

Branch Name:	B.Sc. Biotechnology
ProgramCode:	SC101
CourseName:	Bioprocess and Biochemical Engineering
CourseCode:	2SC1010602
Pre-requisiteCourse:	

Course Objectives:

1. The course is designed to acquire basic knowledge of food fermentation.
2. This will enable the student to understand basics of immobilization technique and its applications.
3. Enabling the students to know and understand the basics, techniques and the applications of typical fermentations.

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	Solid state fermentation: Application Mushroom cultivation Bioassay of Growth inhibiting and Growth Promoting substances Introduction to Fermented foods & beverages; pickles, sauerkraut, silage, sausages, bread and Indian fermented foods, Production of beer, red & white wine, sparkling wine (champagne) Fermented dairy product: Cheese Production, cheese—types Other fermented dairy products: yogurt, cultured buttermilk, acidophilus milk, kafil and cultured sour cream	15	33
2	Fermentation processes of Enzyme (Amylase) Fermentation processes of alcohol, organic acids (Citric acid) Fermentation processes of amino acids (Lysine), vitamins (Vit. B12) Fermentation processes of antibiotics (penicillin) Fermentation processes of Microbial Biomass (SCP, SCO)	14	33
3	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 Immobilization: Basic concept of immobilization in biotechnology, Principles and mechanism of Immobilization, Methods of Immobilization with examples	16	34

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
- Biotechnology –The Biological Principles, M.D.Treva n ,S.Boffey,K H Goulding, P Stanbury Cooney, A.E. Humphrey, Comprehensive Biotechnology : The principles and Regulation of Banwart JM. (1987). Basic Food Microbiology.1st edition.CBS Publishers and Distributors, Delhi, India.
- 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	Discuss the solid state fermentation.	2 Understanding
CLO2	List the applications of food fermentation.	1 Remembering
CLO3	Acquire fundamentals and translate the knowledge that will enable them for biosensor-based research.	2 Understanding,
CLO4	Learn basic techniques to identify and interpret typical fermentations.	3 Applying, 2 Understanding
CLO5	Learn about immobilization, evaluate mechanisms associated with them, identify and compare the advantage and disadvantages of it.	5,3, 4 Evaluate, Applying, Analyze
CLO6	Develop the mechanisms involved in food fermentations.	6 Creating

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	H	L	H	M		M	L	L		L	L	H	M	M	L
CLO2	M	H		H	M	H	M	H	L		M	L	L	M	
CLO3		M	H		M	M	M		L	M		H	H		M
CLO4	H	H	M	M			H	M	H			L		M	L
CLO5	M	L	M	L	H	M	M		M	M		M	M	L	M
CLO6	M	L	M		M	L		M	L	L	M	M	L		L

H:High, M:Medium, L:Low