

SUBJECT OUTLINE DETAILS

1. Subject: FOOD FERMENTATION (LÊN MEN THỰC PHẨM)

- Code: BT304C

- Credits: 2

- Hours: 27 theory hours including virtual video lectures, 3 seminar and discussion hours

2. Management Unit:

- Department: Microbial Biotechnology

- Faculty/Institute: Biotechnology Research and Development Institute

3. Prerequisites: MI301C - Introductory Microbiology (Vi sinh vật đại cương)

4. Subject objectives:

4.1. Knowledge:

4.1.1. Having knowledge about the function and roles of microorganisms in food fermentation; the microbial, physiological and chemical conversion during fermentation.

4.1.2. Having knowledge about the factors effecting on the growth, survival and performance of microorganisms in food.

4.1.3. Understanding the principle and the manufacture processing of some representative fermented products that have the participation of yeasts, moulds and lactic acid bacteria.

4.1.4. Having basic knowledge about the classification of microorganisms that have the essential roles in fermentation and their conversion mechanism.

4.1.5. Having knowledge about the nutritional value and the food safety of fermented products.

4.2. Skill:

4.2.1. Being able to carry out processing of some representative popular fermented products.

4.2.2. Being able to analyze the experimental data and to set up research experiments.

4.2.3. Being able to apply the gained knowledge to solve some certain issue relating to the food fermentation technology.

4.2.4. Having skills to use and to apply informatic technology in study and research. Having ability for team work, writing and presenting scientific seminar.

- 4.2.5. Having skills of communication, presentation, learning, and research in terms of specializations relating to food biotechnology in English. Having ability for higher study abroad, self-study and self-research.

4.3. Attitude:

- 4.3.1. Having a sense of serious and diligent self-study.
 4.3.2. Having effort, inquiring mind and solidarity spirit.
 4.3.3. Having honesty and responsibility.

5. Brief description of subject content:

The main contents of a subject including: introduction of benefits and principles of food fermentation; function and roles of microflora including moulds, yeasts and lactic acid bacteria in fermentation processes; fermenting manufactures, ability of microorganisms and their microbial, physiological, biochemical conversions during fermentation processes of some representative fermented products (beer, wine, traditional fermented rice wine, cheese, yoghurt, amyolytic starter, tempe, sufu, soy sauce...); nutritional value of fermented products and the impact of fermentation on anti-nutritional factors; food safety and reasons causing food-borne diseases; hazard analysis and food safety control for fermented products.

6. Subject content structure:

| Content | Hours | Objectives |
|---|--------------|-------------------------------|
| Chapter 1. Microorganisms in food fermentation | | |
| 1.1. Introduction of fermentation | 1 | 4.1.1; 4.3 |
| 1.2. Benefits and principles of food fermentation | 1 | 4.1.1; 4.2.1; 4.3 |
| 1.3. The roles of moulds, yeasts and lactic acid bacteria in food fermentation | 1 | 4.1.3; 4.1.4; 4.3 |
| 1.4. Factors effecting on the growth, development and performance of microorganisms in fermentation process | 2 | 4.1.1; 4.1.2; 4.2.2; 4.3 |
| Chapter 2. Products fermented from yeasts | | |
| 2.1. The beneficial yeasts | 1 | 4.1.3; 4.1.4; 4.2; 4.3 |
| 2.2. Case study: Beer brewing | 2 | 4.1.1; 4.1.3; 4.1.4; 4.2; 4.3 |
| 2.3. Manufacture processes of wine, rice wine and purple glutinous rice wine | 1 | 4.1.3; 4.1.4; 4.2; 4.3 |
| Chapter 3. Products fermented from moulds | | |
| 3.1. The beneficial moulds and categories of fermentation | 1 | 4.1.1; 4.1.3; 4.1.4; 4.2; 4.3 |
| 3.2. Tempe | 1 | 4.1.3; 4.1.4; 4.2; 4.3 |

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| 3.3. Amylolytic starter | 1 | 4.1.3; 4.1.4; 4.2; 4.3 |
| 3.4. Sufu | 1 | 4.1.3; 4.1.4; 4.2; 4.3 |
| 3.5. Soy sauce | 1 | 4.1.3; 4.1.4; 4.2; 4.3 |
| Chapter 4. Products fermented from lactic acid bacteria | | |
| 4.1. The beneficial lactic acid bacteria | 1 | 4.1.3; 4.1.4; 4.2; 4.3 |
| 4.2. Cheese | 1 | 4.1.3; 4.1.4; 4.2; 4.3 |
| 4.3. Yoghurt | 1 | 4.1.3; 4.1.4; 4.2; 4.3 |
| Chapter 5. Nutritional value of fermented products | | |
| 5.1. Nutritional value | 1 | 4.1.5; 4.2; 4.3 |
| 5.2. Anti-nutritional factors | 1 | 4.1.5; 4.2; 4.3 |
| 5.3. Impact of fermentation on anti-nutritional factors | 2 | 4.1.5; 4.2; 4.3 |
| 5.4. Mechanism of degrading anti-nutritional factors by microorganisms during fermentation | 1 | 4.1.5; 4.2; 4.3 |
| Chapter 6. Food safety in food fermentation | | |
| 6.1. Food safety of fermented products | 1 | 4.1.5; 4.2; 4.3 |
| 6.2. Food infection | 1 | 4.1.5; 4.2; 4.3 |
| 6.3. Food intoxication | 2 | 4.1.5; 4.2; 4.3 |
| 6.4. Hazard analysis and food safety control for fermented products | 1 | 4.1.5; 4.2; 4.3 |

7. Teaching method:

- lecture (including virtual video lecture)
- case study and seminar presentation (in group)
- discussion
- problem solution

8. Duties of student:

Students have to do the following duties:

- Attend in class at least 80% theory hours. Ask permission of lecturer in advance for any absence.
- Pre-study materials before coming to class (based on syllabus and references)
- Implement group seminar assignments and get the result assessment.
- Organize actively for self-study hours.
- Attend seriously the final written exam and submit of task as assigned.

9. Assessment of student learning outcomes:

9.1. Assessment

| No. | Point components | Rules and Requirement | Weights | Objectives |
|-----|--------------------------|---|---------|---------------|
| 1 | Diligen and active study | - Hours of attendance - Active participation and discussion in class | 5% | 4.3 |
| 2 | Group oral assignment | Case study, Seminar presentation, discussion and assessment of implementation results | 25% | 4.1; 4.2; 4.3 |
| 3 | Final exam result | Serious implementation for written exam, submission of task as assigned | 70% | 4.1; 4.2; 4.3 |

9.2. Grading

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

10. Materials:

Materials information

Code number

- [1] Food Fermentation- Part 1 / Tjakko Abee [et. al.] ; editor: Siemen Schoustra.- Netherland: Wageningen Agricultural, 1999.- 197 tr. ; ill., 30 cm.- 664/ F686/P.1 DIG.000137;
CNSH.000159
- [2] Food, fermentation, and micro-organisms / Charles W. Bamforth..- Oxford: Blackwell Science, 2005.- 216 p., 25 cm, 9780632059874.- 664.024/ B199 MT.000046
- [3] Handbook of fermented functional foods / Edited by Edward R. Farnworth.- Boca Raton, FL.: CRC Press, 2003.- 390 p., 25 cm (Functional foods and nutraceuticals), 0849313724.- 613.28/ H236 NN.004106;
MON.014059
- [4] Food Microbiology / Ngo Thi Phuong Dung, Huynh Xuan Phong – Syllabus (in English). Can Tho University Publishing House, 2013.- 219 p., 16x24 cm, 05/QĐ-NXB.ĐHCT. CNSH.029

11. Self-study Guide:

| Week | Content | Theory / Seminar (hours) | Students' duties |
|------|------------|--------------------------|--|
| 1 | Chapter 1: | 3 | - Pre-study material [1]: chapters 1, 2, 3, 4. |

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| | Microorganisms in food fermentation 1.1. Introduction of fermentation 1.2. Benefits and principles of food fermentation 1.3. The roles of moulds, yeasts and lactic acid bacteria in food fermentation | | - Refer relevant information from materials [2], [3], and handouts (ppt slides). |
| 2 | 1.4. Factors effecting on the growth, development and performance of microorganisms in fermentation process Chapter 2: Products fermented from yeasts 2.1. The beneficial yeasts | 3 | - Pre-study material [1]: chapters 3, 11. - Pre-study material [4]: chapter 3. - Refer relevant information from materials [2], [3], and handouts (ppt slides). - Preparation for case study and group oral assignment (follow list of groups, 2 students/group): presentation of seminar on required topics that instructed in handout. |
| 3 | Presentation of group seminar and discussion | 3 | Presentation of group seminar: 5-7 minutes/group presentation, and 3-5 minutes for discussion. |
| 4 | 2.2. Case study: Beer brewing 2.3. Manufacture processes of wine, rice wine and purple glutinous rice wine | 3 | - Pre-study material [1]: chapter 11. - Pre-study material [4]: chapter 5. - Refer relevant information from materials [2], [3], and handouts (ppt slides). |
| 5 | Chapter 3: Products fermented from moulds 3.1. The beneficial moulds and categories of fermentation 3.2. Tempe 3.3. Amylolytic starter | 3 | - Pre-study material [1]: chapters 4, 10. - Pre-study material [4]: chapter 5. - Refer relevant information from materials [2], [3], and handouts (ppt slides). |
| 6 | 3.4. Sufu 3.5. Soy sauce Chapter 4: Products fermented from lactic acid bacteria 4.1. The beneficial lactic acid bacteria | 3 | - Pre-study material [1]: chapters 2, 9, 10. - Pre-study material [4]: chapter 5. - Refer relevant information from materials [2], [3], and handouts (ppt slides). |
| 7 | 4.2. Cheese 4.3. Yoghurt Chapter 5: Nutritional value of fermented products 5.1. Nutritional value | 3 | - Pre-study material [1]: chapters 2, 7, 9. - Pre-study material [4]: chapter 5. - Refer relevant information from materials [2], [3], and handouts (ppt slides). |
| 8 | 5.2. Anti-nutritional factors 5.3. Impact of fermentation on anti- | 3 | - Pre-study material [1]: chapter 7. - Refer relevant information from materials [2], [3], and handouts (ppt slides). |

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| | nutritional factors | | |
| 9 | 5.4. Mechanism of degrading anti-nutritional factors by microorganisms during fermentation Chapter 6: Food safety in food fermentation 6.1. Food safety of fermented products 6.2. Food infection | 3 | - Pre-study material [1]: chapters 7, 8. - Pre-study material [4]: chapter 7. - Refer relevant information from materials [2], [3], and handouts (ppt slides). |
| 10 | 6.3. Food intoxication 6.4. Hazard analysis and food safety control for fermented products. | 3 | - Pre-study material [1]: chapter 8. - Pre-study material [4]: chapter 7. - Refer relevant information from materials [2], [3], and handouts (ppt slides). |

**ON BEHALF OF RECTOR
DEAN/ DIRECTOR**

Can Tho,/...../20...
HEAD OF DEPARTMENT