

**MINISTRY OF EDUCATION & TRAINING  
HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY & EDUCATION**

**UNDERGRADUATE PROGRAM**

*Major of*

**FOOD TECHNOLOGY**

**2023**

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## UNDERGRADUATE PROGRAM

**Education Program: FOOD TECHNOLOGY**

**Level:** Undergraduate

**Major: FOOD TECHNOLOGY**

**Type of Program:** Full time

(Decision No.....date....on.....)

**1. Duration of Study:** 4 years

**2. Student Enrollment:** High-school Graduates

**3. Grading System, Curriculum and Graduation Requirements**

**Grading System:** 10

**Curriculum:** Based on regulations of Decision No 43/2007/BGDDT

**Graduation Requirements:**

*General condition:* Based on regulations of Decision No 43/2007/BGDDT

*Condition of specialty:* None

**4. The objectives and Expected Learning Outcomes**

**Goals**

Training human resources, improving intellectual standards of the people, fostering talents; researching science and technology for new knowledge & product creation to meet the requirements of development of economics & society, to ensure national defense, security and international integration.

Training learners have political quality, morality, knowledge, professional practice skills, research capacity, development of scientific applications and technologies that are commensurate with the level of training. They have a healthy body, creative capability and professional responsibility, adaptability to the work environment; spirit of serving the people.

Training Food Technology major have basic scientific knowledge, fundamental knowledge, specialized knowledge of food technology majors, analysis capability, solve problem skills and solutions assessment, ability contribution, design, operation of mechanical systems, communication skills and work in a team, professional attitudes, meet the development requirements of major and society. After graduation, the graduates are able to work in companies, factories, industrial manufactories, institutes, colleges and universities.

**Objectives**

PO1: Form a stable foundation of general knowledge, foundation and core knowledge and specialized/ major knowledge of Food Technology.

PO2: Use proficiently self-studying skills major, problem-solving skills and professional skills in the major of Food Technology.

PO3: Communicate effectively, organize, lead and conduct teamwork.

PO4: Apply well competences of brainstorming, designing, deploying, and operating the systems of Food System.

PO5: Be able to grasp society's needs, carry out social responsibilities, respect work ethics and be aware of life-long learning

## Program outcomes

### A. *General knowledge, fundamental and specialized knowledge of food technology major:*

ELO 1. Apply fundamental knowledge of mathematics, natural science and social science; achieve more specialized knowledge and study further at higher levels.

ELO 2. Construct the basis of core technological knowledge about Food Technology.

ELO 3. Create the combination of advanced specialized knowledge in the fields of Food Technology.

### B. *Specialized and professional skills in food technology major:*

ELO 4. Analyze issues related to Food Technology.

ELO 5. Examine and evaluate experimental results in the field of Food Technology.

ELO 6. Implement proficiently professional skills in the field of Food Technology.

### C. *Communication skills and ability to work in multidiscipline areas:*

ELO 7. Work independently; lead and work in a team.

ELO 8. Communicate effectively in various methods: written communication, mechanical drawing communication, graphics and presentation.

ELO 9. Use English in communication.

ELO 10. Realize the roles and responsibility of engineers and social circumstance which has impacts on the technical activities of industry.

ELO 11. Comprehend business culture, work ethics principles, and working style of industrial organizations.

ELO 12. Be aware of life-long learning.

### D. *Skills to take shape of ideas, design, deploying and operate system of food technology*

ELO 13. Take shapes of ideas, set up requirements, determine functions and elements of food technology fields.

ELO 14. Design required elements of food technology fields.

**5. Blocks of knowledge in the whole program: 150 credits (without Physical Education and Military Education)**

## 6. Allocation of credits

Groups of Courses	No. of Credits		
	Total	Compulsory	Optional
<b>Foundation science courses</b>	<b>63</b>	<b>61</b>	<b>2</b>
Political Education	13	13	
Social Sciences and Humanities	2		2
Mathematics and Natural Sciences	25	25	
Technical Computer Sciences	3	3	
Introduction to Food Technology	3	3	
Supplementary courses	17	17	
<b>Food Technology Courses</b>	<b>87</b>	<b>81</b>	<b>6</b>
Food Science	14	14	
Food Engineering	12	12	
Food Processing	20	20	
Project and Practice	20	20	
Industry Internship and Related Fields of Food Technology	14	8	6
Graduation thesis	7	7	

<b>Total</b> (not excluding Physical Education, Military courses and Supplementary Courses)	<b>150</b>	<b>142</b>	<b>8</b>
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## 7. CONTENTS OF THE PROGRAM

### 7.1 Foundation science courses (63 credits)

No.	Course's ID	Course Name	Credits	Semester	Notes
<b>Political Education</b>			<b>13</b>		
	LLCT130105E	Philosophy of Marxism and Leninism	3	1	
	LLCT120205E	Political economics of Marxism and Leninism	2	2	
	LLCT120405E	Scientific socialism	2	4	
	LLCT120314E	Ho Chi Minh's Ideology	2	4	
	LLCT220514E	History of Vietnamese communist party	2	5	
	GELA220405E	General Laws	2	6	
<b>Social Science and Humanities</b> (optional)			<b>2</b>		<i>choose 2 credits</i>
	GEEC220105E	General Economics	2	2	
	ULTE121105E	Learning Methods in University	2	2	
	PLSK320605E	Planning Skill	2	2	
	INMA220305E	Introduction to Management	2	2	
	INSO321005E	Introduction to Sociology	2	2	
	IQMA220205E	Introduction to Quality Management	2	2	
	INLO220405E	Introduction to Logics	2	2	
	PRSK320705E	Presentation Skills	2	2	
	SYTH220505E	Systems Thinking	2	2	
	ULTE121105E	University Learning Methods	2	2	
	IVNC320905E	Vietnamese Culture	2	2	
	TDTS320805E	Writing Scientific and Technical Documents	2	2	
<b>Mathematics and Natural Sciences</b>			<b>25</b>		
	MATH132401E	Calculus 1	3	1	
	MATH132501E	Calculus 2	3	2	
	MATH132601E	Calculus 3	3	3	
	AMME230250E	Applied Mathematics in Food Technology	3	3	
	PHYS130402E	Physics 1	3	1	
	PHYS131002E	Physics 2	3	2	
	GCHE130603E	General Chemistry for Engineers	3	1	
	THER222932E	Thermal engineering	2	2	
	ELEE220144E	Electrical engineering	2	2	
<b>Technical Computer Sciences</b>			<b>3</b>		

	CAED220150E	Basic of Computer Aided Design (CAD)	2+1	3	
<b>Introduction of Food Technology</b>			<b>3</b>		
	INFT130150E	Introduction to Food Technology	2+1	1	
<b>Supplementary courses</b>			<b>17</b>		
	COEN140135E	Communicative English 1	4		Non-accumulation
	COEN140235E	Communicative English 2	4		
	COEN240335E	Communicative English 3	4		
	COEN240435E	Communicative English 4	4		
	ACEN340535E	Academic English 1	4	1	
	ACEN340635E	Academic English 2	4	1	
	ACEN440735E	Academic English 3	4	2	
	ACEN440835E	Academic English 4	4	2	
	IEPR550935E	IELTS Preparation	5	5	Non-accumulation
	ENTW611038E	English for Thesis Writing	1	6	
<b>Physical Education</b>			<b>(5)</b>		Non-accumulation
	PHED110513E	Physical Education 1	(1)	1	
	PHED110613E	Physical Education 2	(1)	2	
	PHED130715E	Physical Education 3	(3)	3	
<b>Military Education</b>			<b>(3)</b>		
	GDQP008031E	Military Education	(3)		
<b>Total (not including Physical Education, Military Education)</b>			<b>63</b>		

## 7.2 Food Technology Courses (87 Credits)

### 7.2.1 Food Science Courses (14 credits)

No.	Course's ID	Course Name	Credits	Semester	Lecturers
	OCHE120450E	Organic Chemistry	2	1	Dr. Võ Thị Ngà
	PCHE220750E	Physical Chemistry of Food	2	4	Dr. Trần Thị Nhung
	ACHE220850E	Analytical Chemistry	2	3	Dr. Phan Thị Anh Đào
	FANA221050E	Food Analysis	2	4	Dr. Nguyễn Vinh Tiến
	FCHE120550E	Food Chemistry	2	2	Dr. Hoàng Minh Hào
	FBIO220450E	Food Biochemistry	2	3	Dr. Vũ Trần Khánh Linh
	FMIC220350E	Food Microbiology	2	3	Dr. Trịnh Khánh Sơn
<b>Total</b>			<b>14</b>		

### 7.2.2. Food Engineering Courses (12 credits)

No.	Course's ID	Course Name	Credits	Semester	Lecturers
	TEDG130120E	Technical drawing - Basic course	3	2	MSc. Phan Công Bình
	PFPE120350E	Principle of Food Processing and Food Processing Equipment	2	2	MEng. Lê Tấn Hoàng

	MHPP220550E	Mechanical-hydraulic-pneumatic processes and equipment	2	3	Dr. Nguyễn Tấn Dũng
	HETE220550E	Heat Transfer and Equipment	2	4	Dr. Nguyễn Tấn Dũng
	MATE220950E	Mass Transfer and Equipment	2	5	Dr. Nguyễn Tấn Dũng
	FPPD320150E	Food Process and Plant Design	2	5	Dr. Lại Quốc Đạt
<b>Total</b>			<b>12</b>		

### 7.2.3. Food Processing Courses (20 credits)

No.	Course's ID	Course Name	Credits	Semester	Lecturers
1	MSPR320250E	Meat and Seafood Processing	2	5	MEng. Lê Tấn Hoàng
2	TCCP320350E	Tea, Coffee and Chocolate Production	2	5	Dr. Vũ Trần Khánh Linh
3	BCPR320450E	Bakery and Confectionery Production	2	5	Dr. Vũ Trần Khánh Linh
4	CEPR321150E	Cereals Processing	2	6	Dr. Đỗ Việt Hà
5	VFBP321250E	Vegetable, Fruit Processing and Beverage Production	2	6	Dr. Nguyễn Vũ Hồng Hà MEng. Đặng Thị Ngọc Dung
6	DRDP321350E	Dairy and Related Dairy Production	2	6	Dr. Phạm Thị Hoàn MEng. Đặng Thị Ngọc Dung
7	FETE321450E	Fermentation Technology	2	6	Dr. Trịnh Khánh Sơn
8	FSEV221350E	Sensory Evaluation of Food	2	4	Dr. Phạm Thị Hoàn
9	FPAC420150E	Food Packaging	2	7	Dr. Trịnh Khánh Sơn
10	FRDE420250E	Food Research and Development	2	7	Dr. Lê Ngọc Liễu
<b>Total</b>			<b>20</b>		

### 7.2.4. Project and Practice course (20 credits)

No.	Course's ID	Course Name	Credits	Semester	Lecturers
1	POCH210603E	<i>Practice of Organic Chemistry</i>	1	3	Dr. Võ Thị Nga

2	EACH210503E	<i>Practice of Analytical Chemistry</i>	1	4	Dr. Phan Thị Anh Đào
3	PRFA422950E	<i>Practice of Food Analysis</i>	2	5	Dr. Nguyễn Vinh Tiến
4	PFOB211250E	<i>Practice of Food Biochemistry</i>	1	4	Dr. Vũ Trần Khánh Linh
5	PFMI221150E	<i>Practice of Food Microbiology</i>	2	4	Dr. Trịnh Khánh Sơn
6	PPEF412450E	<i>Project of Food Processing and Machinery</i>	1	6	All lecturers
7	PPEF310850E	<i>Practice of the process and equipment in Food Technology</i>	1		MEng. Hồ Thị Thu Trang
8	PMSP311550E	<i>Practice of Meat and Seafood Processing</i>	1	6	Dr. Nguyễn Tiến Lực MEng. Lê Tấn Hoàng
9	PTCP311650E	<i>Practice of Tea, Coffee and Chocolate Production</i>	1	6	Dr. Nguyễn Tiến Lực MEng. Hồ Thị Thu Trang
10	PBCP311750E	<i>Practice of Bakery and Confectionery Production</i>	1	6	Dr. Vũ Trần Khánh Linh
11	PCPR410550E	<i>Practice of Cereals Processing</i>	1	7	MEng. Nguyễn Đăng Mỹ Duyên
12	PVFP410650E	<i>Practice of Vegetable, Fruit Processing and Beverage Production</i>	1	7	MEng. Đặng Thị Ngọc Dung
13	PDRP410750E	<i>Practice of Dairy and Related Dairy Production</i>	1	7	MEng. Đặng Thị Ngọc Dung Dr. Phạm Thị Hoàn
14	PFTE410850E	<i>Practice of Fermentation Technology</i>	1	7	Dr. Trịnh Khánh Sơn
15	PSEF310650E	<i>Practice of Sensory Evaluation of Food</i>	1	5	Dr. Phạm Thị Hoàn
16	RMFS430950E	Research Methods in Food Science	3	7	
<b>Total</b>			<b>20</b>		

### 7.2.5. Industry Internship and Related Fields of Food Technology (14 credits)

Student selects 06 optional credits

No.	Course's ID	Course Name	Credits	Semester	Notes
1	FAPR413150E	Industry Internship 1 <sup>**</sup>	2	5	Obligatory
2	FAPR423250E	Industry Internship 2 <sup>**</sup>	2	7	
3	TOFT420950E	Topic of Food technology	2	7	
4	FQMA420350E	Food Quality Management <sup>3</sup>	2	7	
5	FOAD320550E	Food Additives <sup>4</sup> (optional)	2	5	optional
6	FNUT320850E	Food Nutrition <sup>4</sup> (optional)	2	5	
7	FSAF320950E	Food Safety <sup>4</sup> (optional)	2	5	
8	AFMI320650E	Analysis in Food Microbiology (optional)	2	3	
9	PTEC320850E	Postharvest Technology (optional)	2	4	
10	FBIO320750E	Food Biotechnology (optional)	2	4	
11	EFOP320950E	Edible Fats and Oils Production (optional)	2	5	

<b>Total</b>	<b>14</b>		
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<sup>1</sup>This course will be taken in summer (after 4<sup>th</sup> semester)

<sup>2</sup>This course will be taken in summer (after 6<sup>th</sup> semester)

<sup>3</sup>This course can be replaced by a Certificated of ISO and HACCP

<sup>4</sup>Suggested courses

### 7.2.6 Graduation thesis (10 Credits)

No.	Course's ID	Course Name	Credits	Semester	Lecturers
1	GRTH473350E	Graduation Thesis (Food Technology)	7	8	
<b>Total</b>			<b>7</b>		

### 7.3 Massive Open Online Courses:

In order to facilitate access to advanced training programs, students can choose online courses proposed in the following table or provide certificates to consider the equivalent to the subjects in training programme:

Number	Course's ID	Course Name	Credits	Subject considered equivalent to MOOC (registration link)
1.	BIEN325450	Biochemistry Engineering	2	FBIO220450E - Food Biochemistry  ( <a href="https://ocw.mit.edu/courses/chemical-engineering/10-442-biochemical-engineering-spring-2005/index.htm">https://ocw.mit.edu/courses/chemical-engineering/10-442-biochemical-engineering-spring-2005/index.htm</a> )
2.	PHCH325550	Physical chemistry	2	PCHE220750E - Physical Chemistry of Food  ( <a href="https://ocw.mit.edu/courses/chemistry/5-61-physical-chemistry-fall-2013/">https://ocw.mit.edu/courses/chemistry/5-61-physical-chemistry-fall-2013/</a> )
3.	INEC325650	Introduction of Experimental Chemistry	2	EACH210503E -Analytical Chemistry  ( <a href="https://ocw.mit.edu/courses/chemistry/5-35-introduction-to-experimental-chemistry-fall-2012/">https://ocw.mit.edu/courses/chemistry/5-35-introduction-to-experimental-chemistry-fall-2012/</a> )
4.	INHT335750	Introduction of Heat transfer	3	HETE220550E - Heat Transfer and Equipment  ( <a href="https://ocw.mit.edu/courses/mechanical-engineering/2-051-introduction-to-heat-transfer-fall-2015/">https://ocw.mit.edu/courses/mechanical-engineering/2-051-introduction-to-heat-transfer-fall-2015/</a> )
5.	SYMI325850	System Microbiology	2	FMIC220350E-Food Microbiology  ( <a href="https://ocw.mit.edu/courses/biological-engineering/20-106j-systems-microbiology-fall-2006/">https://ocw.mit.edu/courses/biological-engineering/20-106j-systems-microbiology-fall-2006/</a> )
6.	If students have a certificate of quality management (for example: QA / QC (7QC tools) + ISO 9001 & 22000 + GMP / HACCP), they are considered exempted from studying the corresponding parts in the Food Quality Management course.			
7.	If the student has a certificate of food hygiene and safety, he / she will be considered exempted from Food Safety course.			
8.	If students have a certificate of food analysis techniques, they are considered exempted from Practice of Food Analysis course.			



9.	If students have a certificate of microbiological analysis techniques, they will be considered for exemption from Practice of Microbiology course.
10.	If students have a certificate of food processing technology courses (such as tea, coffee, cocoa ...) organized by schools or institutes, they will be considered for exemption from corresponding technological practice courses.

## 8. Plan of Courses

### 1<sup>st</sup> Semester:

Number	Course's ID	Course Name	Credits	Prerequisite
1.	INFT130150E	Introduction to Food Technology	2+1	
2.	LLCT130105E	Philosophy of Marxism and Leninism	3	
3.	MATH132401E	Calculus 1	3	
4.	PHYS130902E	Physics 1	3	
5.	PHED110513E	Physical Education 1	(1)	Non-accumulation
6.	OCHE120450E	Organic Chemistry	2	
7.	GCHE130603E	General Chemistry for Engineers	3	
8.	ACEN340535E	Academic English 1	4	
9.	ACEN340635E	Academic English 2	4	
<b>Total (not including Physical Education 1)</b>			<b>25</b>	

### 2<sup>nd</sup> Semester:

Number	Course's ID	Course Name	Credits	Prerequisite
1.	ACEN440735E	Academic English 3	4	
2.	ACEN440835E	Academic English 4	4	
3.	LLCT120205E	Political economics of Marxism and Leninism	2	
4.	MATH132501E	Calculus 2	3	
5.	PFPE120350E	Principle of Food Processing and Food Processing Equipment	2	
6.	FCHE120550E	Food Chemistry	2	
7.	ACHE220850E	Analytical Chemistry	2	
8.	PHYS131002E	Physics 2	3	
9.	PHED110613E	Physical Education 2	(1)	Non-accumulation
10.	POCH210603E	Practice of Organic Chemistry	1	
11.	FMIC220350E	Food Microbiology	2	
12.	GDQP008031E	Military Education*	(3)	Non-accumulation
<b>Total (not including Physical Education 2 and Military Education)</b>			<b>25</b>	

\*This course will be taken in summer (after 1<sup>th</sup> semester)

### 3<sup>rd</sup> Semester:

Number	Course's ID	Course Name	Credits	Prerequisite
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1.	CAED220150E	Basic of Computer Aided Design (CAD)	2+1	
2.	TEDG130120E	Technical drawing - Basic course	3	
3.	THER222932E	Thermal engineering	2	
4.	MATH132601E	Calculus 3	3	
5.	FANA221050E	Food Analysis	2	
6.	ELEE220144E	Electrical engineering	2	
7.	FBIO220450E	Food Biochemistry	2	
8.	PCHE220750E	Physical Chemistry of Food	2	
9.	PFOB211250E	<i>Practice of Food Biochemistry</i>	1	
10.	EACH210503E	<i>Practice of Analytical Chemistry</i>	1	
11.	PHED130715E	Physical Education 3	(3)	Non-accumulation
<b>Total (not including Physical Education 3)</b>			<b>21</b>	

#### 4<sup>th</sup> Semester:

Number	Course's ID	Course Name	Credits	Prerequisite
1.		Social Science and Humanities (optional)	2	
2.	LLCT120405E	Scientific socialism	2	
3.	LLCT120314E	Ho Chi Minh's Ideology	2	
4.	MHPP220550E	Mechanical-hydraulic-pneumatic processes and equipment	2	
5.	PFMI221150E	<i>Practice of Food Microbiology</i>	2	
6.	FSEV221350E	Sensory Evaluation of Food	2	
7.	PRFA414550E	<i>Practice of Food Analysis</i>	1	
8.	BCPR320450E	Bakery and Confectionery Production	2	
9.	VFBP321250E	Vegetable, Fruit Processing and Beverage Production	2	
10.	FNUT320850E	Food Nutrition (optional)	2	
<b>Total</b>			<b>19</b>	

#### 5<sup>th</sup> Semester:

Number	Course's ID	Course Name	Credits	Prerequisite
1.	LLCT220514E	History of Vietnamese communist party	2	
2.	HETE220550E	Heat Transfer and Equipment	2	
3.	DRDP321350E	Dairy and Related Dairy Production	2	
4.	FETE321450E	Fermentation Technology	2	
5.	TCCP320350E	Tea, Coffee and Chocolate Production	2	
6.	FOAD320550E	Food Additives (optional)	2	
7.	PSEF310650E	<i>Practice of Sensory Evaluation of Food</i>	1	

8.	PBCP311750E	<i>Practice of Bakery and Confectionery Production</i>	1	
9.	PVFP410650E	<i>Practice of Vegetable, Fruit Processing and Beverage Production</i>	1	
10.	<b>IEPR550935E</b>	<b>IELTS Preparation</b>	<b>5</b>	<b>Non-accumulation</b>
<b>Total</b>			<b>20</b>	

*\*This course will be taken in summer (after 4<sup>th</sup> semester)*

#### 6<sup>th</sup> Semester:

Number	Course's ID	Course Name	Credits	Prerequisite
1.	FPPD320150E	Food Process and Plant Design	2	
2.	FSAF320950E	Food Safety (optional)	2	
3.	MATE220950E	Mass Transfer and Equipment	2	
4.	GELA220405E	General Laws	2	
5.	FPAC420150E	Food Packaging	2	
6.	MSPR320250E	Meat and Seafood Processing	2	
7.	CEPR321150E	Cereals Processing	2	
8.	PDRP410750E	<i>Practice of Dairy and Related Dairy Production</i>	1	
9.	PFTE410850E	<i>Practice of Fermentation Technology</i>	1	
10.	PTCP311650E	<i>Practice of Tea, Coffee and Chocolate Production</i>	1	
11.	<b>ENTW611038E</b>	<b>English for Thesis Writing</b>	<b>1</b>	
<b>Total</b>			<b>18</b>	

#### 7<sup>th</sup> Semester:

Number	Course's ID	Course Name	Credits	Prerequisite
1.	PPEF412450E	<i>Project of Food Processing and Machinery</i>	1	
2.	AMME230250E	Applied Mathematics in Food Technology	3	
3.	FRDE420250E	Food Research and Development	2	
4.	FQMA420350E	<i>Food Quality Management</i>	2	
5.	FAPR423150E	<i>Industry Internship 1*</i>	2	
6.	FAPR423250E	<i>Industry Internship 2*</i>	2	
7.	PCPR410550E	<i>Practice of Cereals Processing</i>	1	
8.	PPEF310850E	<i>Practice of the process and equipment in Food Technology</i>	1	
9.	PMSP311550E	<i>Practice of Meat and Seafood Processing</i>	1	
10.	TOFT420950E	Topics of Food Technology	2	
11.	RMFS430950E	Research Methods in Food Science	3	
<b>Total</b>			<b>20</b>	

*\*This course will be taken in summer (after 6<sup>th</sup> semester)*

#### 8<sup>th</sup> Semester:

Number	Course's ID	Course Name	Credits	Prerequisite
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1	GRTH473350E	Graduation Thesis (Food Technology)	7	
<b>Total</b>			<b>7</b>	

## 9. COURSE DESCRIPTION AND WORKLOAD

### 9.1 FOUNDATION SCIENCE COURSES

#### Calculus I

**Credits: 3**

*Distribution of learning time: 3 (3/0/6)*

*Prerequisites: None*

*Former subjects of condition: None*

*Course Description:* This course helps students review the general and advanced mathematical knowledge: Cardinality of a set: rational numbers, real numbers, complex numbers. Limit: function, limit of a function, continuous function. Differential calculus: derivative, differential, Taylor-Maclaurin expansion, the survey on function, curve in polar coordinates. Calculus of single variable: volume fraction uncertainty, definite integrals, generalized integrals. Chain: Chain number, string functions, power series, Taylor-Maclaurin sequence, Fourier series, Fourier expansion, trigonometric series.

*Textbook:*

1. K. Smith, M. Strauss and M. Toda –*Calculus* - 6th National Edition–Kendall Hunt.

#### Calculus II

**Credit: 3**

*Distribution of learning time: 3 (3/0/6)*

*Prerequisites: None*

*Former subjects of condition: Calculus I*

*Course Description:* This course provides the learner with contents: Matrix-determinant: the matrix, the form of matrix, inverse matrix, determinants, matrix classes. System of Linear Equations: linear systems, Cramer rule, Gauss method, homogeneous system. Space Vector: Space Vector, subspace, linear independence, linear dependence, basis, dimension, Euclidean space. Diagonal matrix-quadratic form: eigenvalues, eigenvectors, private space, diagonal matrix, quadratic form, canonical form, the surface level 2. Differential calculus of function of several variables: function of several variables, derivative, differential, extreme of function of several variables, calculus applications in geometry in space.

*Textbook:*

1. K. Smith, M. Strauss and M. Toda –*Calculus* - 6th National Edition–Kendall Hunt.

#### Calculus III

**Credit: 3**

– *Distribution of learning time: 3 (3/0/6)*

– *Prerequisites: None*

– *Former subjects of condition: Calculus II*

– *Course Description:* This course provides the learner with contents: multiple integral: double integral, application for calculated area of flat domain, calculate the surface area, object volume, triple integrals, and applications for the object volume. Line integral: lineintegral type one and applications, line integral type one and applications, Green formula, condition of line integral does not depend on integrating line. Surface integral: Integral surface type one, type two, the Ostrogratski formula, vector field, flux and divergence, vector format of Ostrogratski formula, Stokes formula, circulation and vortex vector, vector format of Stokes formula.

*Textbook:*

1. K. Smith, M. Strauss and M. Toda –*Calculus* - 6th National Edition–Kendall Hunt.

#### Principles of Physics 1

**Credit: 3**

- *Distribution of learning time: 3(2/1/4)*
- *Prerequisites: None*
- *Former subjects of condition: None*
- *Summaries of course:* This course provides the learner with contents: the mechanics: point dynamics, the law of conservation, solid motion. Thermodynamics: kinetic molecular theory, principles of Thermodynamics I, principles of Thermodynamics II. Electricity and magnetism: electric field, magnetic, variability of electrical magnetic field.
- *Text book:* R.A. Serway và J.W. Jewett. Physics for Scientists and Engineers with Modern Physics, 8th Edition

### **Principles of Physics 2**

**Credit: 3**

- *Distribution of learning time: 3(3/0/6)*
- *Prerequisites: None*
- *Former subjects of condition: Principles of Physics 1*
- *Summaries of course:* This course provides students with the basic knowledge of physics including electricity, magnetism, light and optics, which is compulsory to access specialized courses in science, engineering and technology branches.

Students will be equipped with the knowledge of phenomena in the natural world, and can apply these knowledge in scientific research, and in technical and technological developments.

The content of the module consists of chapters 23 to 38 of the book “Physics for Scientists and Engineers with Modern Physics”, 9th Edition of R.A. Serway and J.W. Jewett.

The goal of this module is to help students become familiar with the scientific method, the fundamental laws of physics, improve their scientific knowledge of physics in general, reasoning skills, as well as strategies to prepare for learning in specialized science classes in programs for engineers. To achieve this goal, the module will provide both understandings of the concepts and skills of solving standard problems (homework) at the end of each chapter.

Besides, this module will help students understand how to build a mathematical model based on experimental results, how to record, display, analyze data and develop a model based on the data which can be used to predict the results of other experiments. At the same time, students will know the limits of the model and can use them in the prediction.

- *Text book:*
  1. R.A. Serway & J.W. Jewett; Physics for Scientists and Engineers with Modern Physics, 9th Edition; ISBN for bundle 9781285143811.
  2. Physics 2 lectures summary, University of Technology and Education, HCMC.

### **General Chemistry for Engineers (3 credits)**

- *Distribution of learning time: 3(2/1/4)*
- *Prerequisites: None*
- *Former subjects of condition: None*
- *Summaries of course:* This course provides general chemistry necessary for engineering and science. This course covers fundamentals of electronic structures of atoms, relationship of electron and atomic properties, geometric configuration of the molecule, the polarity of the molecules, link of the physical molecules, a preliminary study on the physical and chemical properties of inorganic substances and their structures.
- *Text book:* Lawrence S. Brown, Chemistry for Engineering Students, Brooks/Cole, Cengage Learning, 2nd edition, 2011, 608 papers.

## FOOD TECHNOLOGY COURSES

### Introduction to Food Technology

Credits: 3

*Prerequisites: none*

*Course Description:*

This course is offered by HCMC University of Technology and Education, Faculty of Chemical and Food Technology, and the Department of Food Technology. This course introduces the programme of Food Technology and provides a general knowledge of food technology.

*Textbooks:*

- 1) Codex Alimentarius International Food Standards  
(<http://www.fao.org/fao-who-codexalimentarius/about-codex/en/>)
- 2) FDA U.S. Food & Drug Administration  
(<https://www.fda.gov/Food/default.htm>)
- 3) Food Technology-IFT  
(<http://www.ift.org/knowledge-center/learn-about-food-science/what-is-food-science.aspx>)
- 4) Nguyễn Đăng Mỹ Duyên. *Introduction to Food Technology* (handout).
- 5) Trịnh Khánh Sơn. *Introduction to Food Technology* (handout).

### Organic Chemistry

Credits: 2

*Prerequisites: none*

*Course Description:*

This course provides fundamental knowledge of organic chemistry with emphasis on nomenclature, isomerism, structure, stereochemistry, reactions, and synthesis of organic compounds. The chemistry of Hydrocarbons, Alcohols, Aldehydes, Ketones, Carboxylic acids, and their derivatives are explored in detail. The course strategy focuses on the relationships between molecular structure, chemical reactivity, and physical properties.

This module provides the basic knowledge of organic chemistry as a foundation for deeper learning of the fundamental courses and specific courses in Food Technology, including Food Biochemistry, Food Microbiology, Food Chemistry, Food Processing and Preservation, Food Storage, and Food Nutrition.

This is the foundation for students to acquire basic knowledge of the natural sciences so that they can continue with higher education or further study in different areas of science and technology.

*Textbooks:*

- 1) Klein, D. *Organic Chemistry*. 2<sup>nd</sup> ed., John Wiley & Sons Inc., 2012.
- 2) Klein, D. *Student Study Guide & Solutions Manual. Organic Chemistry*. John Wiley & Sons Inc., 2012.

### Food Chemistry

Credits: 2

*Prerequisites: Organic Chemistry*

*Course Description:*

Students majoring in Food Technology will be introduced to the basic scientific principles in structures, properties, and functions of food constituents, including water, protein, enzyme, carbohydrate, lipid, vitamin, mineral, aroma compounds, and food additives, from which they will gain a comprehensive evaluation of foods. As a result, they will be able to apply their knowledge in the production and preservation of foods. First, students will be offered an introduction to the properties and roles of water in food. Then, the learners will get to know the structures and physical and chemical properties of carbohydrate, lipid, protein, and enzyme. Next, students will be provided with the information regarding many kinds of vitamins and minerals and the chemical and physical properties of their presence in food. Finally, some basic principles of aroma compounds and food additives will be introduced to learners.

*Textbook:*

- 1) Belitz H. D., and Grosch W. *Food Chemistry*. Vol 1, 2, 3, Berlin-New York, 1999.
- 2) Hoàng Kim Anh. *Hóa Học Thực Phẩm*, NXB Khoa Học & Kỹ Thuật, 2005.

### **Food Microbiology**

**Credits: 2**

*Prerequisites: None*

*Course Description:*

This course introduces the general knowledge of microbiology. The topics covered by this course include the structure and function of cell organelles, the factors affecting the growth and survival of microorganisms in food, the types of microorganisms in raw material, food process and equipment, final product, and the advantages and disadvantages of microorganisms in foods.

*Textbook:*

- 1) Adams, M. R., and M. O. Moss. *Food Microbiology*. 2<sup>nd</sup> ed., Royal Society of Chemistry, 2005.
- 2) Nguyễn Lâm Dũng (chủ biên). 2011. Vi sinh vật học. Phần 1. Thế giới vi sinh vật. Nhà xuất bản khoa học kỹ thuật.
- 3) Nguyễn Lâm Dũng (chủ biên). 2011. Vi sinh vật học. Phần 2. Sinh lý học-Sinh hóa học-Di truyền học-Miễn dịch học và Sinh thái học vi sinh vật. Nhà xuất bản khoa học kỹ thuật.

### **Food Biochemistry**

**Credits: 2**

*Prerequisites: Food Microbiology*

*Course Description:*

This module provides requisite knowledge on the biosynthesis and catabolism of food components such as carbohydrates, fatty acids, and amino acids in living cells to help students understand their beneficial effects on human health. Principles of bioenergetics and mitochondria energy metabolism are also covered. In addition, the properties of enzymes and enzyme kinetics are introduced to provide a basic framework for further study on these biological reaction catalysts. Some chemical reactions involving these molecules in relation to processing and storage are also discussed.

*Textbooks:*

- 1) Berg, Jeremy M., et al. *Biochemistry*. 7<sup>th</sup> ed., W. H. Freeman and Company, New York, 2012.
- 2) Nelson, David L., and Michael M. Cox. *Lehninger Principles of Biochemistry*. 6<sup>th</sup> ed., W. H. Freeman and Company, New York, 2013.
- 3) Simpson, Benjamin K. *Food Biochemistry and Food Processing*. 2<sup>nd</sup> ed., John Wiley & Sons, Inc., 2012.

### **Heat Transfer and Equipment**

**Credits: 2**

*Prerequisites: Calculus 1,2,3; Mechanics-Hydraulic- Pneumatic Process and Equipment*

*Course Description:*

The aim of this course is to help students understand, study, and apply knowledge of heat transfer processes and heat transfer equipment such as:

- the theory of heat transfer; heat transfer equipment; heat transfer models;
- heating and cooling processes; cooling and condensing processes; evaporation and sublimation processes;
- the concentrating and crystallizing process;
- pasteurization process;
- the cooling and freezing process

*Textbooks:*

- 1) Ibarz, Albert, and Gustavo V. Barbosa-Canovas. *Unit Operation in Food Engineering*. CRC Press, 2003.
- 2) Nguyen Tan Dzung. *Heat transfer*. 1<sup>st</sup> ed.

- 3) Nguyen Tan Dzung. *Heat Transfer and Equipment, Part 1, 2 & 3*. NXB ĐHQG TpHCM, 2013.
- 4) Nguyen Tan Dzung. *The Method to Determine the Rate of Freezing Water Inside Freezing Product*. Lap Lambert Academic Publishing, 2015.
- 5) Singh, R. Paul, and Dennis R. Heldman. *Introduction to Food Engineering*. 3<sup>rd</sup> ed., London, Academic Press, 2011.
- 6) Trystram, Gilles, Jean-Jacques Bimbenet, and Albert Duquenoy. *Génie des Procédés Alimentaires, des Bases aux Applications*. Paris, Dunod, 2002.

### **Practice of Organic Chemistry**

**Credits: 1**

*Prerequisites:* Organic Chemistry

*Course Description:*

This course is an intensive introduction to the techniques of experimental organic chemistry, and it gives students an opportunity to learn and master the basic chemistry lab techniques for carrying out experiments. These organic chemistry lab techniques include transfer and extraction techniques, purification of solids by recrystallization, purification of liquids by distillation and purification of organic compounds by chromatography.

*Textbooks:*

- 1) Pavia, Donald L. *A Microscale Approach to Organic Laboratory Techniques*. 5<sup>th</sup> ed., Brooks/Cole, Cengage Learning, 2013.
- 2) Zubrick, James W. *The Organic Chem Lab Survival Manual*. 8<sup>th</sup> ed., John Wiley & Sons, Inc, 2011.

### **Physical Chemistry of Food**

**Credits: 2**

*Prerequisites:* General Chemistry for Engineers, Organic Chemistry

*Course Description:*

This course provides Food Technology students with basic knowledge of transport phenomena, water activity, dispersed systems, and rheology properties of liquid and solid foods. This is the basis for students to comprehend and work effectively with systems and processes exploited in the field of food technology.

*Textbook:*

- 1) Coupland, John. *An Introduction to the Physical Chemistry of Food*. Springer, 2014.
- 2) Walstra, Pieter. *Physical Chemistry of Foods*. CRC Press, 2002.

### **Analytical Chemistry of Food**

**Credits: 2**

*Prerequisites:* General Chemistry for Engineers, Organic Chemistry, Food Chemistry

*Course Description:*

This course helps students review general concepts and basic knowledge about the types of concentrations, units, and statistics. In addition, this course will provide basic theory and quantitative methods to determine the concentration of elements and chemical compounds.

This is the foundation for students to acquire relevant knowledge related to physical chemistry, food chemistry, food analysis, as well as the foundation for the implementation of subject projects, graduation project, and scientific research.

*Textbooks:*

- 1) Kenkel, John. *Analytical Chemistry for Technicians*. 4<sup>th</sup> ed., London, CPR Press, 2013.
- 2) Skoog, Douglas A., Donald M. West, and F. James Holler. *Analytical Chemistry*. Saunders College Publishing, 1994.

### **Practice of Analytical Chemistry**

**Credits: 1**

*Prerequisites:* Analytical Chemistry of Food

*Course Description:*



This course provides students with the opportunity to do experiments in the laboratory and improve practical skills such as to prepare solutions, titration, and statistics. In addition, this course will review the basic theory and quantitative methods to determine the concentration of elements and chemical compounds.

This is the foundation for students to acquire relevant knowledge related to physical chemistry, food chemistry, food analysis, as well as the foundation for the implementation of subject projects, graduation project, and scientific research.

*Textbook:*

- 1) Ho Thi Yeu Ly. *Experiment on Analytical Chemistry*. HCM National University, 2017.

## **Mass Transfer and Equipment**

**Credits: 2**

*Prerequisites:* Heat Transfer and Equipment

*Course Description:*

The aim of this course is to help students understand, study, and apply knowledge of mass transfer processes and mass transfer equipment such as:

- the theory of mass transfer; mass transfer equipment; mass transfer models;
- absorption processes; adsorption processes;
- extracting and dissolving processes
- distillation processes;
- food drying processes.

*Textbooks:*

- 1) Heldman, Dennis R, and Daryl B. Lund. *Handbook of Food Engineering*. 3<sup>rd</sup> ed., CRC Press, 2019.
- 2) Ibarz, Albert, and Gustavo V. Barbosa-Canovas. *Unit Operation in Food Engineering*. CRC Press, 2003.
- 3) Nguyen Tan Dzung. *Mass transfer*. 1<sup>st</sup> ed., Publication University of Nation Ho Chi Minh City VietNam.
- 4) Nguyen Tan Dzung. *Mass Transfer and Equipment, Part 1, 2 & 3*. Publication University of Nation Ho Chi Minh City VietNam, 2013.
- 5) Singh, R. Paul, and Dennis R. Heldman. *Introduction to Food Engineering*. 3<sup>rd</sup> ed., London, Academic Press, 2011.
- 6) Trystram, Gilles, Jean-Jacques Bimbenet, and Albert Duquenoy. *Génie des Procédés Alimentaires, des Bases aux Applications*. Paris, Dunod, 2002.

## **Food Analysis**

**Credits: 2**

*Prerequisites:* Food Chemistry, Analytical Chemistry

*Course Description:*

This course is designed to provide students with a clear understanding of the principles behind various methods and instruments that are commonly used in food industry and academic research labs to quantitatively analyse and characterize the main components of food such as moisture, ash, lipids, proteins, carbohydrates, vitamin, as well as physical properties of food, like colour and viscosity.

*Textbooks:*

- 1) Nielsen, S. Suzanne, ed. *Food Analysis*. 4<sup>th</sup> ed., New York: Springer, 2010.
- 2) Tran Bich Lam. *Food Analysis Laboratory Experiments*. Ho Chi Minh City National University Publishing, 2013.

## **Practice of Food Microbiology**

**Credits: 2**

*Prerequisites:* Food Microbiology

*Course Description:*

This course introduces general skills in the practice of food microbiology and introduces how to identify the shape, size, organization and basic characteristics of micro-organism. Furthermore, it provides an understanding of how to measure the quality of micro-organism in raw material and food products

*Textbooks:*

- 1) Harley, J. P., and Prescott, L. M. *Laboratory Exercises in Microbiology*. 5<sup>th</sup> ed., McGraw-Hill, 2002.
- 2) Kiiyukia, Ciira. *Laboratory Manual of Food Microbiology*. Unido Project, 2003.
- 3) Trịnh Khánh Sơn. *Các Kỹ Thuật Cơ Bản Trong Thực Nghiệm Vi Sinh Vật Học*. TP. HCM, Nhà Xuất Bản Đại Học Quốc Gia, 2017.

### **Practice of Biochemistry**

**Credits: 1**

*Prerequisites:* Food Biochemistry

*Course Description:*

This course will equip students with the basic knowledge of biological catalysis, metabolic pathways, and biosynthesis in living cells in general, and food materials in particular. The students will consider the biochemical interactions between food ingredients and the effect of these changes on food processing and preservation.

The students will gain knowledge of the processes of metabolism and modification of food and food ingredients, and understanding of the mechanisms of metabolism and the application and proper control of the processes involved.

*Textbooks:*

- 1) Hoang Kim Anh. *Food Chemistry*. Science & Technology Publishing House, 2005.
- 2) Pham Thi Tran Chau. *Biochemistry*. Vietnam Education Publisher, 2011.
- 3) Tran Bich Lam, et al. *Food Biochemistry Experiment*. Ho Chi Minh National University Publisher, 2005.

### **Sensory Evaluation of Food**

**Credits: 2**

*Prerequisites:* None

*Course Description:*

This course equips learners with basic concepts and knowledge about sensory evaluation of food, as well as the interaction mechanisms of odour and taste compounds to sensory cells on the senses (taste and smell). At the same time, it helps learners get acquainted with the sensory evaluation methods such as discrimination testing, description testing, and effective testing. Furthermore, it helps learners understand some of the data processing methods commonly used in quality assessment and product development research.

*Textbooks:*

- 1) Lawless H. T., and Heymann H. *Sensory Evaluation: Principles and Practices*. Springer Press, 2010.
- 2) Mason, R. *Sensory Evaluation Manual*. The University of Queensland, 2002.
- 3) Morten, Meilgaard. *Sensory Evaluation Techniques*. CRC Press, 1999.
- 4) Nguyen Hoang Dung. *Sensory Evaluation of Food: Principles and Practices*. HCMC National University, 2007.
- 5) O'Mahony, Michael. *Sensory Evaluation of Food: Statistical Methods and Procedures*. Marcel Dekker, Inc, 1986.

### **Food Process and Plant Design**

**Credits: 2**

*Prerequisites:* None

*Course Description:*

This course aims to help students get familiar with activities in the project of food plant design, from conceiving a plan to designing a food plant and its elements (capacity, products, source of materials, process with mass and energy balance, estimation of equipment, water supply, waste treatment, plant operation plan, and economic engineering). In order to achieve this goal, the focus will be on the combination of understanding of principles and required skills for designing a food processing plant through a project that students have to carry out in groups. This will also enhance the students' creativeness and teamwork skills. By the end of this course, they will be able to apply the knowledge and skills for food processing and plant design, as well as for the implementation and operation of a food plant.

*Textbooks:*

- 1) Ahmed, Jasim, and Mohammad Shafi ur Rahman. *Handbook of Food Process Design*. Wiley–Blackwell, 2012.
- 2) Heldman, D. R., and D. B Lund. *Handbook of Food Engineering*. CRC Press, 2007.
- 3) Heldman, D. R., and R. W. Hartel. *Principles of Food Processing*. Aspen Publishers, 1998.
- 4) Irudayaraj, Joseph. *Food Processing Operations Modelling: Design and Analysis*. Marcel Dekker Inc., 2002.
- 5) López-Gómez, Antonio, and Gustavo V. Barbosa-Cánovas. *Food Plant Design*. CRC Press, 2005.
- 6) Maroulis, Zacharias B., and George D. Saravacos. *Food Plant Economics*. CRC Press, 2008.
- 7) Maroulis, Zacharias B., and George D. Saravacos. *Food Process Design*. CRC Press, 2003.
- 8) Perry, R. H., and D. W. Green. *Perry's Chemical Engineers' Handbook*. 7<sup>th</sup> ed., New York, McGraw-Hill, 1997.
- 9) Saravacos, G. D., and A. E. Kostaropoulos. *Handbook of Food Processing Equipment*. Kluwer Academic/Plenum Publishers, 2002.

## **Meat and Seafood Processing**

**Credits: 2**

*Prerequisites:* None

*Course Description:*

This course provides learners with basic knowledge regarding the ingredients and nature of ingredients used in food, methods of preservation, processes, and changes in meat and fish processing. It offers the knowledge and skills needed for learners to understand food and meat processing technologies. Moreover, this course also provides an understanding of the conducting, preserving and processing food products in the processing plant, and evaluating the quality of products. It will help learners understand the role and the importance of nutrition in meat, fish and processing technology, as well as food quality control.

The course provides students with a methodological approach when learning in-depth about food processing technology. At the same time, it improves the knowledge of meat processing and seafood processing technology, creating conditions for students to integrate into the international economy in the domain of import and export of meat, shrimp and fish products. Furthermore, it will help with food technology development and planning in food processing plants.

*Textbooks:*

- 1) Cross, H. R., and A. J. Overby. *Meat Science, Milk Science and Technology*. Amsterdam, Elsevier Science Publishers, 1988.
- 2) Durand, Paule. *Technologies des Produits de Charcuterie et des Salaisons*. Tec&Doc, 1999.
- 3) Food and Agriculture Organization of the United Nations. *Guidelines for Slaughtering, Meat Cutting and Further Processing*. Rome, FAO, 1991.
- 4) Lawrie, R. A. *Lawrie's Meat Science*. Woodhead Publishing Limited, 1998.
- 5) Lê Văn Việt Mẫn. *Food Processing Technology*. Vietnam National University Ho Chi Minh City Publishing House, 2008.

- 6) Nguyễn Trọng Căn. *Seafood Processing Technology. Volume 1 & 2*. Agricultural Publishing House, 2006.
- 7) Nguyễn Trọng Căn. *Technology of Canned Seafood and Poultry*. Scientific and Technical Publishing House, 2008.
- 8) Pearson, A. M. *Processed Meats*. Chapman & Hall, 1996.

### **Tea, Coffee, and Cocoa Production**

**Credits: 2**

*Prerequisites:* None

*Course Description:*

The course provides knowledge and skills regarding:

- production and consumption of tea, coffee, and cocoa in Vietnam and the world;
- biochemical changes after post-harvest, storage and pre-processing; quality control of raw materials;
- processing of tea, coffee, and cocoa, and the biochemical changes during the processing of tea, coffee, and cocoa;
- product quality standards and assurance.

*Textbooks:*

- 1) Beckett, Stephen T. *The Science of Chocolate*. 2<sup>nd</sup> ed., Royal Society of Chemistry, 2008.
- 2) Chakraverty, A., Arun S. Mujumdar, and Hosahalli S. Ramaswamy, editors. *Handbook of Postharvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices*. CRC Press, 2003.
- 3) Chi-Tang Ho, Jen-Kun Lin, and Fereidoon Shahidi, editors. *Tea and Tea Products: Chemistry and Health-Promoting Properties (Nutraceutical Science and Technology)*. CRC Press, 2008.
- 4) Flament, Ivon. *Coffee Flavor Chemistry*. Wiley, 2001.
- 5) Wintgens, Jean Nicolas, editor. *Coffee: Growing, Processing, Sustainable Production: A Guidebook for Growers, Processors, Traders, and Researchers*. 2<sup>nd</sup> updated ed., 2009.

### **Bakery and Confectionery Production**

**Credits: 2**

*Prerequisites:* None

*Course Description:*

This module provides students with an understanding of the baking and confectionery ingredients, as well as their basic functions in bakery and confectionery production. The manufacturing techniques, changes to ingredients in each manufacturing stage, equipment and process control of some bakery and confectionery production processes are also covered.

*Textbooks:*

- 1) Edwards, W. P. *The Science of Sugar Confectionery*. UK, RSC Paperbacks, 2000.
- 2) Hui, Y. H., et al. *Bakery Products Science and Technology*. Blackwell Publishing, 2006.
- 3) Lees, R., and E. B. Jackson. *Sugar Confectionery and Chocolate Manufacture*. Blackie Academic & Professional, 2000.
- 4) Manley, Duncan. *Technology of Biscuits, Crackers and Cookies*. Cambridge, Woodhead Publishing Limited, 2000.

### **Practice of Food Sensory Evaluation**

**Credits: 1**

*Prerequisites:* None

*Course Description:*

This course will help learners:

- review the basics of sensory evaluation of food;

- know how to organize and operate a sensory evaluation program such as experimental design and statistics, and the perceptual process in particular.

*Textbooks:*

- 1) Lawless, H. T., and H. Heymann. *Sensory Evaluation: Principles and Practices*. Springer Press, 2010.
- 2) Mason, R. *Sensory Evaluation Manual*. The University of Queensland, 2002.
- 3) Meilgaard, Morten. *Sensory Evaluation Techniques*. CRC Press, 1999.
- 4) Nguyen, Hoang Dung. *Sensory Evaluation of Food: Principles and Practices*. 2007, HCMC National University, 2007.
- 5) O'Mahony, Michael. *Sensory Evaluation of Food: Statistical Methods and Procedures*. Marcel Dekker Inc., 1986.
- 6) Stonne, H. and J. Sidel. *Sensory Evaluation Practices*. 3<sup>rd</sup> ed., Elsevier, 2004.

**Practice of Food Analysis**

**Credits: 1**

*Prerequisites:* None

*Course Description:*

This course will equip students with methods to determine the basic components of food products such as protein, glucide and lipid, and with a number of techniques for processing different food samples before conducting the analysis. Furthermore, it will help students accumulate knowledge and practical skills needed for analytical methods.

*Textbook:*

- 1) Nielsen, S. Suzanne. *Food Analysis*. 3<sup>rd</sup> ed., Kluwer Academic/Plenum Publishers, 2003.

**Food Nutrition**

**Credits: 2**

*Prerequisites:* None

*Course Description:*

This course examines the food nutrients and the metabolism of foods in the human body, as well as the factors influencing nutritional status and requirements over the life cycle. The cultural and socio-economic factors which underline food selection and methods of food preparation and their impacts on health are also addressed. The course also discusses the effects of nutrient deficiency and malnutrition, and overweight and obesity on individuals and the community.

*Textbooks:*

- 1) Lawrence, Mark, and Tony Worsley, editors. *Public Health Nutrition: From Principles to Practice*. Sydney, Allen & Unwin, 2007
- 2) Smolin, Lori A., and Mary B. Grosvenor. *Nutrition: Science and Applications*. 2<sup>nd</sup> ed., Hoboken, Wiley, 2010.

**Food Safety**

**Credits: 2**

*Prerequisites:* None

*Course Description:*

This course provides students with certain concepts of food hygiene and safety, and food safety hazards in the process of food receipt, processing, and preservation. In addition, this module introduces measures to prevent and ensure food safety.

*Textbooks:*

- 1) Deshpande, S. S. *Handbook of Food Toxicology*. Marcel Dekker, 2002.
- 2) Helferich, W., and C. K. Winter. *Food Toxicology*. CRC Press, 2001.
- 3) McLauchlin, J., and C. Little, editors. *HOBBS' Food Poisoning and Food Hygiene*. CRC Press, 2007.
- 4) Schmidt, R. H., and G. E. Rodrick. *Food Safety Handbook*. John Wiley & Sons, 2003.

- 5) Selamat, J., and S. Z. Iqbal. *Food Safety-Basic Concepts. Recent Issues, and Future Challenges*. Springer, 2016.
- 6) Shaw, C. *Food Safety. The Science of Keeping Food Safe*. John Wiley & Sons, 2013.

### **Cereals Processing**

**Credits: 2**

*Prerequisites:* None

*Course Description:*

This module equips learners with basic knowledge about raw materials and technologies of processing food products such as rice, noodles, and starch. This course will help learners understand the fundamentals of technological processes, product changes during processing, and operation principles of machines used in the processing of food products. Consequently, learners will be able to research and develop food products to diversify the current food products.

*Textbooks:*

- 1) Bui Duc Hoi. *Preservation of Food*. Hanoi, Science and Technology Publishing.
- 2) Dendy, David A. V., and Bogdan J. Dobraszczyk. *Cereals and Cereal Products Chemistry and Technology*. Springer US, 2001.
- 3) Hoang Van Duoc. *Drying Technology*. Hanoi, Science and Technology Publishing, 1999.
- 4) Tran Minh Tam. *Preservation and Processing of Post-Harvest Agricultural Products*. Hanoi, Agricultural Publishing, 2000.

### **Vegetable, Fruit Processing, and Beverage Production**

**Credits: 2**

*Prerequisites:* None

*Course Description:*

This course equips students with knowledge about:

- the biochemistry and physiology of post-harvested fruit and vegetable,
- the principles of thermal and non-thermal techniques associated with fruit and vegetable processing,
- the basic steps involved in fruit and vegetable processing,
- the processing techniques, methods on the product quality inspection and operating the processing chains to produce fruit-based beverage products.

*Textbooks:*

- 1) Ashurst, Philip R. *Chemistry and Technology of Soft Drinks and Fruit Juices*. Continuum International Publishing Group, 1998.
- 2) Cantarelli, C., and G. Lanzarini. *Biotechnology Applications in Beverage Production*. Elsevier Science Publishers Ltd., 1989.
- 3) Evranuz, E. Özgül, and Hui Yiu H. *Handbook of Vegetable Preservation and Processing*. 2<sup>nd</sup> ed., CRC Press, 2016.
- 4) Johnson, H., and J. Halliday. *Wine Science*. 2<sup>nd</sup> ed., Academic Press.
- 5) Jongen, Wim. *Fruit and Vegetable Processing: Improving Quality*. Woodhead Press, 2002.
- 6) Sinha, Nirmal, et al. *Handbook of Fruits and Fruit Processing*. 2<sup>nd</sup> ed., Wiley-Blackwell, 2012.

### **Dairy and Related Dairy Production**

**Credits: 2**

*Prerequisites:* None

*Course Description:*

This course provides the tools for students to learn how to transform milk into high-quality dairy products. Students will acquire a thorough understanding of milk composition, milk chemistry, milk microbiology, milk processing, unit operations, and alternative technologies for whey processing. Students will be able to recognize the procedures needed to produce high-quality dairy products and

alternative technologies for whey processing, production, and isolation of health-promoting bioactive compounds from milk and dairy products.

*Textbooks:*

- 1) Selia dos Reis Coimbra, Jane, and Jose A. Teixeira, editors. *Engineering Aspects of Milk and Dairy Products*. CRC Press, 2009.
- 2) Walstra, Pieter, Jan T. M. Wouters, and Tom J. Geurts. *Dairy Science and Technology*. 2<sup>nd</sup> ed., Taylor and Francis Group, 2006.

### **Fermentation Technology**

**Credits: 2**

*Prerequisites:* None

*Course Description:*

This course introduces general knowledge of fermentation technology and how to prepare a fermentation process in both the laboratory and on the industrial scale. It introduces the microbial growth kinetics in the fermentation process and the typical types of fermentation, as well as how to apply the fermentation in food technology.

*Textbooks:*

- 1) Stanbury, P. F., A. Whitaker, and S. J. Hall. *Principles of Fermentation Technology*. 2<sup>nd</sup> ed., Butterworth Heinemann, 1995.
- 2) Trịnh Khánh Sơn. *Bài Giảng Môn Học Công Nghệ Lên Men*. ĐH Sư Phạm Kỹ Thuật TP.HCM, 2017.

### **Practice of Meat and Seafood Processing**

**Credits: 1**

*Prerequisites:* None

*Course Description:*

This course equips learners with the basics of meat and fish processing and enables them to conduct experiments at the food laboratory. This course will help learners understand the role and importance of meat, seafood, biochemical changes, and food processing methods, as well as how to create specific products.

The students will understand the methodology used in food processing technology and gain an overview of the economic market and strategies. This course will also provide learners with the ability to process and produce meat, shrimp and fish products when building and planning food technology in plants.

*Textbooks:*

- 1) Kerry, Joseph P., John F. Kerry, and David Ledward, editors. *Meat Processing: Improving Quality*. Woodhead Publishing, 2002.
- 2) Nguyen, Tien Luc. *The Curriculum of Meat and Seafood Processing*. Vietnam National University, Ho Chi Minh City Publishing House, 2016.

### **Practice of Bakery and Confectionery Production**

**Credits: 1**

*Prerequisites:* None

*Course Description:*

The aim of this course is to have a more in-depth understanding of the relationship between ingredients, recipes and recipe build-up, and some variations in bakery and confectionery products. The focus of this course is mainly on practical work. However, importance is also laid on the theoretical element in order to get a sound background and to be confident and in control of the process. Each session will start with brief and precise theoretical lessons containing the essential details before the practical part starts. This will help to see, predict and figure out what can or cannot be done. Finally, the comparison will be made between theory and the practical results of the practice trials.

*Textbooks:*

- 1) Edwards, W. P. *The Science of Sugar Confectionery*. RSC Paperbacks, 2000.
- 2) Hui, Y. H., et al. *Bakery Products Science and Technology*. Blackwell Publishing, 2006.
- 3) Lees, R., and E. B. Jackson. *Sugar Confectionery and Chocolate Manufacture*. Blackie Academic & Professional, 2000.
- 4) Manley, Duncan. *Technology of Biscuits, Crackers and Cookies*. Woodhead Publishing Limited, 2000.
- 5) Wheat Marketing Center Inc. *Wheat and Flour Testing Methods – A Guide to Understanding Wheat and Flour Quality*. Portland, Oregon, USA, 2004.

## **Food Packaging**

**Credits: 2**

*Prerequisites:* None

*Course Description:*

This course provides students with knowledge about:

- historical aspects of the development of packaging technology, functions, future directions, and standards required for food packaging materials;
- the production of raw materials used in food packaging, the conversion industry for packaging solutions, and the packaging needs of the food industry;
- the material properties and processing technologies applied to produce the packaging appropriate for the food market;
- the influences of packaging on the quality and shelf life of food products.

*Textbooks:*

- 1) Cerqueira, M. A. P. R., et al., editors. *Edible Food Packaging: Materials and Processing Technologies*. CRC Press, 2016.
- 2) Brody, A. L., E. P. Strupinsky, and L. R. Kline. *Active Packaging for Food Applications*. CRC Press, 2001.
- 3) Robertson, G. L. *Food Packaging: Principles and Practice*. CRC Press, Taylor & Francis Group, 2006.

## **Food Research and Development**

**Credits: 2**

*Prerequisites:* None

*Course Description:*

This course requires students to synthesize and apply all knowledge related to food technology. Students need to understand the composition, nature of materials, technological processes, equipment, packaging, and variations in food preservation and processing.

This course provides students with basic knowledge about new products, research methods, food quality, food products research, and development methods. At the same time, it provides learners with the knowledge and skills to manage, develop and research the processing plants. Moreover, this subject helps learners have an approach and methodology when learning in-depth about research and development of new products and methods of organizing and developing products.

*Textbooks:*

- 1) Brody, Aaron L., and John B. Lord. *Developing New Food Products for Changing Marketplace*. Technomic Publishing Company Inc., 2000.
- 2) Earle, M., R. Earle, and A. Anderson. *Food Product Development*. Woodhead Publishing Limited, 2001.
- 3) Hà Thanh Toàn. *New Product Development Lecture, Agriculture and Applied Biology*. Can Tho University, 2002.
- 4) Harper, W. J., R. Harris, and J. Litchfield. *Food Product Development (FST 650 Syllabus)*. Ohio State University, 2002.



5) McDonald, J. *Course Note: Food Product Development*. University of Queensland, 2003.

## **Food Quality Management**

**Credits: 2**

*Prerequisites:* None

*Course Description:*

This module provides basic knowledge about food quality and methods to manage food quality and the role and importance of food quality management activities at factories. It provides an understanding of the good manufacturing principles and practices in the food industry (GMPs), HACCP, and the ISO 9000 quality management system standards.

*Textbooks:*

- 1) Alli, Inteaz. *Food Quality Assurance: Principles and Practices*. CRC Press, 2004.
- 2) National Advisory Committee on Microbiological Criteria for Foods. *Hazard Analysis and Critical Control Point Principles and Application Guidelines*. Adopted:1997.

## **Practice of Cereals Processing**

**Credits: 1**

*Prerequisites:* None

*Course Description:*

This course includes cereal Practice sessions such as starch processing, modified starch processing, pasta processing, rice noodles processing, etc. This course will help learners understand the principles of the technological process, the impact of processing on cereal products, and the operation of machines used in the cereal process.

*Textbooks:*

- 1) Kent, N. L. *Technology of Cereals: An Introduction for Students of Food Science and Agriculture*. 4<sup>th</sup> ed., Elsevier Science Ltd, 1994.
- 2) Owens, G. *Cereals Processing Technology*. Woodhead Publishing Limited and CRC Press LLC, 2001.

## **Practice of Tea, Coffee, and Cocoa Production**

**Credits: 1**

*Prerequisites:* None

*Course Description:*

This course is based on tea, coffee, and cocoa processing technology theory. It provides students with an opportunity to test their knowledge of this subject. Students will have an opportunity to do practical work using the equipment for making tea, coffee, and cocoa products. Subject contents include:

- testing the quality criteria of raw tea, coffee, and cocoa,
- the technical brief which gives an overview of the types of tea, coffee, and cocoa processing that are possible at a small scale of operation, such as green tea, bottled green tea, instant coffee, canned coffee, cocoa powder, etc.,
- research and development of new tea, coffee, and cocoa products.

*Textbooks:*

- 1) Beckett, S. T. *Industrial Chocolate Manufacture and Use*. 4<sup>th</sup> ed., Blackwell Publishing, 2009.
- 2) Beckett, S. T. *The Science of Chocolate*. 2<sup>nd</sup> ed., RSC Publishing, 2008.
- 3) Chi, Tang Ho, Jen Kun Lin, and Fereidoon Shahidi. *Tea and Tea Products: Chemistry and Health-Promoting Properties*. CRC Press, 2009.
- 4) Clarke, R. J., and O. J. Vitzthum. *Coffee – Recent Developments*. Blackwell Science, 2001.
- 5) Dang Thi Ngoc Dung, and Ho Thi Thu Trang. *Practical Tea, Coffee, and Cocoa Products Processing Technology*. Ho Chi Minh City University of Technology & Education 2013.

## **Practice of Dairy and Related Dairy Production**

**Credits: 1**

*Prerequisites:* None

*Course Description:*

This course is based on dairy and related dairy products theory. It provides the students with an opportunity to test their knowledge of this subject. Students have the opportunity to engage in practical work using the equipment to make dairy products. Subject contents include:

- testing the quality criteria of raw milk and dairy products;
- the technical brief which gives an overview of the types of dairy processing that are possible at a small scale of operation, such as pasteurised milk; flan, butter, yoghurt; cheese-making; ice cream production and dairy confectionery, dried milk powder, etc.;
- research and development of processing new dairy products.

*Textbooks:*

- 1) Dang Thi Ngoc Dung, and Ho Thi Thu Trang. *Practical Dairy Products Processing Technology*. Ho Chi Minh City University of Technology & Education, 2013.
- 2) Selia dos Reis Coimbra, Jane, and Jose A. Teixeira, editors. *Engineering Aspects of Milk and Dairy Products*. CRC Press, 2009.
- 3) Walstra, Pieter, Jan T. M. Wouters, and Tom J. Geurts. *Dairy Science and Technology*. 2<sup>nd</sup> ed., Taylor and Francis Group, 2006.

## **Practice of Fermentation Technology**

**Credits: 1**

*Prerequisites:* None

*Course Description:*

This course introduces general skills in the field of fermentation technology. It demonstrates how to prepare a fermentation process and provides the means and knowledge to identify and analyse the microbial growth kinetics in a fermentation process.

*Textbooks:*

- 1) Kiiyukia, Ciira. *Laboratory Manual of Food Microbiology*. Unido Project, 2003.
- 2) Stanbury, P. F., A. Whitaker, and S. J. Hall. *Principles of Fermentation Technology*. 2<sup>nd</sup> ed., Butterworth Heinemann, 1995.
- 3) Trịnh Khánh Sơn. *Bài Giảng Môn Học Thí Nghiệm Công Nghệ Lên Men*. ĐH Sư Phạm Kỹ Thuật TP.HCM, 2017.

## **Industry Internship 1**

**Credits: 2**

*Prerequisite:*

*Course Description:* This course helps students to obtain practical experiences in industry environment, business and research units related to the food sector. Furthermore, the goal is to help learners apply their knowledge gained during their time at university in practice.

## **Industry Internship 2**

**Credits: 2**

*Prerequisite:*

*Course Description:* This course helps students to strengthen and improve knowledge gained during their time at university. The aim is to apply specialized knowledge to solve real problems while practicing the skills of an engineer, building styles and working methods of electronic engineers in professional activities. Furthermore, the goal is to train the students' ability in the domain of analysis, synthesis, proposals and problem-solving using soft skills.

## **Research Methods in Food Science**

**Credits: 3**

*Prerequisites:* None

*Course Description:* This course covers the content of concepts, processes, and structures regarding research methods. The students will go through the selection of research topics related to their graduate thesis, prepare an outline and apply it, collect and process information while conducting scientific research. By the end of the course, students will conduct graduate thesis or graduation project scientifically and successfully.

*Textbook:*

### **Graduation Thesis (Food Technology)**

**Credits: 7**

*Prerequisites:* None

*Course Description:* In this course, students must complete a scientific or technical project under the supervision of a mentor. Students must use all their knowledge and skills in order to solve the problems presented by the project. The project must be written as a thesis and must be presented to an official evaluation committee.

*Textbooks:*

- 1) All textbooks in Food Technology Programme  
Scientific papers regarding food technology and related fields.

## **10. Campus Infrastructure**

Follow the Ministry of education and training's regulations

## **11. PROGRAM GUIDE**

- Credit hour is calculated as:

1 credit	= 15 lecture hours
	= 30 laboratory hours
	= 45 hours of practice
	= 45 hours of self-study
	= 90 workshop hours.
	= 45 hours for project, thesis.

- Graduation thesis: conduct a research project to solve specific problems related to the major.

**RECTOR**

**DEAN OF FACULTY**