

Subject Description Form

Subject Code	FSN3415 (ABCT3415)
Subject Title	Food Analysis
Credit Value	3
Level	3
Pre-requisite	FSN3402 / ABCT3402 Food Chemistry
Co-requisite	FSN3416 / ABCT3416 Food Analysis Lab
Exclusion	None
Objectives	The subject aims to familiarize students with the principles and techniques of food analysis by using physical, chemical and biological methods. The principles of food testing and certification will be introduced. Another objective of this subject is to develop students' abilities to apply their knowledge and skills acquired to solve real-world problems associated with food analysis and the techniques involved.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: - recognize clearly the principles behind the analytical methods associated with food analysis; - be aware of the improvement in food analysis techniques with technology development; - select an appropriate analytical technique when presented with a practical problem; - demonstrate abilities in analytical, problem-solving and critical thinking.
Subject Synopsis/ Indicative Syllabus	<u>Experimental data analysis</u> Accuracy and precision, experimental errors, bias and uncertainty of Measurement. <u>Chromatographic Methods of Analysis</u> General chromatography theory; van Deemter's equation; resolution, retention time and column efficiency; principles of Thin Layer Chromatography (TLC), Gas Chromatography (GC), High Performance Liquid Chromatography (HPLC), Gel Permeation Chromatography (GPC) and Ion-Exchange Chromatography; choice of stationary and mobile phases; temperature programming; applications in food analysis. <u>Other Methods of Instrumental Analysis</u> Principles of atomic absorption and emission spectrophotometry; major components of the instruments; flame and graphite furnace atomizers; inductively-coupled plasma excitation source; interference effects; electrophoresis systems including Capillary Electrophoresis (CE); applications of instruments in food analysis. <u>Food Testing and Certification</u> Test methods and validation; quality management and laboratory accreditation; measurement uncertainty and interpretation of test results; comparability and traceability of test results and chemical metrology; principles of product certification.

	<u>Sample Preparation and Cleanup Techniques in Food Testing</u> Sampling and test portion; principles of extraction and cleanup, recovery consideration; liquid-liquid extraction, solid phase extraction and cleanup, gel permeation chromatographic cleanup, dispersive solid phase extraction. <u>Characterization of Food Properties</u> Measurement of food colour: CIE colour system; determination of food texture by rheological method; determination of moisture by Karl Fischer titration, distillation methods, and drying by moisture balance/analyzer and other heating methods. <u>Analysis of Lipids</u> Quantitative extraction and chromatographic methods in lipid analysis; iodine, saponification, acid and peroxide values; determination of total fat, saturated fat, trans-fat and cholesterol contents for food labeling. <u>Analysis of Vitamins</u> Titrimetric and colorimetric methods; fluorimetry and microbiological assay in vitamin analysis; determination of vitamin contents for nutrition labeling. <u>Analysis of Food Additives</u> Food classification, determination of preservatives, colouring matters and artificial sweeteners in food. <u>Other Techniques for Analysis of Carbohydrates, Protein and Energy</u> Use of chromatography, electrophoresis and polarimetry in carbohydrate analysis; enzyme hydrolysis in starch determination; chromatographic and electrophoretic methods in amino acids analysis; measurement of energy content of food by bomb calorimetry.
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Teaching/Learning Methodology	<u>Lectures:</u> The basic principles of various analytical methods/techniques for food analysis will be introduced in lectures. <u>Tutorials:</u> Tutorial questions will be used to help students gain a better understanding on the lecture materials. For example, questions related to the analysis of common food nutrients will be provided to students to strengthen their learning.
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Assessment Methods in Alignment with Intended Learning Outcomes	Specific assessment methods/tasks		% weighting	Intended subject learning outcomes to be assessed			
				a	b	c	d
	1. Exam		50	√	√	√	√
	2. Test		35	√	√	√	√
	3. Homework		15	√	√	√	√
	Total		100%				
	Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes: Exam and tests will be used to assess students’ understanding in various topics (e.g. instrumental and chemical techniques) in this course. These tools will also be used to assess the ability of students to analyze problems in food analysis and select appropriate analytical techniques/methods to solve the problems. Homework will be assigned to facilitate student’s comprehension of key analytical principles and techniques, and solve real-life questions. The assignment questions will be discussed during tutorials.						
Student Study Effort Required	Class contact:						
	• Lecture					26	Hrs.
	• Tutorial					12	Hrs.
	Other student study effort:						
	▪ Self study (reading textbooks, reference books, homework, reports ,etc)					86	Hrs.
Total student study effort					124	Hrs.	
Reading List and References	<u>Essential</u>						
	Nielsen, S.S. (Ed.)		Food Analysis – Food Science Texts Series (5 th ed.)		Springer 2017		
	Skoog, D.A., Holler, F.J. andCrouch, S.R.		Principles of Instrumental Analysis (7 th ed.)		Thomson 2018		
	<u>Supplementary</u>						
	Pomeranz, Y. and Meloan. C.E.		Food Analysis: Theoryand Practice (3 rd ed.)		Chapman & Hall1994		

	Multon, J.L.	Analysis of Food Constituents	Wiley-VCH 1997
	Jeon, I.J. and Ikins, W.G.	Analyzing Food for Nutrition Labelling & Hazardous Contaminants	Marcel Dekker 1995