

INSTITUTE	FACULTY OF SCIENCE
PROGRAM	BACHELOR OF SCIENCE (MICROBIOLOGY)
SEMESTER	5
COURSE TITLE	MICROBIAL BIOTECHNOLOGY
COURSE CODE	02MB0308
COURSE CREDITS	4

Objective:

- 1 To explore microbial biotechnology applications in therapeutics, industry, biotransformations, bioenergy, and environmental sustainability.

Course Outcomes: After completion of this course, student will be able to:

- 1 Utilize microbial biotechnology for advancements in healthcare, agriculture, and food technology.
- 2 Explore recombinant microbial production processes for pharmaceuticals, bio-polymers, and biosensors.
- 3 Perform microbial biotransformations for the production of steroids, bioactive compounds, and industrial enzymes.
- 4 Examine microbial contributions to bioenergy production and bioremediation for environmental sustainability.

Pre-requisite of course:NA

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
4	0	0	50	30	20	0	0

Contents : Unit	Topics	Contact Hours
1	Microbial Biotechnology and its Applications Microbial biotechnology: Scope and its applications in human therapeutics, agriculture (Biofertilizers, PGPR, Mycorrhizae), environmental, and food technology. Use of prokaryotic and eukaryotic microorganisms in biotechnological applications. Genetically engineered microbes for industrial application: Bacteria and yeast.	15
2	Therapeutic and Industrial Biotechnology Recombinant microbial production processes in pharmaceutical industries - Streptokinase, recombinant vaccines (Hepatitis B vaccine), Microbial polysaccharides and polyesters, Microbial production of bio-pesticides, bioplastics, Microbial biosensors	15

Contents : Unit	Topics	Contact Hours
3	Applications of Microbes in Biotransformations Microbial based transformation of steroids and sterols, Bio-catalytic processes and their industrial applications: Production of high fructose syrup and production of cocoa butter substitute. Microbial bioactive compounds and flavor enhancers.	15
4	Microbes for Bio-energy and Environment Bio-ethanol and bio-diesel production: commercial production from lignocellulosic waste and algal biomass, Biogas production: Methane and hydrogen production using microbial culture. Microorganisms in bioremediation: Degradation of xenobiotics, mineral recovery, removal of heavy metals from aqueous effluents	15
Total Hours		60

Textbook :

- 1 Food Processing and preservations, B. Sivankar, PHI, 2004
- 2 Food Microorganisms, Dr. H. A. Modi, Aavishkar Publishers and Distributors, 2008
- 3 Microbiology: An Introduction , Gerard J Tortora, Berdell R Funke, Christine L Case , Benjamin- Cummings Publishing Company, 2008
- 4 Food Microbiology, Frazier W C and Westhoff D C , McGraw-Hill Book , 1988
- 5 Introduction to Soil Microbiology, Alexander M, Wiley Eastern Ltd, 1977

References:

- 1 Principles of Microbiology , Principles of Microbiology , R.M. Atlas , Mosby publishers, 1995
- 2 Brock Biology of Microorganisms , Brock Biology of Microorganisms , MICHAEL T. MADIGAN, JOHN M. MARTINKO, Prentice Hall, 2006
- 3 Fundamentals of the fungi , Fundamentals of the fungi , Elizabeth Moore, Benjamin Cummings, 1996

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
5.00	10.00	30.00	30.00	20.00	5.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the class-room in the form of attendance, assignments, verbal interactions etc.
- 3 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory

Supplementary Resources:

- 1 <https://www.youtube.com/playlist?list=PLpH3PurrXAyy8PN4dAZ4itD13s-RXckqC>