Course Syllabus (Academic Year 2021)

School of Interdisciplinary Studies, Kanchanaburi Campus, Mahidol University

1. Course No. and Title : KAFT480 Food Fermentation Technology

Credit (study hours) : 3(3-0-6)

2. Program Name : **Bachelor of Science in Food Technology**

3. Course Module : Elective Course

Pre/co-requisite : KAFT 242, KAFT 244 and KAFT 342

4. Class Semester : 1st Semester Academic Year 2021

5. Class Schedule & Venue : Lecture every Thursday at 9:00-12:00 (Webex online)

6. Class Coordinator : Amnat Jarerat, Ph.D. Room: Administrative Office, Room 2220, Lecture Hall

Contact No. : 034-585-060 ext. 2214 Email : amnat.jar@mahidol.edu

7. Course Description

History and important role of fermented food; microbial inoculum, chemical and biochemical reactions involved in fermentation; principle of food fermentation processes; indigenous fermented foods of Thailand and other countries as well as technology and industry updates

8. Course Objectives / Course Learning Outcomes (CLOs)

No.	Objectives / CLOs	Expected Skills / Knowledge*			PLOs**
		Specific	Generic	Knowledge	
8.1	Explain the important roles of fermented foods in food processing	S1, S2, S3, S4	G2, G3, G4, G6, G9, G12	K1-K4, K8, K28	PLO1
8.2	Explain how microbes, microbial inoculum (starter cultures), chemical and biochemical reactions play important roles in fermented foods	S1, S2, S3, S5, S6, S8	G1, G2, G4, G7, G10, G13	K2, K3, K6-K8, K10, K28	PLO1
8.3	List important production processes and select appropriate standards for particular fermented foods	S4, S6	G1, G2, G5, G7, G9, G10, G12	K1-K16, K28	PLO2

* S1: Skill in selecting appropriate raw material for food production; S2: Skill in controlling food production process; S3: Skill in identifying problem occurred during food process; S4: Skill in providing alternative solution in food production process; S5: Skill in identify important characteristics of food; S6: Skill in selecting appropriate analytical techniques; S8: Skill in judging food quality based on provided data

K1: Post harvest handling of agricultural materials; K2: Food chemistry; K3: Food processing; K4: Food biochemistry; K5: Food laws/std. regulations (HACCP); K6: Food engineering; K7: Food safety; K8: Food microbiology; K9: QC&QA (Stat. for QC); K10: Food sanitation; K11: Logistic; K12: Sustainability; K13: Waste management; K14: Global& national trend & policy; K15: Business administration; K16: Physical properties of food; K17: Analysis of food properties; K18: Sensory; K19: Shelf-life estimation; K20: Stat. (sampling); K21: Stat. (data analysis); K22: Experimental design; K23: Scientific writing; K24: Scientific presentation (media preparation); K25: Thai language for communication; K26: English lang uage for communication; K27: Psychology

K28: Human nutrition

**PLO1: Control and problem-solve food production process at industrial level using fundamentals in food science and technology with intellectual curiosity; PLO2: Apply knowledge of food science and technology at managerial level for controlling food quality; PLO3: Apply scientific principles and methods to carry out research project related to food science and technology, including planning, implementation, collecting data and drawing valid conclusions; PLO4: Communication in Thai and English effectively in food science and tec hnology contexts with wide-range of audiences; PLO5: Demonstrate the ability to work independently, as well as the ability to work cooperatively in teams with ethical awareness

9. Class Instructor

9.1 Amnat Jarerat, Ph.D. (AJ) Email : amnat.jar@mahidol.edu

9.2 Natteewan Udomsil, Ph.D. (NU) Email : paeng888@hotmail.com

9.3 Assoc. Prof. Rungtiwa Wongsagonsup, Ph.D. (RW) Email: kookple@hotmail.com

9.4 Renoo Yenket, Ph.D. (RYE) Email: ryenket@gmail.com

10. Course Outline

10.1 Lecture section

Week	Date	Contents	CLOs	Teaching & Learning	Instructor's Names
1	1/7/21	Course Introduction, Fermented Food: Past, Present and Future	8.1	Lecture and discussion	AJ
2	8/7/21	Microorganisms involved in Food Fermentations	8.1		NU
3	15/7/21	Detection and Identification of Microorganisms in Fermented Foods	8.1, 8.2		AJ
4-5	22/7/21 29/7/21	Starter Cultures	8.1, 8.2		AJ

6-7	5/8/21 12/8/21	Biochemical Reactions and Metabolisms of Fermented Foods	8.1, 8.2		AJ
8	19/8/21	Fermentation of Alcoholic Beverages	8.1, 8.2, 8.3		AJ
9	Mid-term Examination (26/8/2021)				
10	2/9/2021	Fermentation of Meat Products	8.1, 8.2, 8.3	Lecture, discussion and homework	AJ
11	9/9/2021	Fermentation of Vegetables and Fruits	8.1, 8.2, 8.3		AJ
12	16/9/2021	Fermentation of Cereal-based Products	8.1, 8.2, 8.3		RW
13	23/9/2021	Fermentation of Vinegar	8.1, 8.2, 8.3		RYK
14	30/10/2021	Indigenous Fermented Foods in Asia	8.1, 8.2, 8.3		AJ
15	7/10/2021	Bioconversion of agricultural by-products and food processing by-products to value added products	8.1, 8.2, 8.3		AJ
16	14/10/2021	Prebiotics, Probiotics and Synbiotics	8.1, 8.2, 8.3		AJ
17	Final Examination (21/10/2021)				

11. Course Assessment

No.	Methods / Activities	Regulations	CLOs	Week	Weight Distribution (%)
11.1	Mid-term exam	Writing exam	8.1, 8.2, 8.3	9	50
11.2	Final exam	Writing exam	8.1, 8.2, 8.3	16, 17	30
11.3	Homework	Rubric, by instructor	8.1, 8.2, 8.3	1-15	10
11.4	Attendance	Instructor's observation		1-15	10
				Total	**100**

12. Grading System

Criterion-referenced evaluation

Grade	Score	Grade	Score	Grade	Score	Grade	Score
A	≥ 80 %	B	70 – 74.99%	C	60 – 64.99%	D	50 – 54.99%
B+	75 – 79.99%	C+	65 – 69.99%	D+	55 – 59.99%	F	< 50 %

13. References

13.1 Adams MR, Moss MO. Food Microbiology. 3rd ed. The Royal Society of Chemistry; 2008.

13.2 Bamforth WC. Food, Fermentation and Micro-organisms. Blackwell; 2005.

13.3 Jay JM, Loessner MJ, Golden DA. Modern Food Microbiology. 7th ed. Springer; 2005

13.4 Macedo, R. E. F., Luciano, F. B., Cordeiro, R. P. and Udenigwe, C. 2017. Sausages and other fermented meat products, Starter Cultures. in Food Production, ed. B. Speranza, A. Bevilacqua, M. R. Corbo, M. Sinigaglia, pp. 324-354. Oxford: Wiley Blackwell.

13.5 Pereira G. V. D. M., Neto D. P. D. C., Ana C., Junqueira D. O., Karp S. G., Luiz A. J., Letti, A. I., Magalhães J. and Carlos R. S. 2020. A Review of Selection Criteria for starter culture development in the food fermentation industry, Food Reviews International, 36(2): 135-167. DOI: 10.1080/87559129.2019.1630636