

Subject Description Form

Subject Code	FSN4420 (ABCT4420)
Subject Title	Food Engineering and Processing II
Credit Value	3
Level	4
Pre-requisite	Food Engineering and Processing I (FSN3418 / ABCT3418)
Co-requisite	Food Engineering & Processing II Lab (FSN4421 / ABCT4421)
Exclusion	Nil
Objectives	The subject aims to equip students with the knowledge of food spoilage mechanisms, and the application of processing methods and packaging methods for preservation of food quality. The principles of chemistry, microbiology, and process technology will be integrated into the study of this subject.
Intended Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> Explain the source and variability of raw food materials and their impact on food processing operations; Define the principles of mass transfer and process operations and for separation, processing and preservation of food products; Recognize the effects of processing conditions on food product quality and describe the major food packaging methods and materials; Demonstrate improved logical thinking and problem-solving skills.
Subject Synopsis/ Indicative Syllabus	<p><u>Principles of Food Spoilage and Preservation:</u> Important parameters of foods that affect their stability; causes of food spoilage: microbial, enzymatic, and chemical changes in foods; water activity as related to microbial spoilage and stability of foods; aim, principles and methods of food preservation.</p> <p><u>Thermal Processing:</u> Heat resistance and kinetics of microbial cells and bacteria spores; Thermal-Death-Time curves; commercial sterility and 12D concept; commercial thermal processing and equipment: blanching, pasteurization, sterilization, aseptic UHT processing.</p> <p><u>Processing by Removal of Heat (Chilling and Freezing):</u> Effect of low temperature on microbial activity, enzymatic activity and rate of chemical changes; behavior of foods at chilling temperatures; nucleation and crystallization; freezing curves; calculation of chilling and freezing time; chilling and freezing equipment and operation.</p> <p><u>Dehydration:</u> Pychrometry and principles of drying; mass and heat balance in air drying; drying curves and calculation of drying rates; factors affecting drying rates; industrial food dehydration methods and equipment; freeze drying; quality and stability of dehydrated foods.</p> <p><u>Separation and Concentration:</u> The principles, processes and applications of common separation processes in the food industry, e.g. mechanical expression, centrifugation, filtration, solvent extraction, and membrane concentration; principles of mass transfer.</p> <p><u>Processing of Different Food Products:</u> Cereal products, Fruits and vegetables,</p>

	<p>Beverages; Fermented foods, Milk and dairy products; Meats and seafoods;</p> <p><u>Food Packaging</u>: Role of product packaging, Levels and functions of food packaging, Food packaging materials (paper-based, plastic, metal, glass); Specialized packaging strategies; Packaging of fresh and processed food products.</p> <p><u>Novel Food Processing/Preservation Methods</u>: Microwave- Ohmic- and Infrared-heating; Non-thermal methods: high-pressure, Ultrasound; Hurdle technology; Sustainable processing strategies.</p>					
Teaching/Learning Methodology	<p>Lectures: to introduce and explain the subject contents with Powerpoint presentations. The principles of microbiology, chemistry and physics are integrated into the study of food processing and preservation.</p> <p>Tutorials: to give further explanation and illustration of the major and relatively difficult contents, to apply the concepts and principles in problems and exercises, and to engage the students in more interactive and effective discussion of problems cases</p> <p>After class: homework assignments and exercises will be given to students.</p> <p>On-line resources: a subject web will be set up and used as a teaching aid.</p> <p>Detail answers/solution manuals are provided to the students for most of the assignments.</p>					
Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)			
			a	b	c	d
	1. Course work	50	√	√	√	√
	2. Final exam	50	√	√	√	√
	Total	100 %				
	<p>Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:</p> <p>Learning outcomes will be assessed continually through written assignments, quizzes and tests, and lab reports. The connection of these assessments to the learning outcomes will be stated explicitly to the students.</p>					
Student Study Effort Expected	Class contact:					
	▪ Lecture					26 Hrs.
	▪ Tutorial					13 Hrs.
	Other student efforts:					
	▪ Assignment					20 Hrs.
	▪ Self-study					48 Hrs.
	Total student study effort					107 Hrs.
Reading List and References	<p><u>Essential</u></p> <p>1. Fellows, PJ: Food Processing Technology: Principles and Practice (4th ed) Woodhead 2017</p> <p>2. Geankoplis CJ: Transport Processes and Separation Process Principles, Prentice Hall 2003.</p>					

Supplementary

3. Toledo RT, Singh R, Kong F: Fundamentals of Food Process Engineering, 4th ed. Springer, 2018.

4. Clark S, Jung S, Lamsal B: Food Processing-Principles and Applications (2nd Ed.) Wiley & Blackwell, 2014.