

Subject Description Form

Subject Code	ABCT4403
Subject Title	WATER AND WASTE MANAGEMENT
Credit Value	2
Level	4
Pre-requisite	Food Analysis (ABCT3415) Food Processing I (ABCT3413)
Objectives	This subject aims to develop in students an understanding of the general principles of water and waste treatment, control and management, with special reference to food processing and the relevant legislation in Hong Kong
Intended Learning Outcomes	<p>Upon completion of the subject, students will be able to:</p> <ol style="list-style-type: none"> a. recognize the regulations on water quality as well as wastewater management and disposal; b. understand the requirements for water utilization and waste management in food and food processing; c. use appropriate methods for testing water and wastewater; d. understand solid waste disposal methods and the advantages as well as disadvantages of the methods; e. formulate and integrate processes to treat water and wastewater including food processing wastewater in order to meet the effluent discharge requirements; f. demonstrate skills in analytical and critical thinking as well as problem solving abilities.
Subject Synopsis/ Indicative Syllabus	<p><u>Introduction</u> Principles in waste management and control; role and deeds of Hong Kong Government on environmental management; policy and environmental regulations on waste management.</p> <p><u>Wastewater Management and Treatment</u> Wastewater characteristics; primary, secondary and tertiary treatments of wastewater; physical, chemical and biological treatment processes; sewage sludge production; wastewater analysis: BOD, COD, suspended solids, turbidity, etc.</p> <p><u>Water Management and Treatment</u> Water quality requirements and characteristics; conservation of water; requirements for water utilization in food and food processing; tests for water quality; principles of water treatment.</p> <p><u>Solid Waste Management</u> Sources and classification of food and municipal solid waste; waste minimization, collection, processing, anaerobic digestion, incineration and landfill; assessments of waste treatment and disposal sites; environmental quality requirement; environmental impacts of waste disposal and treatment options; waste audit.</p>

Recycling and Waste Management
 Recycling; management principles and technologies in bulk reduction and composting.

Food Wastewater Treatment:
 Case studies and current thoughts; processes for the treatment of different types of food processing wastewater; aerobic and anaerobic biological treatment processes for food processing wastewater; food wastewater treatment in Hong Kong.

Teaching/Learning Methodology

Interactive lectures and guided readings are used to facilitate communication between lecturer and students, and also to enhance students in comprehending the taught topics and key concepts. After each lecture, in-class activities (case studies and group discussion, etc.) are conducted to stimulate students' interest and promote critical and creative thinking in students' learning. Field visit is to provide students with first-hand information and experience on waste treatment. Tutorials and laboratory sessions are designed to assist students to re-think the previous learning process, and in-class exercise of problem solving to reinforce the key concepts as well as to challenge students to raise questions on the taught topics. The purpose is not only to consolidate their learned concepts but also to stimulate their further interest in the subject and to develop their professional integrity as well as social and national responsibilities. The continuous assessment is based on the performance of students, including tests, in-class learning activities, laboratory performance and reports, and field visit report. Examination is focused on critical and analytical skills as well as problem-solving abilities.

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	e	f
1. In-class problems/ Class participation	5		√		√	√	√
2. Assignments/Field visit report	8	√	√		√	√	√
3. Laboratory performance & reports	12			√			√
4. Tests	25	√	√	√	√	√	√
5. Examination	50	√	√	√	√	√	√
Total	100 %						

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Since the comprehensive examination and tests will cover material from lectures, reading in the text, assignments, field visit and laboratory, all the intended subject learning outcomes will be assessed.

Student Study Effort Expected	Class contact:	
	▪ Lecture	20 Hrs.
	▪ Tutorial, laboratory, field visit	13 Hrs.
	Other student study effort:	
	▪ Reading, studying, preparing for class etc.	30 Hrs.
	▪ Assignments, reports	15 Hrs.
	Total student study effort	78 Hrs.
Reading List and References	<p>Hammer, M.J. and Hammer, M.J., Jr. <i>Water and Wastewater Technology</i>, 7th ed. Upper Saddle River, N.J.: Pearson Prentice Hall, 2012.</p> <p>Nathanson, J.A. <i>Basic Environmental Technology: Water Supply, Waste Management & Pollution Control</i>, 5th ed. Upper Saddle River, N.J.: Pearson Prentice Hall, 2008.</p> <p>Shah, K.L. <i>Basics of Solid and Hazardous Waste Management Technology</i>. Prentice Hall, 2000.</p> <p>Hui, Y.H. <i>Handbook of Food Science, Technology, and Engineering</i>, Vol. 3. CRC Taylor & Francis, 2006.</p> <p>Sawyer, C.N., McCarty, P.L. and Parkin, G.F. <i>Chemistry for Environmental Engineering and Science</i>, 5th ed. McGraw-Hill, 2003.</p> <p>Environmental Protection Department. <i>Environment Hong Kong</i> (Current Editions). Hong Kong Government Publication.</p>	