COLLEGE OF FISHERIES AND MARINE SCIENCES

BACHELOR OF SCIENCE IN FOOD TECHNOLOGY

OUTCOMES- BASED EDUCATION (OBE) SYLLABUS
IN
FT 10
(FOOD ENGINEERING)

Prepared by:	Reviewed By:	Approved by:	Effectivity Date:
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I. COLLEGE

Vision:

A WORLD-CLASS INSTITUTION FOR HIGHER LEARNING, RESEARCH, DEVELOPMENT AND INNOVATION IN FISHERIES, MARINE SCIENCES, MARITIME EDUCATION, AND TECHNOLOGY.

Mission

PROVIDE QUALITY EDUCATION AND RELEVANT RESEARCH AND EXTENSION TO PRODUCE GLOBALLY COMPETITIVE GRADUATES THAT CONTRIBUE TO THE SUSTAINABLE DEVELOPMENT OF RESOURCES

Core Values: **C-** Commitment **A-** Attitude **R-**Relationship **E-**Excellence

PROGRAM: Bachelor of Science in Food Technology

Institutional Outcomes:

Graduates who are conscious of their professional responsibility and of their vocational and technological competence for global competitiveness.

Program Goals:

The Bachelor of Science in Food Technology is designed to provide and in-depth understanding of the sciences and the related fields of study to enable the graduates to apply such knowledge in their respective careers. It emphasizes the processes and techniques of identifying, analyzing problems and application of relevant technologies in the development of the food industry.

PROGRAM OUTCOMES:

The minimum standards for BS Food Technology programs are expressed in the following minimum set of program outcomes:

1. Common to all programs in all types of school

a. Articulate and discuss the latest developments in their specific field of practice;
b. Effectively communicate orally and in writing using both English and Filipino languages.;
c. Work effectively and independently in multi-disciplinary and multi-cultural teams. ;
d. Act in recognition of professionals, social and ethical responsibilities;
e. Preserve and promote "*Filipino historical and culture heritage"*;(based on RA 7722)

2. Common to the discipline (Agriculture Education: BS Food Technology, BS Fisheries, BS Forestry and Doctor of Veterinary Medicine)

f. Generate and share knowledge relevant to specific fields in the study of agriculture education;
g. Formulate and implement of agricultural developments plans and programs;

3. Specific to sub-discipline

h. Demonstrate communication skills (i.e. oral and written) that lead to success in a food technology career including preparation of proposals, position papers, technical reports, communicating technical information to a non-technical audience, making formal and informal presentation;
i. Explain the functionality of different kind of food ingredients and chemical changes occurring during post-harvest handling, preparation, processing, packaging and storage, including reactions involving carbohydrates, proteins and fats.
j. Understand the international and local registration required for the manufacture, distribution and sale of food products, either fresh or processed;
k. Understand and apply the role of microorganisms in post-harvest hanling, preparation, processing and preservation, packaging and storage with respect to pathogenic, spoilage and fermentative microorganisms;
l. Understand and apply the principles of engineering as they relate to converting agricultural commodities to the finished products;
m. Understand and apply the principles and various facets of food technology, including sensory evaluation, in practical situations, problem solving and environmental sustainability.
n. Understand and apply the basic elements of sanitation and quality assurance programs to assure food safety.
o. Evaluate the microbiological, physical, chemical, sensory and functional properties of food; and
p. Create new product ideas, concepts and procedures leading to innovative food technologies.

4. Common to a horizon type as defined in CMO 46 s 2012.

For professional institutions: a service orientation in one's profession;
For colleges: an ability to participate in various types of employment, development activities and public discourses particularly in response to the needs of the communities one serves;
For universities: an ability to participate in the generation of new knowledge or in research and development projects.

COURSE SPECIFICATION

Course Number and Name	FT 10 (FOOD ENGINEERING)
Course Credits	5 units (3 units lecture ; 2 units laboratory)
Course Description	Engineering concepts and principles as applied to food processing
Contact Hours/week	9 hours (3 hours lecture ; 6 hours laboratory)
Prerequisite	CALCULUS, PHYSICS, FOOD PROCESSING I AND II

COURSE OUTCOMES	COURSE MAP																	
Upon completion of the course, the students should be able to:	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r
1. To study basic principles of engineering as applied to unit operations/process									IP	I	IP		I	IP				
2. To analyze and solve materials and energy balances for each unit operations/process									IP	I	IP		I	IP				
3. Apply the mechanical energy balance to different types of fluid system									IP	I	IP		I	IP				
4. To understand the mechanisms and able to solve problems related to heat transfer									IP	I	IP		I	IP				

Legend:
I = Introduced
P = Practice
D = Development

TIME FRAME	COURSE OUTLINE
Week 1	1. Introduction
Week 1-2	2. Review of Mathematical Principles and Applications in Food Processing
Week 3-4	3. Units and Dimensions
Week 5-8	4. Material and Energy Balance
Week 9	MIDTERM EXAMINATION
Week 10-11	5. Physical Properties of Food Materials
Week 12	6. Fluid Flow
Week 13-14	7. Heat Transfer
Week 15-16	8. Energy use in Food Processing
Week 17	9. Modelling in Food Engineering
Week18	FINAL EXAMINATION

Alignment of Course Outcomes with Summative Assessment Tasks

Course Objectives	Summative Assessment Task	Details
1. To study basic principles of engineering as applied to unit operations/process	Interactive Tasks such as Kahoots	Students are expected to do oral presentations: discussing/assimilating concepts in food Engineering. Rubric will be used.
2. To analyze and solve materials and energy balances for each unit operations/process	Synchronous Online Laboratory Activity via Google Classroom	Students are expected to learn and enhance skills in Chemistry, physics and math related to Food Industry. A rubric in laboratory procedure and performance will be used as criteria for grading
3. Apply the mechanical energy balance to different types of fluid system	Oral Presentation using MS Powerpoint via Google Classroom	Students are expected to present the collection of their laboratory activities/ experiments applying the concepts in Food Engineering.
4. To understand the mechanisms and able to solve problems related to heat transfer		A rubric will be used as criteria for grading.
	Midterm and Final Examination via Google Forms	This task is given to evaluate students' knowledge and understanding of the concepts and principles of the course content. These are given to validate the results of their practical activities.

LEARNING PLAN

Detailed Learning Outcomes (DLO)	Course Content/ Subject Matter	Textbooks/ References	Teaching and Learning Activities (TLAs)	Assessment of Tasks (ATs)	Resource Materials	Time Table
- Understand the vision, mission and goals of ZSCMST - Describe the common unit operations involved in food processing - Apply the principles of mass and energy balance to food processing systems. -	**Orientation** • Vision, Mission and goals of the college 1. Introduction - Course goals, outcomes, and requirements - Overview of the course 2. Review of Mathematical Principles and Applications in Food Processing 3. Units and Dimensions 4. Interpolation Method 5. Steam Properties	Student Handbook Engineering for Food Technologist Ernesto V. Carpio UPLB Publishing Center Institute of Food Science and Technology College of Agriculture UPLB College, Laguna ISBN 971-547-179-X Introduction to Food Engineering, Fourth Edition R. Paul Singh Dennis R. Heldman Food Science and Technology, International Series http://www.ucarecdn.com/fb7332e8-c35a-47b0-9805-051fa171f8fa/ *Unit Operations in Food Engineering* Albert Ibarz Gustavo V. Barbosas-Canovas CRC Press LLC 2003 USA	Discussion Lecture A. 1. Review lecture on Mathematics, Chemistry and thermodynamics concepts of measures and its corresponding units. 2. Illustrate derivation procedure/steps on the secondary units of measurements 3. Show how to estimate unknown values based upon other observed values of steam from the steam table through Interpolation method Exercises: • Tools of Engineering • Heat and Mass Balance Laboratory Group (by Three) Task on : 1. Measurements 2. Calibration of Thermometer Games using kahoot	A Oral/ written (ppt presentation/paper pen) 1. Correct use of units of measurements and conversion of units to other units of measurement - Assignments/ problem set using rubrics Laboratory report using rubrics	Module 1 On-line G-classroom Hand-outs	3 hours 6 hrs (1wk) 18 hrs (2 wks)

Detailed Learning Outcomes (DLO)	Course Content/ Subject Matter	Textbooks/ References	Teaching and Learning Activities (TLAs)	Assessment of Tasks (ATs)	Resource Materials	Time Table
- Apply the principles of mass and energy balance to food processing systems.	6. Material and Energy Balance -Total Material Balance -Component Material Balance - First Law of Thermodynamics - Energy Balance in Steady State System.	*Food Process Engineering and Technology*, 3rd Ed. Zeki Berk Elsevier Academic Press 2018 ISBN 978-0-12-812018-7	-Lecture and Discussion -Problem sets Laboratory Activity: 3. Mass Balance of food preparations at home 4. Sensible heat computations of foods commonly found in refrigerators at home.	- Quizzes thru Google forms - Examination thru Google Forms - Laboratory Reports, video and picture documentation of the Lab Activities at home.	Module 2 Powerpoint slides On-line G-classroom	18 hrs (2 weeks)
- Explain Newtonian and non-newtonian behavior of fluids and their relevance to food rheology principles	7. Physical Properties of Food Materials -Thermodynamic Properties -Rheological Properties		- Lecture and Discussion - Problem sets	- Quizzes thru Google forms - Examination thru Google Forms	Module 3 Powerpoint slides On-line G-classroom	18 hrs (2 weeks)
	8. Fluid Flow - Rheology - Newtonian and non-newtonian fluids - Pumps		- Lecture and Discussion - Problem sets	- Quizzes thru Google forms - Examination thru Google Forms	Module 4 Powerpoint slides On-line G-classroom	6 hrs (1 week)
- Describe the construction and operating principles of heating and cooling food processing systems.	9. Heat Transfer - Thermodynamic concepts - Conduction - Convection - Radiation - Heat Exchangers		- Lecture and Discussion - Problem sets	- Quizzes thru Google forms - Examination thru Google Forms	Module 5 Powerpoint slides On-line G-classroom	18 hrs (2 weeks)

Detailed Learning Outcomes (DLO)	Course Content/ Subject Matter	Textbooks/ References	Teaching and Learning Activities (TLAs)	Assessment of Tasks (ATs)	Resource Materials	Time Table
- Create an improvised concrete model of a bomb calorimeter - Understand the relationships, interactions and effects of different variables on the drying of foods.	10. Energy use in Food Processing -Evaporation 11. Modeling in Food Engineering		- Lecture and Discussion - Problem sets - Lecture and Discussion - Problem sets Laboratory Activity: 5. Improvising a Bomb Calorimeter at home. 6. Determination of the calorific values of different foods at home using the improvised bomb calorimeter. 7. Effects of moisture content and food thickness on the drying of foods.	8. Quizzes thru Google forms 9. Examination thru Google Forms 10. Quizzes thru Google forms 11. Examination thru Google Forms 12. Laboratory Reports, video and picture documentation of the Lab Activities at home.	Module 6 Powerpoint slides On-line G-classroom Module 7 Powerpoint slides On-line G-classroom	18 hrs (2 weeks) 18 hrs (2 weeks)

Course Requirements	Online submission of concise, cohesive and coherent technical reports using MS WORD and oral presentation on the assigned readings and one (1) results of activity in MS Powerpoint.
Rubrics for the conduct of online synchronous Lab Experiments	Observance of Good Laboratory Practices (GLP). 1-3 points. None to minimal GLP was observed. 4-6 points. Some GLP was observed, 7-9 points. The student was consistently observing GLP through the activity. Execution of the procedure. 1-3 points. The student barely followed the instructions of the activity. 4-6 points. The student followed the instructions except in few instances. 7-9 points. The student totally followed the instruction of the activity.

Grading System	40% Online Laboratory Participation, written and oral powerpoint presentation + 30% (online Quizzes/Assignments) + 30% Mid-term Exam/Final Term Exam) Final Grade = Mid-Term Grade + Final Grade /2
Classroom Policies on Data Privacy	1. Be it known to all students that the personal data gathered from you will be used solely for online classes, school documentation and record purposes only unless otherwise specified. 2. The instructor will record online meetings as proof of conducting online classes and that this will be used for documentation purposes only. 3. The instructor will take screen shots of the online meeting for school documentation purposes. 4. There will be no posting on social media any proceedings of meetings in the form of pictures or videos by the instructor and the students. 5. Tasks, projects and requirements in the form of video will be saved on Google drive. Only the link to the Google drive will be submitted to the instructor. There will be no posting of such on social media. 6. A group chat on Facebook messenger will be used as a means of communication between the instructor and the students. Be responsible enough with what you posts and how you reply. NO screenshots will be taken and uploaded on social media. 7. Essays, reflection papers, and lab report must cite the corresponding references. Be careful and be warned about plagiarism as this will be dealt according to the stipulations in the student manual. 8. Any student who submits an output that is the same as his classmate or will be caught cheating in any form will be punished and be dealt with according to the stipulations in the student manual. 9. Grades of outputs are shown and recorded in the Google classroom where students can individually see their grades. 10. No student output will be shared to other students unless these outputs are required to be reported online on class.

References:

1. Berk, Zeki. *Food Process and Engineering and Technology*, 3rd Ed. Elsevier Academic Press. 2018.
2. Carpio, E.V., *Engineering for Food Technologist*. UPLB Publishing Center. Institute of Food Science and Technology, College of Agriculture, University of the Philippines, Laguna, Philippines. 2000
3. Ibarz, A., Barbosas-Canovas, G.V., *Unit Operation in Food Engineering*. CRC Press LLC 2003. USA.
4. Singh, R.P., Heldman, D. R., *Introduction to Food Engineering*, 4th Ed. Food Science and Technology Series.