

Branch Name:	B.Sc. Microbiology
Program Code:	SC102
Course Name:	Microbial Processes and Technology
Course Code:	2SC1020602
Pre-requisite Course:	Basics of Fermentation

Course Objective:

1. To understand Microbial processes and production
2. To understand Fermentation processes
3. To understand Biosensors
4. To understand Fermentation economics

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
3	--	--	3	70	30	--	--	100

Subject Contents:

Unit	Content	Lectures	Weightage
1	• Mushroom cultivation • Microbial processes in industry:-bioleaching and MEOR • Microbial processes in agriculture: bio insecticide and bio-fertilizer • Microbial production Bioplastic • Microbial production of biofuels	13	28%
2	• An overview of solid state fermentation, • Fermentation processes of Enzyme (Amylase, Protease) • Fermentation processes of alcohol, organic acids (Gluconic acid / Citric acid) • Fermentation processes of amino acids (Lysine), vitamins (Vit. B12) • Fermentation processes of antibiotics (penicillin, Streptomycin) • Fermentation processes of Microbial Biomass (SCP, SCO)	13	28%
3	• CONTROL PARAMETERS & ECONOMICS Control systems manual and automatic, combined method, requirement for control, Recent trends in fermentation control • Biosensors: Principles and definition, characteristics of Ideal biosensors, Basic measuring procedure, Biochemical components of biosensors: Enzyme based biocatalyst sensors, Bioaffinity systems, Immunosensors • Application of Biosensors: Clinical laboratory, In vivo determination of metabolites, Environmental monitoring of toxic compound. • Fermentation economics: Fermentation economics for isolation , strain improvement, media design, sterilization , aeration and agitation and effluent treatments	19	44%

	• Immobilization: Basic concept of immobilization in biotechnology, Principles and mechanism of Immobilization, Methods of Immobilization with examples		
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Text books:

1. Casida LE. (1991). Industrial Microbiology. 1st edition. Wiley Eastern Limited.
2. Stanbury PF, Whitaker A and Hall SJ. (2006). Principles of Fermentation Technology. 2nd edition, Elsevier Science Ltd.

Reference Books:

1. Patel AH. (1996). Industrial Microbiology .1st Edition. MacMillan India Limited Publishing Company Ltd. New Delhi, India
2. Tortora GJ, Funke BR, and Case CL. (2008). Microbiology: An introduction.9th Edition. Pearson Education
3. Biotechnology –The Biological Principles, M.D.Trevaan ,S.Boffey,K H Goulding, P Stanbury
4. Mukhopadhyay, Process Biotechnology Fundamental. Viva book.
5. Shuler and Kargi, 1992. Bioprocess engineering, Prentice-Hall.
6. Bialy & Ollis.1986. Biochemical Eng. Fundaments. McGraw-Hill.
7. Schugerl. 1987. Bioreaction engineering, J/W.
8. Stanbury and Whitaker. Principles of fermentation technology.
9. Sikyta. Methods in Industrial microbiology. Ellis Hardwood Ltd.
10. Krysman. Product recovery in bioprocess technology.
11. T.K. Ghose. Bioprocess computation in biotechnology, Ellis Hardwood Ltd.
12. MurryJoh. 1997. Microorganisms and Biotechnology.
13. Demainefal. (ED) 1999. Manual of industrial Microbiology and Biotechnology. Asin Press.
14. Bioprocess Engineering Principles by Doran (D); Academic Press, 1998.
15. Cooney, A.E. Humphrey, Comprehensive Biotechnology : The principles and Regulation of
16. Biotechnology in Industry, Agriculture and Medicine. Vol.2, Pergamon Press, 1985.
17. Edition. Panima Publishing Company, New DelhiWilley JM, Sherwood LM AND Woolverton CJ (2013)
18. Prescott, Harley and Klein's Microbiology.9th Edition. McGraw Hill Higher education Adams MR and Moss MO. (1995). Food Microbiology. 4th edition, New Age International (P) Limited Publishers, New Delhi, India.

List of Open Source Software/learning website:

1. <https://www.youtube.com/watch?v=HNOcQKwW5ks>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	To describe and Microbial processes for sustainable development	1 Remembering 2 Understanding
CLO2	To explain and discuss various Fermentation processes	1 Remembering 2 Understanding 3 Applying 4 Analyze
CLO3	To list types of Biosensors and understand its mechanism and structure, so the it will help to design	1 Remembering 2 Understanding 3 Applying 4 Analyze 5 Evaluate
CLO4	To be able discuss various methods of Immobilization and its commercial applications.	1 Remembering 2 Understanding 3 Applying
CLO5	To understand and study the control parameters & economics control systems in fermentation.	1 Remembering 2 Understanding 3 Applying

CLO6	To identify and understand Fermentation economics so as to evaluate and design cost effective processes	1 Remembering 2 Understanding 3 Applying 4 Analyze 5 Evaluate 6 Create
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Mapping of CLOs with Pos& PSOs

Course Learning Outcomes	Program Outcomes (POs)									Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3
CLO1	M	M				M		M				
CLO2	H	H	M		M			L	M			
CLO3	M	M	H					M	M		M	
CLO4	M				M				H	M		
CLO5	M		H		M					H		
CLO6				H		M	H		H		H	M

L= Low M= Medium H= High