**MINISTRY OF EDUCATION & TRAINING**

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

 **UNDERGRADUATE PROGRAM**

***Major of***

**FOOD TECHNOLOGY**

**June 2019**

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| THE MINISTRY OF EDUCATION & TRAINING**HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY & EDUCATION** | SOCIALIST REPUBLIC OF VIETNAMIndependence – Liberty - Happiness |

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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 Technologymajor 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 FoodSystem.

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

**Program outcomes**

1. ***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.

1. ***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.

1. ***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.

1. ***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:** 130 credits *(without Physical Education, Military Education, and Supplementary Courses)*

**6. Allocation of credits**

|  |  |
| --- | --- |
| **Groups of Courses** | **No. of Credits** |
| **Total** | **Compulsory** | **Optional** |
| **Foundation science courses** | **46** | **44** | **2** |
| 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 |  |
| **Food Technology Courses** | **84** | **73** | **11** |
| Food Science | 14 | 14 |  |
| Food Engineering | 12 | 12 |  |
| Food Processing | 20 | 20 |  |
| Project and Practice | 18 | 18 |  |
| Industry Internship and Related Fields of Food Technology | 11 |  | 11 |
| Graduation thesis | 9 | 9 |  |
| **Total** *(not excluding Physical Education, Military courses and Supplementary Courses)* | **130** | **116** | **13** |

**7. CONTENTS OF THE PROGRAM**

**7.1 Foundation science courses (45 credits)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Course’s ID** | **Course Name** | **Credits** | **Semester** | **Lecturers (Notes)** |
| **Political Education** | **13** |  |  |
|  | LLCT130105E | Philosophy of Marxism and Leninism | 3 | 1 |  |
|  | LLCT120205E | Political economics of Marxism and Leninism | 2 | 1 |  |
|  | LLCT120405E | Scientific socialism | 2 | 2 |  |
|  | LLCT120314E | Ho Chi Minh’s Ideology | 2 | 2 |  |
|  | LLCT220514E | History of Vietnamese communist party | 3 | 3 |  |
|  | GELA220405E | General Laws | 2 | 6 |  |
| **Social Science and Humanities** (optional) | **2** |  | *(choose 2 credits)* |
|  | 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 |  |
| **Mathematics and Natural Sciences** |  **25** |  |  |
|  | MATH141601E | Calculus 1 | 3 | 1 |  |
|  | MATH141701E | Calculus 2 | 3 | 2 |  |
|  | MATH141801E | Calculus 3 | 3 | 3 |  |
|  | AMME230250E | Applied Mathematics in Food Technology | 3 | 3 | Dr. Nguyễn Thái Anh |
|  | PHYS130402E | Principles of Physics 1 | 3 | 1 |  |
|  | PHYS130902E | Principles of Physics 2 | 3 | 2 |  |
|  | GCHE130603E | General Chemistry for Engineers | 3 | 1 | Dr. Nguyễn Vinh Tiến |
|  | THER222932E | Thermal engineering | 2 | 2 |  |
|  | ELEN220144E | Electrical engineering | 2 | 2 |  |
| **Technical Computer Sciences** | **3** |  |  |
|  | CAED220150E | Basic of Computer Aided Design (CAD) | 2+1 | 3 | MSc. Nguyễn Văn Sơn (1 lab) |
| **Introduction of Food Technology** | **3** |  |  |
|  | IFNT130150E | Introduction to Food Technology | 2+1 | 1 | Dr. Trịnh Khánh SơnDr. Vũ Trần Khánh Linh |
| **Physical Education** | **(5)** |  |  |
|  | PHED110513E | Physical Education 1 | (1) | 1 |  |
|  | PHED110613E | Physical Education 2 | (l) | 2 |  |
|  | PHED130715E | Physical Education 3 | (3) | 3 |  |
| **Military Education** | **(3)** |  |  |
|  | GDQP008031E | Military Education  | (3) |  |  |
| **Total** *(not excluding Physical Education, Military courses and Supplementary Courses)* | **47** |  |  |

**7.2 Food Technology Courses (85 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 Hảo |
|  | FBIO220450E | Food Biochemistry | 2 | 3 | Dr. Vũ Trần Khánh Linh |
|  | FMIC220350E | Food Microbiology  | 2 | 3 | Dr. Trịnh Khánh Sơn |
| **Total** | **14** |  |  |

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

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Course’s ID** | **Course Name** | **Credits** | **Semester** | **Lecturers** |
|  | EDDG120250E | Descriptive Geometry & Technical Drawing | 2 | 2 | MSc. Phan Công Bình |
|  | PFPE120350E | Principle of Food Processing and Food Processing Equipments | 2 | 2 | MEng. Lê Tấn Hoàng |
|  | MHPP220650E | Mechanical-hydraulic-pneumatic processes and equipments | 2 | 3 | Dr. Nguyễn Tấn Dũng |
|  | HETE220550E | Heat Transfer and Equipments | 2 | 4 | Dr. Nguyễn Tấn Dũng |
|  | MATE220950E | Mass Transfer and Equipments | 2 | 5 | Dr. Nguyễn Tấn Dũng |
|  | FPPD320150E | Food Process and Plant Design | 2 | 5 | Dr. Lại Quốc Đạt |
| **Total** | **12** |  |  |

**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 HàMEng. Đặng Thị Ngọc Dung |
| 6 | DRDP321350E | Dairy and Related Dairy Production  | 2 | 6 | Dr. Phạm Thị HoànMEng. 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 |
| **Total** | **20** |  |  |

**7.2.4. Project and Practice course** *(18 credits)*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Course’s ID** | **Course Name** | **Credits** | **Semester** | **Lecturers** |
| 1 | POCH210650E | *Practice of Organic Chemistry* | *1* | 3 | Dr. Võ Thị Ngà |
| 2 | PANC210850E | *Practice of Analytical Chemistry* | *1* | 4 | Dr. Phan Thị Anh Đào |
| 3 | PFAN320750E | *Practice of Food Analysis* | *2* | 5 | Dr. Nguyễn Vinh Tiến |
| 4 | PFCB211250E | *Practice of Food Biochemistry* | *1* | 4 | Dr. Vũ Trần Khánh Linh |
| 5 | PFMI221150E | *Practice of Food Microbiology* | *2* | 4 | Dr. Trịnh Khánh Sơn |
| 6 | PFPM321050E | *Project of Food Processing and equipment* | *2* | 6 | All lecturers |
| 7 | PPEP310550E | *Practice of the process and equipment in Food Technology* | *1* |  | MEng. Hồ Thị Thu Trang |
| 8 | PMSP311550E | *Practice of Meat and Seafood Processing*  | *1* | 6 | Dr. Nguyễn Tiến LựcMEng. Lê Tấn Hoàng |
| 9 | PTCP311650E | *Practice of Tea, Coffee and Chocolate Production*  | *1* | 6 | Dr. Nguyễn Tiến LựcMEng. Hồ Thị Thu Trang |
| 10 | PBCP311750E | *Practice of Bakery and Confectionery Production*  | *1* | 6 | Dr. Vũ Trần Khánh Linh |
| 11 | PCPR410550E | *Practice of Cereals Processing* | *1* | 7 | MEng. Nguyễn Đặng Mỹ Duyên |
| 12 | PVFP410650E | *Practice of Vegetable, Fruit Processing and Beverage Production*  | *1* | 7 | MEng. Đặng Thị Ngọc Dung |
| 13 | PDRP410750E | *Practice of Dairy and Related Dairy Production*  | *1* | 7 | MEng. Đặng Thị Ngọc DungDr. Phạm Thị Hoàn |
| 14 | PFTE410850E | *Practice of Fermentation Technology*  | *1* | 7 | Dr. Trịnh Khánh Sơn |
| 15 | PFSE310650E | *Practice of Sensory Evaluation of Food* | *1* | 5 | Dr. Phạm Thị Hoàn |
| **Total** | **18** |  |  |

**7.2.5. Industry Internship and Related Fields of Food Technology** *(11 credits)*

*Student selects 11 optional credits*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Course’s ID** | **Course Name** | **Credits** | **Semester** | **Lecturers** |
|  | ININ420450E | *Industry Internship* | *2* | 7 | All lecturer |
|  | TOFT420950E | *Topic of Food technology* | *2* | 7 |  |
|  | FQMA410350E | *Food Quality Management\**  | *1* | 7 |  |
|  | FAIN320550E | *Food Additives\*\* (optional)* | *2* | 5 | Dr. Phạm Thị Quỳnh |
|  | FNUT320850E | *Food Nutrition\*\* (optional)* | *2* | 5 | Dr. Phạm Thị Quỳnh |
|  | FSAF320950E | *Food Safety\*\* (optional)* | *2* | 5 | Dr. Phạm Thị Quỳnh |
|  | AFMI320650E | *Analysis in Food Microbiology (optional)* | *2* | 3 |  |
|  | PTEC320850E | *Posthavest Technology (optional)* | *2* | 4 | Dr. Vũ Trần Khánh Linh |
|  | FBIO320750E | *Food Biotechnology (optional)* | *2* | 4 | Dr. Phạm Thị Hoàn |
|  | EFOP320950E | *Edible Fats and Oils Production (optional)* | *2* | 5 | Dr. Vũ Trần Khánh Linh |
| **Total**  | **11** |  |  |

*\*This course can be replaced by a Certificated of ISO and HACCP*

*\*\*Suggested courses*

**7.2.6 Graduation thesis** *(10 Credits)*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **No.** | **Course’s ID** | **Course Name** | **Credits** | **Semester** | **Lecturers** |
| 1 | GRAT409150E | Graduation Thesis (Food Technology) | 9 | 8 |  |
| **Total**  | 9 |  |  |

**7.3 Supplementary courses (11 credits)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **No.** | **Course’s ID** | **Course Name** | **Credits** | **Notes** |
|  | EHQT130137E | Academic English 1 | (3) | 1st semester |
|  | EHQT230237E | Academic English 2 | (3) | 2nd semester |
|  | *EHQT230337E* | *Academic English 3* | *(3)* | *3rd semester* |
|  | *EHQT230437E* | *Academic English 4* | *(3)* | *4th semester* |
|  | TEEN123750E | Technical English 1 | (2) | 3rd semester |
|  | TEEN233850E | Technical English 2 | (3) | 4th semester |
| **Total**  | **11** |  |

**7.4 Massive Open Online Cources:**

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) |
|  | BIEN325450 | Biochemistry Engineering | 2 | FBIO220450E - Food Biochemistry(https://ocw.mit.edu/courses/chemical-engineering/10-442-biochemical-engineering-spring-2005/index.htm) |
|  | PHCH325550 | Physical chemistry | 2 | PCHE220750E - Physical Chemistry of Food (https://ocw.mit.edu/courses/chemistry/5-61-physical-chemistry-fall-2013/) |
|  | INEC325650 | Introduction of Experimental Chemistry | 2 | ACHE220850E-Analytical Chemistry (https://ocw.mit.edu/courses/chemistry/5-35-introduction-to-experimental-chemistry-fall-2012/) |
|  | INHT335750 | Introduction of Heat transfer | 3 | HETE220550E - Heat Transfer and Equipments (https://ocw.mit.edu/courses/mechanical-engineering/2-051-introduction-to-heat-transfer-fall-2015/) |
|  | SYMI325850 | System Microbiology | 2 | FMIC220350E-Food Microbiology(https://ocw.mit.edu/courses/biological-engineering/20-106j-systems-microbiology-fall-2006/) |
|  | 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. |
|  | If the student has a certificate of food hygiene and safety, he / she will be considered exempted from Food Safety course. |
|  | If students have a certificate of food analysis techniques, they are considered exempted from Practice of Food Analysis course. |
|  | If students have a certificate of microbiological analysis techniques, they will be considered for exemption from Practice of Microbiology course. |
|  | 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**

**1st Semester:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number** | **Course’s ID** | **Course Name** | **Credits** | **Prerequisite** |
| 1.
 | INFT130150E | Introduction to Food Technology | 2+1 |  |
|  | LLCT130105E | Philosophy of Marxism and Leninism | 3 |  |
|  | LLCT120205E | Political economics of Marxism and Leninism | 2 |  |
|  | MATH141601E | Calculus 1 | 3 |  |
|  | PHYS130402E | Principles of Physics 1 | 3 |  |
|  | EHQT130137E | Academic English 1 | (3) |  |
|  | PHED110513E | Physical Education 1 | (1) |  |
|  | OCHE120450E | Organic Chemistry | 2 |  |
|  | GCHE130603E | General Chemistry for Engineers | 3 |  |
| **Total** *(not excluding Physical Education and Supplementary Courses)* | **19** |  |

**2nd Semester:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number** | **Course’s ID** | **Course Name** | **Credits** | **Prerequisite** |
|  | EDDG120250E | Descriptive Geometry & Technical Drawing | 2 |  |
|  | MATH141701E | Calculus 2 | 3 |  |
|  | PFPE120350E | Principle of Food Processing and Food Processing Equipments | 2 |  |
|  | FCHE120550E | Food Chemistry | 2 |  |
|  | LLCT120405E | Scientific socialism | 2 |  |
|  | LLCT120314E | Ho Chi Minh’s Ideology | 2 |  |
|  | THER222932E | Thermal engineering | 2 |  |
|  | PHYS130902E | Principles of Physics 2 | 3 |  |
|  | EHQT230237E | Academic English 2 | (3) |  |
|  | TEEN123750E | Technical English 1 | (2) |  |
|  | PHED110613E | Physical Education 2 | (l) |  |
|  | GDQP008031E | Military Education  | (3) |  |
| **Total** *(not excluding Physical Education, Military courses and Supplementary Courses)* | **18** |  |

**3rd Semester:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number** | **Course’s ID** | **Course Name** | **Credits** | **Prerequisite** |
|  | CAED220150E | Basic of Computer Aided Design (CAD) | 2+1 |  |
|  | MATH141801E | Calculus 3 | 3 |  |
|  |  | Social Science and Humanities (optional 1) | 2 |  |
|  | ELEN220144E | Electrical engineering | 2 |  |
|  | ACHE220850E | Analytical Chemistry | 2 |  |
|  | FMIC220350E | Food Microbiology  | 2 |  |
|  | FBIO220450E | Food Biochemistry | 2 |  |
|  | MHPP220550E | Mechanical-hydraulic-pneumatic processes and equipments | 2 |  |
|  | POCH210650E | *Practice of Organic Chemistry* | *1* |  |
|  | EHQT230337E | Academic English 3 | (3) |  |
|  | TEEN233850E | Technical English 2 | (3) |  |
|  | PHED130715E | Physical Education 3 | (3) |  |
| **Total** *(not excluding Physical Education and Supplementary Courses)* | **19** |  |

**4th Semester:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number** | **Course’s ID** | **Course Name** | **Credits** | **Prerequisite** |
|  | LLCT220514E | History of Vietnamese communist party | 2 |  |
|  | PCHE220750E | Physical Chemistry of Food | 2 |  |
|  | HETE220550E | Heat Transfer and Equipments | 2 |  |
|  | FANA221050E | Food Analysis | 2 |  |
|  | PFMI221150E | *Practice of Food Microbiology* | *2* |  |
|  | PFCB211250E | *Practice of Food Biochemistry* | *1* |  |
|  | PANC211450E | *Practice of Analytical Chemistry* | *1* |  |
|  | FSEV221350E | Sensory Evaluation of Food | 2 |  |
|  | AMME230250E | Applied Mathematics in Food Technology | 3 |  |
|  | EHQT230437E | Academic English 4 | (3) |  |
| **Total** *(not excluding Supplementary Course)* | **17** |  |

**5th Semester:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number** | **Course’s ID** | **Course Name** | **Credits** | **Prerequisite** |
| 1 | MATE220950E | Mass Transfer and Equipments | 2 |  |
| 2 | FPPD320150E | Food Process and Plant Design | 2 |  |
| 3 | MSPR320250E | Meat and Seafood Processing | 2 |  |
| 4 | TCCP320350E | Tea, Coffee and Chocolate Production  | 2 |  |
| 5 | BCPR320450E | Bakery and Confectionery Production  | 2 |  |
| 6 | FAIN320550E | *Food Additives*\*\* *(optional)* | *2* |  |
| 7 | PFSE310650E | *Practice of Sensory Evaluation of Food* | *1* |  |
| 8 | PFAN320750E | *Practice of Food Analysis* | *2* |  |
| 9 | FNUT320850E | Food Nutrition\*\* (optional) | 2 |  |
| 10 | FSAF320950E | Food Safety\*\* (optional) | 2 |  |
| **Total**  | **19** |  |

**6th Semester:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number** | **Course’s ID** | **Course Name** | **Credits** | **Prerequisite** |
|  | GELA220405E | General Laws | 2 |  |
|  | PFPM321050E | *Project of Food Processing and Machinery* | *2* |  |
|  | CEPR321150E | Cereals Processing | 2 |  |
|  | VFBP321250E | Vegetable, Fruit Processing and Beverage Production  | 2 |  |
|  | DRDP321350E | Dairy and Related Dairy Production  | 2 |  |
|  | FETE321450E | Fermentation Technology  | 2 |  |
|  | PPEF310850E | *Practice of the process and equipment in Food Technology* | *1* |  |
|  | PMSP311550E | *Practice of Meat and Seafood Processing*  | *1* |  |
|  | PTCP311650E | *Practice of Tea, Coffee and Chocolate Production*  | *1* |  |
|  | PBCP311750E | *Practice of Bakery and Confectionery Production*  | *1* |  |
| **Total**  | **16** |  |

\**This courses can be replaced by the others optional courses in “Industry Internship and Related Fields of Food Technology”*

**7th Semester:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Number** | **Course’s ID** | **Course Name** | **Credits** | **Prerequisite** |
| 1 | FPAC420150E | Food Packaging  | 2 |  |
| 2 | FRDE420250E | Food Research and Development  | 2 |  |
| 3 | FQMA410350E | *Food Quality Management\**  | *1* |  |
| 4 | ININ420450E | *Industry Internship\*\** | *2* |  |
| 5 | PCPR410550E | *Practice of Cereals Processing* | *1* |  |
| 6 | PVFP410650E | *Practice of Vegetable, Fruit Processing and Beverage Production*  | *1* |  |
| 7 | PDRP410750E | *Practice of Dairy and Related Dairy Production*  | *1* |  |
| 8 | PFTE410850E | *Practice of Fermentation Technology*  | *1* |  |
| 9 | TOFT420950E | *Topic of Food technology* | *2* |  |
| **Total**  | **13** |  |

\**This courses can be replaced by the others optional courses in “Industry Internship and Related Fields of Food Technology”*

*\*\*This course will be taken in summer (after 6th semester)*

**8th Semester:**

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| **Number** | **Course’s ID** | **Course Name** | **Credits** | **Prerequisite** |
| 1 | GRAT409150E | Graduation Thesis (Food Technology) | 09 |  |
| **Total** | **09** |  |

**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 learnerwith 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 Ostrogratskiformula, 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 learnerwith 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**

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| **Introduction to Food Technology Credits: 3** |
| *Distribution of learning time:* | ***3 (2/1/6)*** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| This course introduces the basic information of HCMC University of Technology and Education, Faculty of Chemical and Food Technology, and Department of Food Technology. This course introduces the programme of Food Technology. This course introduces the general knowledge of food technology.  |
| *Textbook:*1. Trịnh Khánh Sơn. Introduction to Food Technology (handout)
2. Nguyễn Đặng Mỹ Duyên. Introduction to Food Technology (handout)
3. Food Technology-IFT (*http://www.ift.org/knowledge-center/learn-about-food-science/what-is-food-science.aspx*)
4. FDA U.S. Food & Drug Admistration (*https://www.fda.gov/Food/default.htm*)
5. Codex Alimentarius International Food Standards (*http://www.fao.org/fao-who-codexalimentarius/about-codex/en/*)
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| **Organic Chemistry** | **Credits: 2** |
| *Distribution of learning time:* | ***2 (2* /0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| This course equips 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 supports the basic knowledge of organic chemistry as a foundation for deeper learning the fundamental courses and specific courses in Food Technology, including: Food biochemistry, Food microbiology, Food chemistry, Food processing and perseveration, Food storage, Food nutrition. This is the foundation for students to acquire basic knowledge of the natural sciences so that they can continue on higher education or further studying in different areas of science and technology. |
| *Textbook:*1. David Klein, Organic Chemistry, John Wiley & Sons Inc., 2nd edition, 2012, 1364.
2. David Klein, Student study guide & solutions manual Organic Chemistry, John Wiley & Sons Inc., 1st edition, 2012, 721.
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| **Food Chemistry** | **Credits: 2** |
| *Distribution of learning time:* | ***2 (2* /0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *Organic Chemistry* |
| *Course Description*: |  |
| Students majoring in food techonology will perceive the basic scientific principles in structures, properties, functions of food constituents, including water, protein, enzyme, carbohydrate, lipid, vitamin, mineral, aroma compounds and food additives. From which students will have a comprehensive evaluation of foods. As a concequence, they can apply their knowledge in production and preservation of foods. Firstly, students will be offered a foreword of properties and roles of water in food. Thereafter, the learners will be supplied the structures, physical and chemical properties of carbohydrate, lipid, protein and enzyme. Next, many kinds of vitamins and minerals will be will be tranfered to students, composing of the chemical and physical properties their presences in foods. Finally, some basic principles of aroma compounds and food additives will be introduced to learners. |
| *Textbook:*1. Belitz H.D., Grosch W., *Food Chemistry*, Vol 1, 2, 3 (900 pages), Berlin-New York 1999.
2. Hoàng Kim Anh, *Hóa học thực phẩm*, NXB Khoa học & Kỹ thuật, 2005.
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| **Food Microbiology** | **Credits: 2** |
| *Distribution of learning time:* | ***2 (2* /0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| This course introduces the general knowledge of microbiology. This course introduces the structure and function of cell organelles. This course introduces factors affecting the growth and survival of microorganism in foods. This course introduces the types of microorganism in raw material, food process and equipment, final product. This course introduces the advantages and disadvantages of microorganism in foods. |
| *Textbook:*1. M.R. Adams and M.O.Moss. 2005. Food Microbiology. Second Edition. Royal Society of Chemistry. UK. 2. Physics 1 lectures summary, University of Technology and Education, HCMC.
2. Nguyễn Lân Dũng (chủ biên). 2011. Vi sinh vật học. Phần 1. Thế giới vi sinh vật. Nhà xuất bản khoa học kỹ thuật
3. Nguyễn Lân 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.
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| **Food Biochemistry** | **Credits: 2** |
| *Distribution of learning time:* | ***2 (*2/0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *Food Microbiology* |
| *Course Description*: |  |
| This module provides requisite knowledge on the biosynthesis and catabolism of food components such as carbohydrates, fatty acids, 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 basic framework for further study on these biological reaction catalysts. Some chemical reactions involving these molecules with relation to processing and storage are also discussed. |
| *Textbook:*1. David L. Nelson and Michael M.Cox, Lehnigher Principles of Biochemistry – 6th Edition, W. H. Freeman and Company, New York, 2013.
2. Jeremy M. Berg et al., Biochemistry - 7th Edition, W. H. Freeman and Company, New York, 2012
3. Benjamin K. Simpson, Food Biochemistry and Food Processing, Second Edition, John Wiley & Sons, Inc., 2012.
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| **Mechanical - Hydraulic – Pneumatic process and equipments** | **Credits: 2** |
| *Distribution of learning time:* | ***2 (2* /0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *Calculus 1, 2, 3* |
| *Course Description*: |  |
| The aim of this course helps students understand, study, and apply whole knowledge of Mechanics - Hydraulic – Pneumatic processes and Mechanics - Hydraulic – Pneumatic equipment such as: * Theory of Mechanics - Hydraulic – Pneumatic; Mechanics - Hydraulic – Pneumatic equipments; Mechanics - Hydraulic – Pneumatic models;
* Theory of Hydraulic; Process of transporting liquids; Process of transporting gas;
* Liquid stirring process;
* Technique of separating gas system is not uniform

Technique of separating lipuids system is not uniform |
| *Textbook:*1. Nguyen tan Dzung, Mechanics - Hydraulic – Pneumatic – 1st Edition.2. Heldman, Food Engineering – 3rd Edition, International Series.3. Nguyen Tan Dzung., (2015). The method to determine the rate of freezing water inside freezing product, Lap Lambert Adecamic Publishing. |

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| **Heat Transfer and Equipments** | **Credits: 2** |
| *Distribution of learning time:* | ***2 (2* /0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *Calculus 1,2,3, Mechanics - Hydraulic – Pneumatic process and equipments* |
| *Course Description*: |  |
| The aim of this course helps students understand, study, and apply whole knowledge of heat transfer processes and heat transfer equipment such as: * 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
 |
| *Textbook:*1. Heldman, Food Engineering – 3rd Edition, International Series.
2. Nguyen Tan Dzung., (2015). The method to determine the rate of freezing water inside freezing product, Lap Lambert Adecamic Publishing.
3. Nguyen tan Dzung, Heat transfer – 1st Edition.
4. Nguyen Tan Dzung., (2013). Heat Transfer and Equipment, Part 1, 2 & 3. NXB ĐHQG TpHCM, năm 2013.
5. Albert Ibarz, Gustavo V. Barbosa- Canovas*, Unit Operation in Food Engineering*, CRC Press, 2003.
6. Jean-Jacques Bimbenet, Albert Duquenoy, Gilles Trystram, Dunod, Génie des procédés alimantaires, des bases aux applications, 2002, Paris.
 |
| **Practice of Organic Chemistry Credits: 1** |
| *Distribution of learning time:* | ***1 (0* */1/2)*** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *Organic Chemistry* |
| *Course Description*: |  |
| This course is an intensive introduction to the techniques of experimental organic chemistry and 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. |
| *Textbook:*1. Danald L. Pavia, A Microscale Approach to Organic Laboratory Techniques, Brooks/Cole, Cengage learning, 5th edition, 2013, 1042.
2. James W. Zubrick, The Organic Chem Lab survival manual, John Wiley & Sons, Inc, 8th edition, 2011, 374.
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| **Physical Chemistry of Food Credits: 2** |
| *Distribution of learning time:* | ***2 (*2/0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *General Chemistry for Engineers, Organic Chemistry* |
| *Course Description*: |  |
| The course equips Food Technology students with a 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. Pieter Walstra, *Physical Chemistry of Foods*, CRC Press, 2002, 832 pages.
2. Coupland, John. *An introduction to the physical chemistry of food*. Springer, 2014.
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| **Analytical chemistry of Food** | **Credits: 2** |
| *Distribution of learning time:* | ***2 (*2/0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *General Chemistry for Engineers, Organic Chemistry, Food Chemistry* |
| *Course Description*: |  |
| This course helps students review the general, definitions, 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 og 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. Douglas A. Skoog, Donald M. West, F. James Holler, Analytical Chemistry, Saunders College Publishing, United States of America, 1994.
2. John Kenkel, Analytical Chemistry for technicians, CPR Press, Taylor & Francis Group, London.
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| **Practice of Analytical Chemistry** | **Credits: 1** |
| *Distribution of learning time:* | ***1 (0/1/2)*** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *Analytical chemistry of Food* |
| *Course Description*: |  |
| This course helps students practise experiments in lab and improve practical skills such as prepare solutions, titration, and statistics. In addition, this course will review 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:*Experiment on Analytical Chemistry, Publisher of HCM National University, Ho Thi yeu Ly, 2017 |
| **Mass Transfer and Equipments Credits: 2** |
| Distribution of learning time: | **2 (2 /0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *Heat Transfer and Equipments* |
| *Course Description*: |  |
| The aim The aim of this course helps students understand, study, and apply whole knowledge of mass transfer processes and mass transfer equipment such as: * Theory of mass transfer; Mass transfer equipment; Mass transfer models;
* Absorption processes; Adsorption processes
* Extracting and dissolving processes
* Distillation processes
* Food drying processes
 |
| *Textbook:*1. R Paul Singh – Dennis R Heldman, Food Engineering – 3rd Edition, International Series.
2. Dennis R Heldman, Handbook Food Engineering – 3rd Edition
3. Nguyen tan Dzung, Mass transfer – 1st Edition, Publication University of Nation Ho Chi Minh City VietNam.
4. Nguyen Tan Dzung., (2013). Mass Transfer and Equipment, Part 1, 2 & 3. Publication University of Nation Ho Chi Minh City VietNam, năm 2013.
5. Albert Ibarz, Gustavo V. Barbosa- Canovas*, Unit Operation in Food Engineering*, CRC Press, 2003.
6. Jean-Jacques Bimbenet, Albert Duquenoy, Gilles Trystram, Dunod, Génie des procédés alimantaires, des bases aux applications, 2002, Paris.
 |
| **Food Analysis** | **Credits: 2** |
| *Distribution of learning time:* | ***2 (*2/0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *Food Chemistry, Analytical Chemistry* |
| *Course Description*: |  |
| This course is designed to provide students a clear understanding of the principles behind various methods and instruments that are commonly used in food industry and academic research labs to quantitatively analyze and characterize the main components of food, like moisture, ash, lipids, proteins, carbohydrates, vitamin, as well as physical properties of food, like colour and viscosity. |
| *Textbook:*1. Nielsen, S. Suzanne, ed. *Food analysis, 4th edition*. New York: Springer, 2010.
2. Tran Bich Lam, Food Analysis Laboratory Experiments, Ho Chi Minh City National University Publishing, 2013.
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| **Practice of Food Microbiology Credits: 2** |
| *Distribution of learning time:* | ***2 (*0/2/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *Food Microbiology* |
| *Course Description*: |  |
| This course introduces the general skills in practice of food microbiology. This course introduces how to identify the shape, size, organization and basic characteristics of micro-organism. This course introduces how to measure the quality of micro-organism in raw material and food products |
| *Textbook:*1. Harley Prescott. 2002. Laboratory Exercises in Microbiology, 5th Edition. The McGraw Hill
2. Ciira Kiiyukia. 2003. Laboratory Manual of Food Microbiology. Unido Project.
3. Trịnh Khánh Sơn. 2017. Các kỹ thuật cơ bản trong thực nghiệm Vi sinh vật học. Nhà xuất bản Đại học quốc gia TP.HCM.
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| **Practice of Biochemistry Credits: 1** |
| *Distribution of learning time:* | ***1 (0/1/2)*** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *Food Biochemistry* |
| *Course Description*: |  |
| Equip students with the basics of biological catalysis, metabolic pathways and biosynthesis in living cells in general and food materials in particular. Consider the biochemical interactions between food ingredients and the effect of these changes on food processing and preservation.Equip students with knowledge of the processes of metabolism and modification of food and food ingredients, understanding the mechanisms of metabolism and the application and proper control of the processes involved. Out in food processing and preservation |
| *Textbook:*1. Tran Bich Lam et al., *Food Biochemistry Experiment*, Ho Chi Minh National University Publisher, 2005
2. Pham Thi Tran Chau - *Biochemistry* - Vietnam Education Publisher 2011
3. Hoang Kim Anh, *Food Chemistry*, Science & Technology Publishing House, 2005
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| **Sensory Evaluation of Food** | **Credits: 2** |
| *Distribution of learning time:* | ***2 (*2/0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| This course equips learners with basic concepts and knowledge about sensory evaluation of food as well as the interaction mechanisms of odor and taste compounds to sensory cells on the senses (taste and smell). At the same time, it helps learners to approach the sensory evaluation methods such as Discrimination testing, Description testing and Affective testing. Further less, it helps learners to approach some of the data processing methods commonly used in quality assessment and product development research. |
| *Textbook:*1. Lawless H. T., Heymann H., Sensory evaluation: Principles and Practices, Springer Press, 2010.
2. Nguyen Hoang Dung, Sensory evaluation of Food: Principles and Practices, 2007, HCMC National University, 2007.
3. O’Mahony Michael, Sensory Evaluation of Food: Statistical Methods and Procedures Food Science and Technology, Marcel Dekker, Inc, 1986.
4. Morten Meilgaard, Sensory Evaluation Techniques, CRC Press, 1999.
5. 3. Mason R., Sensory Evaluation Manual, The University of Queensland, 2002.
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| **Food Process and Plant Design Credits: 2** |
| *Distribution of learning time:* | ***2 (*2/0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| This course provides students with the principles of food process and plant design which are approached as conceive – design – implement– operate (CDIO) concept. The students will be trained the knowledge on food process and food plant in order to apply for analysis, evaluation and design of a food plant and its elements. After completion of this course, they can apply the knowledge and skills for food process and plant design as well as implementation and operation of food plant. The content of this course consists of 10 chapters. This subject aims to help students be familiar with activities of project of food plant design, from conceiving a plan, designing food plant and its elements: capacity, products, source of materials, process with mass and energy balance, estimation of equipment, water supply, waste treatment, plan of plant operation and economic engineering. In order to achieve this goal, this course will focus on the combination of understanding of principles and required skills for designing a food process and plant through a project students have to carry out in groups. Besides that, this course will help the students know how to analyze and evaluate the feasibility and effectiveness of a project of food plant. In addition, this course will also enhance the creativeness and team work skills of students through conducting a design of food plant project.  |
| *Textbook:*1. Zacharias B. Maroulis and George D. Saravacos, Food Plant Economics, CRC Press, 2008, 352 pages
2. Antonio López-Gómez and Gustavo V. Barbosa-Cánovas, Food Plant Design, CRC Press, 2005, 372 pages
3. Zacharias B. Maroulis and George D. Saravacos, Food Process Design, CRC Press, 2003
4. Joseph Irudayaraj, Food Processing Operations Modeling: Design and Analysis, Marcel Dekker Inc., 2002
5. Jasim Ahmed and Mohammad Shafi ur Rahman, Handbook of Food Process Design, Wiley – Blackwell, 2012, 1470 pages
6. G. D. Saravacos and A. E. Kostaropoulos, Handbook of Food Processing Equipment, Kluwer Academic/Plenum Publishers, 2002
7. D. R. Heldman and R. W. Hartel, Principles of Food Processing, Aspen Publishers, 1998
8. Perry, R.H. and Green, D.W., Perry’s chemical engineers’ handbook, 7th ed, New York McGraw-Hill
9. 9. D.R. Heldman and D.B Lund, Handbook of Food Engineering, CRC Press, 2007
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| **Meat and Seafood Processing** | **Credits: 2** |
| *Distribution of learning time:* | ***2 (*2/0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *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. Providing the knowledge and skills for learners to understand about food and meat processing technologies. Moreover, the course also supplies the understanding about conducting, preserving and processing food products in the processing plant, evaluating the quality of products. This course will help learners to understand the role and the importance of nutrition in meat, fish and processing technology, as well as food quality control.The subject provides students with a methodological approach when learning deeply in food processing technology. At the same time, it improves the knowledge of meat processing technology and seafood processing, creating conditions for students to integrate into the international economy regarding import and export meat, shrimp and fish products. Furthermore, it could help food technology to be developed and planned in food processing plants |
| *Textbook:*1. R. A. LAWRIE, 1998. Lawrie’s meat science, Woodhead Publishing limited, 336 p.
2. H. R. CROSS, 1988. Meat science, milk science and technology, Elsevier science publishers B. V., 449 p.
3. FAO, 1991. Guidelines for slaughtering, meat cutting and further processing, 162 p.
4. A. M. PEARSON, 1996. Processed meats, Chapman & Hall, 438 p
5. Paule DURAND, 1999. Technologies des produits de charcuterie et des salaisons, Tec&Doc, 515 p
6. Nguyễn Trọng Cẩn, (2008). Technology of canned seafood and poultry. Scientific and technical publishing house
7. Nguyễn Trọng Cẩn, (2006). Seafood processing technology. Volume 1 & 2. Agricultural Publishing House
8. Lê Văn Việt Mẫn (2008). Food processing technology. Vietnam National University Ho Chi Minh City publishing house
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| **Tea, Coffee and Cocoa Production Credits: 2** |
| *Distribution of learning time:* | ***2 (*2/0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| The course provides knowledge and skills so that students can:* Production and consumption of tea, coffee and cocoa in Vietnam and in the world;
* Biochemical changes after post-harvest, storage and pre-processing; Quality control of raw materials;
* Processing of tea, coffee, and cocoa, the biochemical changes during processing of tea, coffee and cocoa
* Product quality standards and assurance.
 |
| *Textbook:*1. Wintgens Jean Nicolas (Editor). Coffee: Growing, Processing, Sustainable Production: A Guidebook for Growers, Processors, traders, and Researchers. 2nd updated edition. 2009. Wiley-VCH.A. Chakraverty, A.S. Mujumdar, H.S. Ramaswamy (editors). Handbook of Postharvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices. 1st Edition, 2003. CRC.
2. Stephen T. Beckett. 2008. The Science of Chocolate. Royal Society of Chemistry, 2nd edition.
3. Ivon Flament. Coffee Flavor Chemistry (Hardcover). 2001. Willey.
4. Chi-Tang Ho, Jen-Kun Lin, Fereidoon Shahidi. Tea and Tea Products (Nutraceutical Science and Technology): Chemistry and Health-promoting properties. 1st Edition. 2008. CRC Press
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| **Bakery and Confectionery Production Credits: 2** |
| *Distribution of learning time:* | ***2 (*2/0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *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 then covered. |
| *Textbook:*1. Duncan Manley, *Technology of biscuits, crackers and cookies*, Woodhead Publishing Limited, Cambridge England, 2000.
2. Y. H. Hui et al, *Bakery Products Science and Technology*, Blackwell Publishing, 2006.
3. W. P. Edwards, *The Science of Sugar Confectionery*, RSC Paperbacks, UK, 2000.
4. R. Lees, E. B. Jackson, *Sugar Confectionery and chocolate manufacture*, Blackie Academic & Professional, 2000.
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| **Practice of Food Sensory Evaluation Credits: 1** |
| *Distribution of learning time:* | ***1 (0/1/2)*** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| This course will help learners:• To review the basics of sensory evaluation of food;• To know how to organize and operate a Sensory Evaluation Program such as experimental design and statistics, and especially the perceptual process. |
| *Textbook:*1. Stonne H., Sidel J., Sensory Evaluation practices, Third Edition, Elsevier, 2004.
2. O’Mahony Michael, Sensory Evaluation of Food: Statistical Methods and Procedures Food Science and Technology, Marcel Dekker, Inc, 1986.
3. Morten Meilgaard, Sensory Evaluation Techniques, CRC Press, 1999.
4. Mason R., Sensory Evaluation Manual, The University of Queensland, 2002.
5. Lawless H. T., Heymann H., Sensory evaluation: Principles and Practices, Springer Press, 2010.
6. Nguyen Hoang Dung, Sensory evaluation of Food: Principles and Practices, 2007, HCMC National University, 2007.
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| **Practice of Food Analysis Credits: 2** |
| *Distribution of learning time:* | ***2 (0* */2/4)*** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| This course will equip students with methods to determine the basic components of food products such as protein, glucid and lipid of food products.Equip students with a number of techniques for processing different food samples before conducting the analysis. From there, it helps students to accumulate enough knowledge as well as practical skills for analytical methods other than enterprises.*Textbook:*S.Suzanne Nielsen. 2003. Food Analysis. 3rd edition. Kluwer Academic/Plenum Publishers**.** |
| **Food Nutrition** | **Credits: 2** |
| *Distribution of learning time:* | ***2 (*2/0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| The course examines the food nutrients and the metabolism of foods in the human body, 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 community.  |
| *Textbook:*1. Lori A. Smolin and Mary B. Grosvenor, Nutrition: science and applications, Hoboken, NJ: Wiley, 2nd edition, 2010
2. Mark Lawrence and Tony Worsley (editors), Public health nutrition: from principles to practice, Sydney: Allen & Unwin, 2007.
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| **Food Safety** | **Credits: 2** |
| *Distribution of learning time:* | ***2 (* 2/0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| This course provides students with some concepts of food hygiene and safety, food safety hazards in the process of food receipt, processing, processing and preservation. In addition, this module introduces measures to prevent and ensure food safety. |
| *Textbook:*RH. Schmidt, GE. Rodrick. *Food Safety Handbook*. John Wiley & Sons, 20031. J. McLauchlin, C. Little. *HOBBS’ Food Poisoning and Food Hygiene*. Hodder Arnold
2. J. Selamat, S. Z. Iqbal. *Food Safety-Basic Concepts, Recent Issues, and Future Challenges*. Springer, 2016
3. S. S. Deshpande. *Handbook of Food toxicology*. Marcel Dekker, 2002
4. W. Helferich, C. K. Winter. *Food toxicology*. CRC Press, 2001
5. C. Shaw. *Food Safety-The Science of Keeping Food Safe*. John Wiley & Sons, 2013
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| **Cereals Processing** | **Credits: 2** |
| *Distribution of learning time:* | ***2 (*2/0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| This module equips learners with basic knowledge about raw materials and technologies of processing food products such as rice, noodles, starch ... This course will help learners understand basic knowledge about Technological processes, product changes during processing, operation principles of machines used in the processing of food products. Based on that, learners will be able to research and develop food products to diversify the current food products. |
| *Textbook:*1. David AV Dendy PhD. *Cereals and cereal products chemistry and technology*. 2001.
2. MEng Nguyen Dang My Duyen - Food Processing Technology slide
3. Tran Minh Tam, Preservation and processing of post-harvest agricultural products, Agricultural Publishing, Hanoi 2000.
4. Hoang Van Duoc. Drying technology Science and Technology Publishing, Hanoi 1999.
5. Bui Duc Hoi. Preservation of food Hanoi Science and Technology Publishing.
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| **Vegetable, Fruit Processing and Beverage Production Credits: 2** |
| *Distribution of learning time:* | ***2 (*2/0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *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 the fruit and vegetable processing.- The processing techniques, methods on the product quality inspection and operate the processing chains to produce fruit based beverage products.  |
| *Textbook:*1. Wim Jongen. 2002. Fruit and Vegetable processing: Improving quality. Woodhead Press.
2. Philip R. Ashurst. 1998. Chemistry and Technology of Soft Drinks and Fruit Juices. Continuum International Publishing Group.
3. H. Johnson, J. Halliday. Wine Science, 2nd Edition. Academic Press.
4. C. Cantarelli, G. Lanzarini. (1989). Biotechnology Applications in Beverage Production. Elsevier Sciene Publishers Ltd.
5. Nirmal Sinha, Jiwan Sidhu, Jozsef Barta, James Wu, M.Pilar Cano. (2012) Handbook of Fruits and Fruit Processing (2nd eds). Wiley-Blackwell
6. Evranuz, E. Özgül.; Hui, Yiu H. (2016). Handbook of vegetable preservation and processing (2nd eds). CRC Press
 |
| **Dairy and Related Dairy Production** | **Credits: 2** |
| *Distribution of learning time:* | ***2 (*2/0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| Dairy and Dairy Products provides the tools for students to learn how to transform milk into high quality 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 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. |
| *Textbook:*1. Dairy Science and Technology, Pieter Walstra, Jan T.M. Wouters, and Tom J. Geurts, Second Edition, Taylor and Francis Group, 2006.
2. Engineering Aspects of Milk and Dairy Products, Jane Selia dos Reis Coimbra, Jose A Teixeira, Hoboken: Taylor and Francis. Online resource. Publication Date: 2010
3. Engineering Aspects of Milk and Dairy Products, Jane Selia dos Reis Coimbra, Jose A Teixeira, Hoboken: Taylor and Francis. Online resource. Publication Date: 2010.
 |
| **Fermentation Technology Credits: 2** |
| *Distribution of learning time:* | ***2 (*2/0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| This course introduces the general knowledge fermentation technology. This course introduces how to prepare a fermentation process in both laboratory and industrial scales. This course introduces the microbial growth kinetic in fermentation process. This course introduces typical types of fermentation. This course introduces how to apply the fermentation in food technology |
| *Textbook:*1. P.F. Stanbury, A.Whitaker and S.J. Hall. 1995. Principles of Fermentation Technology, 2nd edition. Butterworth Heinemann
2. Trịnh Khánh Sơn. 2017. Bài giảng môn học Công nghệ lên men. ĐH Sư phạm kỹ thuật TP.HCM
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| **Practice of Meat and Seafood Processing Credits: 1** |
| *Distribution of learning time:* | ***1 (0/1/2)*** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| This course equips learners with the basics of meat and fish processing. Students need to have the knowledge and skills to conduct experiments in meat and fish processing technology 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 create specific products.This subject helps student understand methodology when practicing food processing technology. Moreover, improving knowledge of meat and seafood processing technology will help students have the overview of economic market and strategies. It also provides leaners with the ability to process and produce meat, shrimp and fish products when building and planning food technology in plants. |
| *Textbook:*1. Kerry J., Kerry J., Ledward D., Meat Processing: Improving Quality, CRC Press, Boca Raton, 2002
2. Nguyen Tien Luc, PH.D. Curriculum of Meat and Seafood Processing. Vietnam National University Ho Chi Minh City publishing house, 2016
3. Nguyen Tien Luc, PH.D. Practice lecture of Meat and Seafood Processing
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| **Practice of Bakery and Confectionery Production Credits: 1** |
| *Distribution of learning time:* | ***1 (0/1/2)*** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| The target of this course is to have a more in-depth understanding of the relation between: ingredients, recipes and recipe buildup, and some variations in bakery and confectionery products. The focus of this course is mainly on the 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 day 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 be done or not. Finally, it will be interesting to compare theory and the practical results of the practice trials.  |
| *Textbook:*1. Duncan Manley, *Technology of biscuits, crackers and cookies*, Woodhead Publishing Limited, Cambridge England, 2000.
2. Y. H. Hui et al, *Bakery Products Science and Technology*, Blackwell Publishing, 2006.
3. W. P. Edwards, *The Science of Sugar Confectionery*, RSC Paperbacks, UK, 2000.
4. R. Lees, E. B. Jackson, *Sugar Confectionery and chocolate manufacture*, Blackie Academic & Professional, 2000.
5. Wheat Marketing Center, Inc, *Wheat and Flour Testing Methods – A guide to Understanding Wheat and Flour Quality*, Wheat Marketing Center, Inc, Portland, Oregon, USA, 2004.
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| **Food Packaging** | **Credits: 2** |
| *Distribution of learning time:* | ***2 (*2/0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *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 productions 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 applying to produce the packaging appropriate for the food market.
* Influences of packaging on the quality and shelf life of food products.
 |
| *Textbook:*1. G. L. Robertson (2006). Food Packaging: Principles and Practice. CRC Press, Taylor & Francis Group.
2. A.L. Brody, E. P. Strupinsky, L. R. Kline. (2001). Active Packaging for Food Applications. CRC Press
3. M. A.P.R. Cerqueira, R.N.C. Pereira, O. L. da S. Ramos; J. A. C. Teixeira and A. A. Vicente. (2016). Edible Food Packaging: Materials and Processing Technologies. CRC Press
 |
| **Food Research and Development** | **Credits: 2** |
| *Distribution of learning time:* | ***2 (*2/0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| This subject 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, devolop and research in the processing plants. Moreover, this subject helps learners have an approach, methodology when learning deeply about research and development of new products, methods of organizing and developing products. |
| *Textbook:*1. Aaron L. Brody, John B. Lord (2000), *Developing New Food Products for Changing Marketplace*, Technomic Publishing Company, Inc. Pennsylvania, USA
2. Earle M, Earle R and Anderson A. (2001), *Food Product Development,* Woodhead Publishing Limited, Cambridge England.
3. McDonal J. (2003), Course Note: *Food Product Development*, University of Queensland, Australia.
4. W. James Harper W.J., Harris R., and Litchfield J. (2002), *Food Product Development* (FST 650 Syllabus). Ohio State University
5. Hà Thanh Toàn (2002), *New Product Development Lecture, Agriculture and Applied Biology, Can Tho University*.
 |
| **Food Quality Management Credits: 2** |
| *Distribution of learning time:* | ***2 (*2/0/4)** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| This module provides the basic knowledge about food quality and methods to manage food quality; the role and importance of food quality management activities at factories. This module provides the principles and practices of food industry goodmanufacturing practices (GMPs), HACCP, and the ISO 9000 quality management system standards. |
| *Textbook:*1. Alli, Inteaz. Food quality assurance : principles and practices., 2004
2. National Advisory Committee on Microbiological Criteria for Foods. Hazard analysis and critical control pointprinciples and application guidelines. Adopted, 1997
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| **Practice of Cereals Processing Credits: 1** |
| *Distribution of learning time:* | ***1 (0/1/2)*** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| This course includes cereal practical sessions such as: starch processing, modified starch processing, pasta processing, rice noodle processing... This course will help learners understand the principles of the technological process, impact of processing on cereal products, and the operation of machines used in the cereal process |
| *Textbook:*1. Kent, N. L. Technology of cereals: an introduction for students of food science and agriculture. - 4th edited. Elsevier Science Ltd, 1994.
2. 2. Gavin Owens. Cereals processing technology. Woodhead Publishing Limited and CRC Press LLC, 2001
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| **Practice of Tea, Coffee, and Cocoa Production Credits: 1** |
| *Distribution of learning time:* | ***1 (0/1/2)*** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| Practical Tea, coffee and cocoa processing technology is based on , Tea, coffee and cocoa processing technology theory, it supports students have conditions to test the knowledges that they learned about this subject. Students have opportunities to practice on equipments to make some tea, coffee and cocoa products. Subject content includes:* Test the quality criteria of raw tea, coffee and cocoa.

 The technical brief 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, ….* Research and development of new tea, coffee and cocoa products.
 |
| *Textbook:*1. Chi – Tang Ho, Jen – Kun Lin, Fereidoon Shahidi, *Tea and Tea Products: Chemistry and Health Promoting – Properties*, CRC Press, 2009, 305 pages
2. Beckett, S., T., *Industrial Chocolate Manufacture and Use*, Blackwell Publishing, 4th Edition 2009, 688 pages. Beckett, S., T., *The Science of Chocolate, RSC publishing*, 2nd Edition, 2008, 240 pages
3. Clarke,R. J. and Vitzthum,O. J.,*Coffee – Recent Developments*, Blackwell Science, 2001.
4. Practical tea, coffee and cocoa products processing technology, Dang Thi Ngoc Dung – Ho Thi Thu Trang, Ho Chi Minh city Technology & education university, 2013.
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| **Practical Dairy and Related Dairy Production Credits: 1** |
| *Distribution of learning time:* | ***1 (0/1/2)*** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| Practical Dairy and Related Dairy Products is based on Dairy & related Dairy products theory, it supports students have conditions to test the knowledges that they learned about this subject. Students have opportunities to practice on equipments to make some Dairy products. Subject content includes:* Test the quality criteria of raw milk, dairy products.
* The Technical Brief 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,....

Research and development of processing new Dairy products |
| *Textbook:*1. Practical dairy products processing technology, Dang Thi Ngoc Dung – Ho Thi Thu Trang, Ho Chi Minh city Technology & education university, 2013.
2. Dairy Science and Technology, Pieter Walstra, Jan T.M. Wouters, and Tom J. Geurts, Second Edition, Taylor and Francis Group, 2006.
3. Engineering Aspects of Milk and Dairy Products, Jane Selia dos Reis Coimbra, Jose A Teixeira, Hoboken: Taylor and Francis. Online resource. Publication Date: 2010
4. Engineering Aspects of Milk and Dairy Products, Jane Selia dos Reis Coimbra, Jose A Teixeira, Hoboken: Taylor and Francis. Online resource. Publication Date: 2010.
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| **Practice of Fermentation Technology Credits: 1** |
| *Distribution of learning time:* | ***1 (0/1/2)*** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| This course introduces the general skills in practice of fermentation. This course introduces how to prepare a fermentation process. This course introduces how to identify and analyze the microbial growth kinetic in a fermentation process.  |
| *Textbook:*1. P.F. Stanbury, A.Whitaker and S.J. Hall. 1995. Principles of Fermentation Technology, 2nd edition. Butterworth Heinemann. 2. Ciira Kiiyukia. 2003. Laboratory Manual of Food Microbiology. Unido Project.
2. Trịnh Khánh Sơn. 2017. Bài giảng môn học Thí nghiệm Công nghệ lên men. ĐH Sư phạm kỹ thuật TP.HCM
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| **Graduation Thesis (Food Technology) Credits: 09** |
| *Distribution of learning time:* | ***9 ( 0/9/18)*** |
| *Prerequisites:*  | *None* |
| *Former subjects of condition:* | *None* |
| *Course Description*: |  |
| In this course, student must finish a scientific or technical project under the advice of a teachers. Student must use all knowledge and skill to solves the problems of project. Project must be written as a thesis and must be presented to an official evaluation committee.  |
| *Textbook:*1. All text books in Food Technology Programme
2. Scientific papers of food technology and related fields
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**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**