



UNIVERSITI TEKNOLOGI MARA

BMS543: BIOPROCESS TECHNOLOGY

Course Name (English)	BIOPROCESS TECHNOLOGY APPROVED
Course Code	BMS543
MQF Credit	3
Course Description	A comprehensive course dealing with microbial bioprocess derived from current industrial fermentation processes. It also includes bioresource utilization, energy from renewable resources, bioreactor types and design.
Transferable Skills	At the end of the course, student should be able to understand the fermentation bioprocess as well as technique and application of bioprocess
Teaching Methodologies	Lectures, Field Trip, Practical Classes, Journal/Article Critique, Industrial Talk
CLO	CLO1 Assemble laboratory equipment related to bioprocess technology CLO2 Explain the concepts and techniques of bioprocesses and bioreactors and their applications in biotechnology CLO3 Demonstrate entrepreneurial mind skills in providing issues in bio-based industries
Pre-Requisite Courses	No course recommendations
Topics	
1. 1.0 Overview of Microbial Bioprocess 1.1) 1.1 Introduction to terms/definition in Microbial Bioprocess. 1.2) 1.2 Outline of an Integrated microbial bioprocess with industrial products Involved in Bioprocess	
2. 2.0 Upstream 1: Strain Development 2.1) 2.1 Screening and isolation of microbes for industrial desire products 2.2) 2.2 Inoculum preparation 2.3) 2.3 Strain improvement (mutation, recombinant technique and etc)	
3. 3.0 Upstream II : Preservation of Microorganism 3.1) 3.1 Storage at Low Temperature on Agar Slants and Liquid Nitrogen 3.2) 3.2 Storage in Dehydrated Form – Dried Culture	
4. 4.0 Upstream III: Media Design 4.1) 4.1 Medium Requirement for Fermentation Processes 4.2) 4.2 Media formulation for Optimal Growth and Product Formation 4.3) 4.3 Media Design and Usage of Various Commercial Medium for Industrial Fermentation	
5. 5.0 Fermentation I: Fermenter Design and Operation 5.1) 5.1 General Requirements of Fermentation Processes 5.2) 5.2 Basic Design and Construction of Fermentation and Ancillaries 5.3) 5.3 Main Parameters to be Monitored and Controlled in Fermentation Process	
6. 6.0 Fermentation II: Modes of Fermentation Operation and Their Application 6.1) 6.1 Close System 6.2) 6.2 Open System 6.3) 6.3 Growth Kinetics and Product yield 6.4) 6.4 Types of fermentation process (surface, submerge, batch, continuous)	
7. 7.0 Downstream : Microbial Product separation 7.1) 7.1 Froth Floatation 7.2) 7.2 Sedimentation 7.3) 7.3 Centrifugation 7.4) 7.4 Precipitation 7.5) 7.5 Filtration	

8. 8.0 Case studies

8.1) 8.1 Article Review

8.2) 8.2 Presentation : Poster and Prototype

Assessment Breakdown	%
Continuous Assessment	50.00%
Final Assessment	50.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	students need to discuss, present and provide a prototype of the product based on the case studies on any related topic from selected research article	20%	CLO3
	Practical	the report is based on the practical video presentation.	20%	CLO1
	Test	test 1	10%	CLO2

Reading List	Recommended Text	<ul style="list-style-type: none"> • Rastogi S.C. 2009, <i>Biotechnology Principles and Applications.</i>, 1st Ed., 1,2,3,4,5,6, Alpha Science International Ltd. New York, USA [ISBN: 978184265370] • J. Reynolds Green 2014, <i>The Soluble Ferments and Fermentation.</i>, 1st Ed., 1,2,3, Cambridge University Press [ISBN: 978110767395] • Robert W. Hutkins 2006, <i>Microbiology and Technology of Fermented Foods</i>, 22 Ed., 2,3,4, Wiley-Blackwell [ISBN: 9780813800189]
	Reference Book Resources	<ul style="list-style-type: none"> • BIOTOL 1992, <i>Bioreactor design and product yield</i>, 1st Ed., 1,2,3, Butterworth-Heinemann [ISBN: 978075061509] • Murray Moo-Young, <i>Comprehensive Biotechnology</i>, 2nd Ed., volume 2, Elsevier [ISBN: 9780444533524]
Article/Paper List	This Course does not have any article/paper resources	
Other References	<ul style="list-style-type: none"> • cd-rom Open Universiteit (Heerlen, Netherlands), Thames Polytechnic 2007, <i>Bioreactor design and product yield</i>, Butterworth-Heinemann,, michigan, u.s.a 	