

Branch Name:	B.Sc. Biotechnology
Program Code:	SC101
Course Name:	Industrial Biotechnology
Course Code:	2SC1010601
Pre-requisite Course:	

Course Objectives:

1. The course is designed to acquire basic knowledge of industrial Biotechnology from all aspects.
2. This will enable the student to understand basics of strain improvement. It will also help in acquiring knowledge on artificial media preparation.
3. This course is designed to enable students in understanding the basics and applications of optimization.
4. Enabling the students to know and understand the basics, techniques and the applications of downstream processing.
5. Understanding the design of bioreactor.

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:

Sr. No	Topic	Total Hours	Weightage (%)
1	Range of fermentation processes. Growth kinetics: Batch and continuous culture (chemostat and turbidostat) Isolation & screening (Primary & Secondary) Preservation techniques Strain Improvement: Induced mutants for primary and secondary metabolites, Application of r-DNA technology for strain improvement	17	35%
2	Raw materials used in fermentation media and criteria for selection. Sterilization of Media & Air Inoculum Development: Typical Inoculum Development program, Inoculum development for Bacteria, Yeast and Fungal processes.	10	28%
3	Design of fermentor: Design of ideal STR and various auxillary parts(aeration, agitation, valves and body construction) Types of fermenters: Tower, Air lift Downstream processing: Removal of Solid & Microbial Cells and other solid Matter, Foam separation, Precipitation, Filtration and Centrifugation, Cell disruption Concentration of extracted product: Liquid-Liquid extraction, Distillation, Purification products: Chromatography, Membrane proesses and ultra filtration Drying-Crystalization	18	37%

Text Books: Casida LE. (1991). Industrial Microbiology.1st edition.Wiley Eastern Limited.

Stanbury PF, Whitaker A and Hall SJ.(2006). Principles of Fermentation Technology. 2nd edition, Elsevier Science Ltd.

Reference Books:

Patel AH. (1996). Industrial Microbiology .1st Edition. MacMillan India Limited Publishing Company Ltd. New Delhi, India

Tortora GJ, Funke BR, and Case CL. (2008). Microbiology: An introduction.9th Edition. Pearson Education

Frazier WC and Westhoff DC. (1992). Food Microbiology.3rd edition. Tata McGraw-Hill Publishing Company Ltd, New Delhi, India.

List of Open Source Software/learning website: <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	It will enable the knowledge of the basic concepts of isolation and improvement of microbes.	6 Creating, 2 Understanding
CLO2	Discuss the basic design of fermenter.	2 Understanding
CLO3	Students will have knowledge of purification of microbial products.	3 Applying, 2 Understanding
CLO4	Evaluate and compare different inoculums development processes.	5, 4 Evaluate, Analyze
CLO5	List the types of fermentors.	1 Remembering
CLO6	List out and understand the mechanisms of preservations.	1 Remembering, 2 Understanding

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	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	M	H		M	L	M	H	L		H	L	H	L	M	
CLO2		H		H	M	H	M	H	L		M	L	L	L	H
CLO3	L	M	H		L		M		L	M		H	H	M	
CLO4	H	L	M	M	L		M	M	H			L		M	L
CLO5	M	L	M	L	H	M	M		M	M		M	M		L
CLO6	H	L	L		M	L		M	L	L	M	M			M

H:High, M:Medium, L:Low