



UNIVERSITI TEKNOLOGI MARA

BMS423: MICROBIAL PROCESSES

Course Name (English)	MICROBIAL PROCESSES APPROVED
Course Code	BMS423
MQF Credit	3
Course Description	A comprehensive course dealing with microbial products derived from current industrial fermentation processes. It also includes bioresource utilization, energy from renewable resources, bioreactor types and design.
Transferable Skills	1. Inoculum / Starter Culture Preparation 2. Media formulation and sterilization 3. Shake flask experiments 4. Measurement of Cells Growth 5. Measurement of Cells Production Like Ethanol and Organic Acids
Teaching Methodologies	Lectures, Blended Learning, Field Trip, Practical Classes, Presentation, Journal/Article Critique
CLO	CLO1 Describe concepts related to microbial processes involved in fermentation technology: including microbial growth kinetics, process development and culture maintenance (P01-C2) CLO2 Discuss how microbial processes are used to produce microbial products or microbial activities of commercial value (P03-C3) CLO3 Apply knowledge in microbial fermentation technology to plan the production of a microbial product at laboratory scale (P03-C3) CLO4 Work in teams to plan and conduct scientific investigations in areas of microbial fermentation technology (PO2-C4, PO7)
Pre-Requisite Courses	No course recommendations
Topics	
1. 1.0 Overview on Microbial Processes and Products 1.1) 1.1 Introduction of Biotechnology products by microbial processes (example (example 1.2) Example : cell biomass, solvent, organic acids, enzyme, pharmaceutical protein and etc 1.3) 1.2 Type of microbial processes 1.4) i) Liquid state 1.5) ii) Solid state 1.6) 1.3 Condition of microbial process 1.7) i) Anaerobic 1.8) ii) Aerobic	
2. 2.0 Isolation and Development of strain 2.1) 2.1 Screening and isolation program for industrial strain for production of target product 2.2) 2.2 Strain improvement by microbial approach such as: 2.3) i) Mutation technique 2.4) ii) Recombinant technique etc	
3. 3.0 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 Inoculum/ Starter Culture Development 4.1) 4.1 Microorganism preparation 4.2) i) type of microorganism 4.3) ii) size of inoculum 4.4) iii) inoculum procedure	

5. 5.0 Different modes of cultivation

- 5.1) 5.1 Close system
- 5.2) i) Types of bioreactor
- 5.3) ii) Kinetics in close system
- 5.4) 5.2 Open system
- 5.5) i) Fed batch culture
- 5.6) ii) Continuous batch culture

6. 6.0 Microbial Products

- 6.1) 6.1 Methods of product separation from culture medium
- 6.2) 6.2 Types of products

Assessment Breakdown	%
Continuous Assessment	50.00%
Final Assessment	50.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	Case Studies / Journal	10%	CLO1 , CLO2 , CLO3
	Group Project	Mini Project	10%	CLO3 , CLO4
	Test	2 tests	20%	CLO1 , CLO2 , CLO3
	Written Report	Industrial Visit report	10%	CLO1 , CLO2 , CLO3

Reading List	Recommended Text
	<ul style="list-style-type: none"> • Joseph R.G 2011, <i>The Soluble Ferments and Fermentation</i>, 2010-01-12. Ed., Nabu Press [ISBN: 1142302962] • Robert W. Hutkins 2006, <i>Microbiology and Technology of Fermented Foods</i>, Wiley-Blackwell [ISBN: 9780813800189] • S. C. Rastogi 2007, <i>Biotechnology</i>, Alpha Science International Limited [ISBN: 9781842653708]

Article/Paper List	Reference Article/Paper Resources
	<ul style="list-style-type: none"> • Antonio Iglesias 1, Ananias Pascoal 2, Altino Branco Choupina 2, Carlos Alfredo Carvalho 3, Xesús Feás 4,* and Leticia M. Estevinho 2014, Developments in the Fermentation Process and Quality Improvement Strategies for Mead Production, <i>molecules</i>, 19, 12577 [ISSN: 1420-3049] • Patrick MF Derkx*, Thomas Janzen, Kim I Sørensen, Jeffrey E Christensen, Birgitte Stuer-Lauridsen, Eric Johansen 2014, The art of strain improvement of industrial lactic acid bacteria without the use of recombinant DNA technology, <i>Microbial Cell Factories</i> 2014, 13, 13 http://www.microbialcellfactories.com/content/13/S1/S5

Other References	This Course does not have any other resources