
5. Hands-on laboratory experience and ability to work in teams.

Assessment:

Formative		**70%**
1. Quiz & assignment	35%	
2. Lab report	15%	
3. Term paper/project	10%	
4. Attention & participation	10%	
Summative		**30%**
1. Midterm examination	10%	(TDS)
2. Additional examination	10%	(TDS)
3. Final examination	10%	(9 Dec 2022, 9.00-12.00)
Total		**100%**

Grading criteria:

80-100%	A
75-79%	B+
70-74%	B
65-69%	C+
60-64%	C
55-59%	D+
50-54%	D
< 50%	F

References:

1. Belitz, H.D., & Grosch, W. 1999. **Food Chemistry**. 2nd ed. Springer-Verlag Berlin Heidelberg. New York.
2. Brown, A. (2008). **Understanding Food: Principles & Preparation**. 3rd ed. Thomson& Wadsworth. Australia.
3. Cui, S.W. (2005). **Food Carbohydrates: Chemistry, Physical Properties and Applications**. CRC. Taylor & Francis group. London.
4. deMan, J. M. 1999. **Principles of Food Chemistry**. 3rd ed. Aspen Publication. Maryland.
5. Eskin, N.A.M.1990. **Biochemistry of Foods**. 2nd ed. Academic Press. New York.
6. Fennema, O.R. 1996. **Food Chemistry.** 3rd ed. Marcel Dekker, Inc. New York.
7. Hui, Y.H., Nip, W.K., Nollet, LM.L, Paliyath, G., & Simpson B.K. 2006. **Food Biochemistry & Food Processing.** Blackwell Publishing. Oxford.
8. McWilliams, M. 2012. **Foods Experimental Perspectives.** 7th ed. Prentice Hall. Boston.
9. Owusu-Apenten, R. 2004. **Introduction to Food Chemistry**. CRC Press. New York.
10. Shaw, I.C. 2009. **Food Safety: The Science of Keeping Food Safe.** Wiley-Blackwell. Oxford.
11. Vaclavik, V.A., & Christian, E.W. 2003. **Essentials of Food Science**. 2nd ed. Kluwer Academic/Plenum Publishers. New York.
12. Wong, D.W.S. 1989. **Mechanism and Theory in Food Chemistry**. Van Nostrand Reinhold. New York.

TENTATIVE LECTURE SCHEDULE
1402307 Food Chemistry
First Semester Academic year 2022
Monday 10:00-12:00 Room: C1-312

Week	Date	Topic	Content	Instructor
1	15/16 Aug 22 (lab)	Introduction	- Introduction to course, Introduction to food chemistry - Approach to the study of food chemistry	SW (1h)
	15 Aug 22	Water	- Types and properties of water - Moisture content and water activity Role of water in food during processing and storage	SR (2h)
2	22 Aug 22	Dispersed systems	- Dispersion types and classification - Dispersion in food systems; colloid, emulsion, sol, gel & foam	SR (2h)
3	29 Aug 22	Carbohydrates	- Structure and types of carbohydrate - Functional properties of carbohydrates	SR (2h)
4	5 Sep 22	Carbohydrates	- Starch and other polysaccharides	SR (2h)
5	12 Sep 22	Protein	- Classification and structures of proteins - Physical, chemical and functional properties of protein in foods	SR (2h)
6	19 Sep 22	Protein	- Physical, chemical and functional properties of protein in foods	SR (1h)
		Browning reactions	- Types of browning reaction in food systems	SR (1h)
7	26 Sep 22	Browning reactions	- Effect of browning reaction on food quality	SR (1h)
		Pigments	- Source of pigments in foods; animal & plant - Changes of pigments during processing and storage	SR (1h)
8	3 Oct 22	Pigments	- Effect of pigments on food quality	SR (1h)
		Enzyme	- Classification, source, nature and function of enzyme in foods	SW (1h)
Midterm Examination: TDS				
9	17 Oct 22	Enzyme	- Enzyme in food industry in terms of biochemistry aspects	SW (1h)
		Lipid	- Lipid in food systems - Physical properties of lipids in foods	SW (1h)
10	24 Oct 22 (Official Holiday)	Lipid	- Chemical properties of lipids in foods - Lipids refining and products	SW (2h)
11	31 Oct 22	Vitamin & Minerals	- Fat-soluble & water-soluble vitamins - Effect of processing & storage on vitamins - Major minerals, trace elements - Effect of processing & storage on minerals	PW (2h)
12	7 Nov 22	Flavor	- Flavor compounds - Interaction of flavors in food components - Effect of processing & storage on flavors	PW (2h)
13	14 Nov 22	Food additives	- Classifications of food additives - Color & flavor modifying additives	SW (2h)
14	21 Nov 22		- Shelf-life extension additives - Gums and stabilizers	SW (2h)
15	28 Nov 22	Chemical hazards	- Types of hazards, hazardous substance - Food toxicology; terms, safety evaluation and public health - Contaminants	SW (2h)
Final Examination: 9 December 2022, 09.00-12.00				

TENTATIVE LABORATORY SCHEDULE
1402307 Food Chemistry
First Semester Academic year 2022
Section 01 Monday 13:00-16:00 Room: S4-114
Section 02 Tuesday 09:00-12:00 Room: S4-114

Week	Date	Topic	Instructors
1	15 Aug 22 16 Aug 22	Class introduction & Lab orientation	SW/Staff
2	22 Aug 22 23 Aug 22	1. Emulsion: emulsifying properties	SR
3	29 Aug 22 30 Aug 22	2. Carbohydrate: detection of reducing sugar & starch	SR
4	5 Sep 22 6 Sep 22	3. Carbohydrate: Functional properties; polysaccharide	SR
5	12 Sep 22 13 Sep 22	4. Protein: Quantitative analysis by biuret method	SR
6	19 Sep 22 20 Sep 22	5. Protein: Functional properties; foamability	SR
7	26 Sep 22 27 Sep 22	6. Browning reactions: enzymatic & non-enzymatic browning	SR
8	3 Oct 22 4 Oct 22	Presentation & Discussion	Staff
Midterm Examination: TDS			
9	17 Oct 22 18 Oct 22	7. Pigments; myoglobin, chlorophyll, anthocyanin	SR
10	24 Oct 22 25 Oct 22	8. Enzyme: Factors effecting enzyme activity	SW
11	31 Oct 22 1 Nov 22	12. Vitamin C loss in foods	PW
12	7 Nov 22 8 Nov 22	9. Lipids: characterization	SW
13	14 Nov 22 15 Nov 22	10. Lipids: chemical properties	SW
14	21 Nov 22 22 Nov 22	11. Additives: sulfur dioxide, benzoic acid	SW
15	28 Nov 22 29 Nov 22	Presentation & Discussion	Staff
Final Examination: 9 December 2022, 09.00-12.00			

Examination Score for 1402307 Food Chemistry

No.	Topic	No. of hours	Exam score (%) Formative+Summative	Instructor
1	Water	2	2+2	SR
2	Dispersed systems	2	2+2	SR
3	Carbohydrates	4	4+4	SR
4	Protein	3	3+3	SR
5	Browning reactions	2	2+2	SR
6	Pigments	2	2+2	SR
7	Enzyme	2	2+2	SW
8	Lipid	3	3+3	SW
9	Food additives	4	4+4	SW
10	Chemical hazards	2	2+2	SW
11	Vitamin & Minerals	2	2+2	PW
12	Flavor	2	2+2	PW
Total		**30**	**30+30**	

Tentative Lecture Outline
1402307 Food Chemistry
First Semester Academic year 2022

No.	Topic	Brief Content	No. of hours	Instructor
1	Introduction	- Introduction to course - Introduction to food chemistry - Approach to the study of food chemistry	(1)	SW
2	Water	- Types and properties of water - Moisture content and water activity - Role of water in food during processing and storage	2	SR
3	Dispersed systems	- Dispersion types and classification - Dispersion in food systems; colloid, emulsion, sol, gel and foam	2	SR
4	Carbohydrates	- Structure and types of carbohydrate - Functional properties of carbohydrates - Starch and other polysaccharides	4	SR
5	Protein	- Classification and structures of proteins - Physical, chemical and functional properties of protein in foods	3	SR
6	Browning reactions	- Types of browning reaction in food systems - Effect of browning reaction on food quality	2	SR
7	Pigments	- Source of pigments in foods; animal & plant - Changes of pigments during processing and storage - Effect of pigments on food quality	2	SR
8	Enzyme	- Classification, source, nature and function of enzyme in foods - Enzyme in food industry in terms of biochemistry aspects	2	SW
9	Lipid	- Lipid in food systems - Physical and chemical properties of lipids in foods	3	SW
10	Food additives	- Classifications of food additives - Function of additives in food system	4	SW
11	Chemical hazards	- Types of hazards, hazardous substance - Food toxicology; terms, safety evaluation and public health - Contaminants	2	SW
12	Vitamin & Minerals	- Fat soluble & water soluble vitamins - Effect of processing & storage on vitamins - Major minerals, trace elements - Effect of processing & storage on minerals	2	PW
13	Flavor	- Flavor compounds - Interaction of flavors in food components - Effect of processing & storage on flavors	2	PW
Ttal			**30**	