

## Subject Description Form

<b>Subject Code</b>	ABCT4747
<b>Subject Title</b>	Food Processing Technology
<b>Credit Value</b>	3
<b>Level</b>	4
<b>Pre-requisite</b>	Introduction to Chemical & Bioprocess Technology AND any one of the following subjects: Microbiology OR Food Chemistry
<b>Objectives</b>	This subject aims to present the principles upon which food preservation technology is based with emphases on heat processing, freezing, and dehydration. Innovative methods and recent developments in food processing technology will also be introduced. Various background disciplines in chemistry, microbiology, and process technology will be integrated into the study of this subject.
<b>Intended Learning Outcomes</b>	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> <li>a. gain appreciation of the fundamental principles of food spoilage, food preservation and processing, and able to assess the storage stability of food products.</li> <li>b. formulate solutions for the food industry through summarizing the advantages and criticizing the limitations of various food processing methods;</li> <li>c. reflect and contrast the recent developments and contemporary issues in food preservation and processing</li> <li>d. integrate knowledge of microbiology, chemistry, and engineering principles to solve problems in food preservation and processing.</li> </ol>
<b>Subject Synopsis/ Indicative Syllabus</b>	<p><u>Principles Underlying Food Spoilage and Food Preservation</u></p> <p>Important parameters of foods that affect their stability, causes of food spoilage; microorganisms and food spoilage; enzymatic reactions in foods; chemical changes in foods; the aim of food preservation; principles of food preservation; methods of food preservation.</p> <p><u>Thermal Processing of Foods</u></p> <p>Thermal destruction of microbial cells and bacteria spores; kinetics of microbial death; heat penetration into foods; method of determining lethality of thermal processes; thermal destruction of enzymes; mechanisms of heat transfer in food; blanching, pasteurization, and sterilization; thermal processing of foods in containers and outside containers; principle of aseptic technology; thermal destruction of nutrients and quality factors; optimization of the thermal processes for nutrient retention; thermal processing equipment and technology</p>

Chilling and Freezing of Food

Chilling of food: normal behaviour of foods stored at chilling temperatures : animal tissues, plant tissues and non-tissue food; quality loss in foods stored at chilling temperatures; temperature, relative humidity and other conditions selected for chilling storage; storage of food in chilled atmospheres of modified composition; chilling equipment.

Freezing of foods: effect of low temperature on microbial activity, enzymatic activity and rate of chemical changes; crystallization of water : nucleation, crystal growth; physical and chemical changes associated with ice formation; prefreezing treatments for major classes of natural food tissues; freezing methods and equipments; storage of frozen foods.

Dehydration and Concentration of Food

Water activity and food preservation: free and bound water in foods; water activity and sorption behaviour of foods; water activity and microbial spoilage; water activity and enzymatic reactions; effects of water activity on the chemical deterioration of foods.

Dehydration of foods : mass and heat balance in air drying; constant and falling rate period drying; psychrometric chart; analysis of drying under constant external conditions; shrinkage during drying; nutrient destruction and other deteriorative reactions occurring during drying; industrial drying processes and equipment for foods; freeze drying; reconstitutability of dried foods.

Concentration of foods: evaporation, freeze-concentration and membrane processes.

Other Methods of Food Processing

An introduction to selected topics on other methods and recent developments in food processing such as extrusion, food packaging, food irradiation, high pressure processing, ultrasound technology, and hurdle technology.

**Teaching/Learning Methodology**

Keynote lectures with guided reading will be used to cover the main theme of the subject matter. A qualitative and semi-quantitative approach is used to integrate various background disciplines of microbiology, chemistry, and engineering principles into the study of food processing. Exercises in various forms (true-or-false/multiple choice questions, discussion questions, calculations, and analysis of food production processes) will be designed to check the students' understanding of the subject matters and problem-solving abilities.

<b>Assessment Methods in Alignment with Intended Learning Outcomes</b>	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
			a	b	c	d	
	1. Assignments	10	√	√	√	√	
	2. Tests/group project	40	√	√	√	√	
	3. Examination	50	√	√	√	√	
<b>Total</b>	<b>100 %</b>						
	<p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p>Both the continuous assessment and end-of-semester examination are important elements to reflect the learning of students and their ability to apply the knowledge acquired. The continuous assessment comprises of home work assignments, quizzes and tests, It is used to assist students to learn as well as to monitor and review their progress in respect of the expected learning outcomes. The final examination is used to assess the knowledge acquired by students and their ability to apply and integrate such knowledge.</p>						
<b>Student Study Effort Expected</b>	Class contact:						
	▪ Lecture		33 Hrs.				
	▪ Tutorial		6 Hrs.				
	Other student study effort:						
	▪ Assignment/group project		20 Hrs.				
	▪ Self-study		48 Hrs.				
	Total student study effort		107 Hrs.				
<b>Reading List and References</b>	<ol style="list-style-type: none"> <li>1. Fellows, PJ, Food Processing Technology: Principles and Practices, 3<sup>rd</sup> edition, Woodhead Publishing 2009</li> <li>2. Ramaswamy, H and Marcotte, M, Food Processing: Principles and Applications, CRC Press 2006</li> </ol>						