Subject Description Form

Subject Code	ABCT3641
Subject Title	Microbiology and Toxicology
Credit Value	3
Level	3
Pre-requisite	Introductory Cell Biology and Biochemistry
Objectives	The subject is designed to enable students to understand the importance of the relationships between microorganisms and toxicology, and the role of microorganisms in the food safety and environment, with emphases on the characterization of toxicants and adverse effect of these toxicants on human health, as well as toxicity testing, quality assurance and risk assessment.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) Understand the basic background of pathogenic microorganisms including viruses, bacteria and fungi; b) Understand different virulent factors produced by different pathogenic microorganism; c) Discuss the major types of toxicants from microorganisms and the modes of their actions on human; d) Understand the basic concepts of toxicology, the types of toxicity and toxicity testing; e) Understand the quality assurance, data interpretation and risk assessment f) Recognize the common analytical, biochemical and cell-based techniques for detection of microbial toxicants.
Subject Synopsis/ Indicative Syllabus	<u>Introduction of Toxicology (4-6 hr)</u> Basic concepts of toxicology: dose-response; characteristics of exposure; evaluation of toxicity; Toxicokinetics: mechanism of absorption, distribution, metabolism and excretion (ADME); Toxicodynamics. <u>Classification of Toxins (2 hr)</u> Exposure classes: air, water, soil, domestic, occupational settings; Use classes: metals, pesticides, food additives, contaminants, natural toxins, solvents, cosmetics. <u>Types of Toxicity (2-4 hr)</u> Examples of hepatotoxicity, nephrotoxicity, neurotoxicity, reproductive toxicity and respiratory toxicity <u>Toxicity Testing and Quality Assurance (2 hr)</u> Types of toxicity test, endpoints, effects; Test guidelines and requirements <u>Data Interpretation and Risk Assessment (2-4 hr)</u> Toxicity test data interpretation; basic framework of risk assessment, international guidelines. <u>Environmental Toxicology (2 hr)</u> Basics: environmental fate and transport of chemicals; bioaccumulation; sample collection and toxicity testing methods; Data interpretation <u>Introduction of Pathogenic Microorganism (2 hr)</u> Microorganisms that post threats to human health. <u>Classification of Microorganisms (3-4 hr)</u> Classification and physical structures of pathogenic microorganisms including

virus, bacteria and fungi

Microbial infection (4 hr)
Pathogenic microorganisms that infect hosts to cause diseases

Microbial intoxication (2 hr)
Pathogenic microorganisms that cause diseases by producing toxins

Microbial toxicoinfection (2 hr)
Pathogenic microorganisms that produce spores

Techniques to detect the Microbial Toxicants (1-2 hr)
Traditional and novel techniques used to detect microbial toxicants based on DNA- and protein- based assays, as well as analytical instruments.

Teaching/Learning Methodology

The core information in different topics will be explained and presented to students in lectures. Students will be gradually guided to learn different topics and eventually the integration between different topics. Tutorials are designed to assist students to refresh the lecture contents and brain-storm to solve questions that may happen in real life.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weight	Intended subject learning outcomes to be assessed (Please tick as appropriate)				
		a	b	c	d	e
Quizzes	40	√	√	√	√	
Lecture-continuous assessment	10	√	√	√	√	√
Examination	50	√	√	√	√	√
Total	100					

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

Quizzes, lecture-continuous assessment and examination are used to evaluate how much student have learnt basic concept of pathogenic microorganisms, major types of toxins and their actions on human and principles and application of different common techniques for microbial toxicants detections.

Student Study Effort Expected

Class contact:	
▪ Lectures	26 Hrs.
▪ Tutorials	9 Hrs.
▪ Quiz	2 Hrs.
Other student study effort:	
▪ Self-study	80 Hrs.
▪ Total student study effort	117 Hrs.

Reading List and References	Sharma D.M. Microbiology. Oxford. 2013. Prescott, L.M.; Harley, J.P. and Klein, D.A. Microbiology (8th ed.) McGraw Hill 2010. Hans Marquardt; Siegfried G. Schäfer; Roger O. McClellan; Frank Welsch. Toxicology. Academic Press 1999.	