MINISTRY OF EDUCATION AND TRAINING
CAN THO UNIVERSITY

SOCIALIST REPUBLIC OF VIETNAM
Independence - Freedom - Happiness

COURSE OUTLINE DETAILS

1. **Course: Technology of Food Fermentation** (Kỹ thuật lên men thực phẩm)
   - **Code: NS306H**
   - **Credits:** 2
   - **Hours:** 20 theory hours, 20 practical hours and 60 self-study hours.
2. **Management Unit:**
   - **Department:** Food Technology
   - **College of Agriculture**
3. **Requisites:**
   - **Prerequisites:** none
   - **Corequisites:** none
4. **Course objectives:**

Objectives	Descriptions	Program Outcomes
4.1	Outline and point out the chemical and microbiological changes in the fermentation process; Having knowledge about systematic and modern techniques of food fermentation; Understand basic food fermentation processes.	2.1.3a; 2.1.3b
4.2	Applying fermentation techniques in food processing to solve practical problems in the field of food technology; satisfy and address economic, environmental, social, political, ethical, health and safety issues, production, and sustainability	2.2.1c
4.3	Applying information technology and English ability to read and synthesize documents, improve teamwork skills based on the data/results obtained.	2.2.2d
4.4	Logical and problem-solving skills and abilities in the work (group working, practicing…)	2.3c

5. **Course learning outcomes:**

COs	Descriptions	Objectives	POs
	Knowledge		
CO1	Understand and explain chemical and microbiological changes in food fermentation	4.1	2.1.3a
CO2	Systematize and understand traditional and modern techniques in food fermentation	4.1	2.1.3b

COs	Descriptions	Objectives	POs
CO3	Explain and apply basic food fermentation processes	4.1	2.1.3b
	Skills		
CO4	Knowing how to set up and suggest appropriate fermentation methods helps maintain the quality and extend the shelf life of specific agricultural and food products.	4.2	2.2.1c
CO5	Practical processing of common fermentation products and the ability to develop new fermentation products;	4.3	2.2.2d
	Attitudes/Autonomy/Responsibilities		
CO6	Promote student activeness in research and application in food fermentation process.	4.4	2.3c
CO7	Apply the knowledge of theory to select the fermentation method effectively.	4.4	2.3c
CO8	Have professional ethics when participating in the production process.	4.4	2.3c

Note: "COs" means Course Outcomes; "POs" means Program Outcomes

6. Brief description of the course:

This course introduces the students to the various concepts of fermentation, discusses the use of microorganisms in fermentation technology, which cover 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.

7. Course structure:

7.1. Theory

	Content	Hours	COs
Chapter 1.	**Definition and concepts**	**2**	**CO1, CO2, CO4**
1.1.	The concept of fermentation and fermentation process		
1.2.	History of fermentation		
1.3.	Type of fermentation		
1.4.	Food fermentation: tradtional and modern technology		
1.5	Properties/Importance of food fermentation		
Chapter 2.	**Starter Cultures**	**4**	**CO1, CO3, CO5**
2.1	Introduction		
2.2	Role of Starter Cultures		
2.3	Starter Culture Microorganisms		
2.4	Starter Culture Math		
2.5	Culture Composition		

Chapter 3.	**Dynamic of fermentation process** 3.1. Principles of microbial growth 3.2. Product formation during fermentation 3.3. Substance absorption and nutrition 3.4. Factors affecting microbial growth during fermentation process 3.5. Fermentation methods: Continuous culture, Batch culture and Semi continuous culture 3.6. Measurement of fermentation process 3.7. Questions and exercises	**4**	**CO1-CO3, CO6**
Chapter 4.	**Fermentation equipment** 4.1 Equipment groups in the fermentation process 4.2 The general construction of fermentation equipment 4.3 Classification and general requirements for fermentation equipment 4.4 Stirring and aerating 4.5 Questions and exercises	**4**	**CO1 – CO4**
Chapter 5.	**Fermented food products** 5.1 Cultured Dairy Products 5.2 Meat and Fish Fermentation 5.3 Fermented Vegetables 5.4 Bread Fermentation 5.5 Alcohol Fermentation 5.6 Vinegar Fermentation 5.7 Fermentation of Foods in the Orient	**6**	**CO3, CO4, CO6, CO7, CO8**

7.2. Practice

	Content	Hours	Objectives
Unit 1	Natural fermentation with lactic acid bacteria	5	CO1-CO8
Unit 2	Modeling of yeast metabolism and process dynamics in batch fermentation.	5	CO1-CO8
Unit 3	Kefir fermentation	5	CO1-CO8
Unit 4	Yeast fermentation in case study: Fermented glutinous rice dumplings	5	CO1-CO8

8. Teaching methods:

- Attend the theory lessons, combine with discussion, and exchange topics.
- Finish homework, and present striking solutions to each group in the class.

9. Duties of student:

Students have to do the following duties:

- Complete 80% of the theory lessons.
- Complete all the assignment for the project and report the project result.
- Take the mid-term test, and the final exam.
- Organize self-study hours effectively

10. Assessment of course learning outcomes:

10.1. Assessment

No.	Point components	Rules and Requirement	Weights	COs
1	Particiaption	Complete 100% of the classroom activities	10%	CO6-CO8
2	Project completion	- Presentation - Acceptable group members.	20%	CO1-CO8
3	Mid-term test	- Quizes (30 minutes)	20%	CO1-CO8
4	Final test	- Written test (60 minutes) - Complete 80% of the theory lessons. - Take the final exam	50%	CO1-CO8

10.2. Grading

- Grading components and final test scores will be marked on a scale of 10 (0 to 10), rounded to one decimal place.
- Course score is the sum of all the components of the evaluation multiplied by the corresponding weight. The course score is marked on a scale of 10 and rounded to one decimal place, then it is converted to A-B-C-D score and score on a scale of 4 under the academic regulations of the University.

11. Learning materials:

Learning materials information	Barcode number
[1] (Key teaching material/Hand-out/Textbook)	
[2] Food, fermentation, and micro-organisms / Charles W. Bamforth.- Oxford: Blackwell Science, 2005.- 216 p., 25 cm, 9780632059874.- 664.024/ B199	MT.000046
[3] Hanbook of food and beverage fermentation technology / Edited by Y. H. Hui ... [et al.].- New York, N.Y.: Marcel Dekker, 2004.- 919 p., 27 cm (Food science and technology), 0824747801.- 660.28449/ H236	NN.003883
[4] Principle of fermentation technology/Sandbury B.F., A. Whitaker, and S.J. Hall- Butterworth-Heinemann, 2016.- 824p.	

12. Self-study Guide:

Week	Content	Theory (hours)	Practice (hours)	Student's Tasks
1	**Chapter 1: Definition and concepts** 1.1 The concept of fermentation and fermentation process 1.2 History of fermentation	2		- Prepare: + Document [1], chapter 1 + Document [2], chapter 1, sub-chapter 1.1 to 1.3; document [3], chapter 1 to 2; document [4], chapter 1

Week	Content	Theory (hours)	Practice (hours)	Student's Tasks
	1.3 Type of fermentation 1.4 Food fermentation: tradtional and modern technology 1.5 Properties/Importance of food fermentation			
2-3	**Chapter 2: Starter Cultures** 2.1 Introduction 2.2 Role of Starter Cultures 2.3 Starter Culture Microorganisms 2.4 Starter Culture Math 2.5 Culture Composition	4		- Review the content learned. - Prepare: + Document [1], chapter 2 + Document [2], chapter 1, sub-chapter 1.4; document [3] chapter 3 and 4; document [4], chapter 2 and 3
4-5	**Chapter 3: Dynamic of fermentation process** 3.1 Principles of microbial growth 3.2 Product formation during fermentation 3.3 Substance absorption and nutrition 3.4 Factors affecting microbial growth during fermentation process 3.5 Fermentation methods: Continuous culture, Batch culture and Semi continuous culture 3.6 Measurement of fermentation process 3.7 Questions and exercises	4		- Review the content learned. - Prepare: + Document [1], chapter 3 + Document [3] part 2 and 3. - Teamwork: discussion questions
6-7	**Chapter 4: Fermentation equipment** 4.1 Equipment groups in the fermentation process 4.2 The general construction of fermentation equipment 4.3 Classification and general requirements for fermentation equipment 4.4 Stirring and aerating 4.5 Questions and exercises	4		- Review the content learned. - Prepare: + Document [1], chapter 4 + Document [4] chapter 7 and 8. - Teamwork: discussion questions

Week	Content	Theory (hours)	Practice (hours)	Student's Tasks
8-10	**Chapter 5: Fermented food products** 5.1 Cultured Dairy Products 5.2 Meat and Fish Fermentation 5.3 Fermented Vegetables Bread Fermentation 5.4 Alcohol Fermentation 5.5 Vinegar Fermentation 5.6 Fermentation of Foods in the Orient	6		- Review the content learned. - Prepare: + Document [1], chapter 5 + Document [2] chapter 10, 11 for sub-chapter 5.1, chapter 2, 3 and 6, 8 for sub-chapter 5.4; chapter 12 for sub-chapter 5.3, chapter 9 for sub-chapter 5.5, chapter 17.16 for sub-chapter 5.6. + Document [3], part 2 and 3 for sub-chapter 5.1, part 4 for sub chapter 5.2 part 6 for sub-chapter 5.3, part 7 for sub-chapter 5.4; part 8 for sub-chapter 5.5.
10-15	**Practice** **Unit 1:** Natural fermentation with lactic acid bacteria **Unit 2:**Modeling of yeast metabolism and process dynamics in batch fermentation. **Unit 3:**Kefir fermentation **Unit 4:**Yeast fermentation in case study: Fermented glutinous rice dumplings		20	- Review the content learned (chapter 5 in especial). - Preview document [1], Practice chapter. - Working-group: devide into small groups and create the time-table to carrying out the practice units (4 weeks in total) and report the pratice results (in the last week).

Can Tho, ...5../..28.../2019

ON BEHALF OF RECTOR
DEAN OF COLLEGE/SCHOOL
(or DIRECTOR OF INSTITUTE)

Lê Văn Vàng

HEAD OF DEPARTMENT

Nguyễn Công Hà