Subject Description Form

Subject Code	ABCT370
Subject Title	CHEMICAL & BIOPROCESS TECHNOLOGY
Credit Value	3
Level	3
Pre-requisite / ~~Co-requisite/~~ ~~Exclusion~~	INTRODUCTION TO CHEMICAL & BIOPROCESS TECHNOLOGY / BIOPROCESS ENGINEERING PRINCIPLES
Objectives	To introduce the general chemical & bioprocess engineering principles, with a focus on the common processes and operations in the chemical and bioprocess industry.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) understand the theoretical principles and practical considerations for design and operation of chemical and biological processes, and the engineering approaches to deriving the design equations for complex processes. b) design and predict the major process parameters in chemical, biochemical and separation processes. c) use and analyze experimental data to derive the kinetic and process parameters with simple computing techniques.
Subject Synopsis/ Indicative Syllabus	<u>Fluid Flow</u> Steady state mechanical energy balance, laminar and turbulent flow in pipes, Reynolds number, friction factor, viscosity. <u>Chemical Reactors and Bioreactors</u> Batch reactor and continuous stirred tank reactor (CSTR); fixed and fluidized beds. Batch growth (fermentation) kinetics; continuous bioreactor (chemostat); fed-batch process. <u>Bioreactor Mixing and Mass transfer</u> Agitation and mixing in stirred tanks, impellor Reynolds number and impeller power; Mass transfer concepts: molecular diffusion and convective mass transfer, convective mass transfer coefficients, gas-liquid two phase transfer, oxygen transfer in bioreactors. <u>Product Recovery and Purification</u> Evaporation, crystallization and drying; Mass transfer operations: extraction, gas absorption, fractional distillation.
Teaching/Learning Methodology	1. Lectures and tutorials. 2. Exercises, assignments and tests. 3. Questions, consultation and discussion. 4. T/L aids: power point slides, handouts, subject web, and reference books.

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	
1. Final exam	60	√	√	√			
2. Course work	40	√	√	√			
Total	100 %						

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

Student Study Effort Required

Class contact:	
▪ Lectures	28 Hrs.
▪ Tutorials	14 Hrs.
Other student study effort:	
▪ Reading and revising	56 Hrs.
▪ Exercises & assignments	32 Hrs.
Total student study effort	88 Hrs.

Reading List and References

1. Geankoplis C J: Transport Processes and Unit Operations, 4th Edition Prentice-Hall PTR 2003
2. Fogler HS, Elements of Chemical Reaction Engineering, 2nd-4th ed. 1992-2006.
3. Doran P: Bioprocess Engineering Principles, Academic Press, 1998
4. Shuler M & Kargi F: Bioprocess Engineering, Basic Concepts, Prentice Hall, 2002.