

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF MICROBIOLOGY

COURSE CURRICULUM

PART – A: Introduction	
Program: Bachelor in Life Science (Diploma/Degree/Honors)	Semester - IV
1 Course Code	MBSE-02 T
2 Course Title	Industrial Microbiology
3 Course Type	Discipline Specific Elective (DSE)
4 Prerequisite (If Any)	As per Program
5 Course Learning Outcomes (CLO)	<p>At the end of this course, the students will be able to –</p> <ul style="list-style-type: none"> ➤ define the role of microorganism in industry ➤ explain the processing of the best microbial strains for the industry ➤ outline the fundamentals of fermenters and fermentation processes ➤ relate metabolic pathways for industrial products ➤ identify the production of various industrially important products
6 Credit Value	03 Credits Credit = 15 Hours - Learning & Observation
7 Total Marks	Max. Marks: 100 Minimum Passing marks: 40

PART – B: Content of the Course

Total No. of Teaching-Learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	<p>Multidisciplinary nature of Industrial microbiology: Introduction, brief History, ancient Indian perspective, important characteristics of industrially useful microorganisms.</p> <p>Upstream and Down-stream processing: Detection and assay of the product, Recovery and Purification, storage and packaging methods.</p>	12
II	<p>Scale up, Screening and Strain Development Strategies: Industrial sterilization, Isolation. preservation and maintenance of industrial strains. Production Media and Raw materials, Fermenter design. Types of fermentation: Aerobic and anaerobic Batch, fed-batch and Continuous fermentation.</p>	11
III	<p>Metabolic pathways: Industrial production of citric acid, acetic acid, Lactic acid, Glutamic acid.</p> <p>Vaccines and Hormones: Hepatitis vaccine, Rabies vaccine, insulin.</p>	11
IV	<p>Production of industrial fermentation products: Fermented food and beverages, Ethanol, Amylases, Penicillin, Single Cell Protein, Biofertilizers and Biopesticides</p>	11
Key Words	Scale up, Fermenter, Fermentation, Downstream processing, Metabolic pathways, Fermented food	

Name and Signature of Convener and Members of CBoS

Laadhane
10.6.24

Sumi
10.6.24

Rashmi
10.6.24

Dr. D. D. D.
10.6.24

Dr. D. D. D.

Dr. D. D. D.

Dr. D. D. D.
10.6.24

Dr. D. D. D.
10.6.24

Dr. D. D. D.
10.6.24

Dr. Nelson
10.6.24

Part – C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

1. Industrial Microbiology: Patel A. H. (1996). I edition, MacMillan India Limited publishing company Ltd New Delhi, India.
2. A Text Book of Microbiology: R. C. Dubey & D. K. Maheshwari
3. Industrial Microbiology by Prescott & Dunns, AVI Publishing Company Inc.
4. Biotechnology; V. Kumaresan, Saras Publications

Reference Books:

1. Modern Industrial Microbiology and Biotechnology: Okafor N. (2007).1st edition. Bios Scientific Publishers Limited. USA.
2. Industrial Microbiology: Casida LE, New age International (P) Ltd.

Online Resources – e-Resources/ e-Books and e- learning portals

- <https://bookarchive.net/pdf/industrial-microbiology-by-i-e-casida-jr/>
- <http://foodhaccp.com/foodsafetymicro/onlineindex.html>
- https://sist.sathyabama@ac.in/sist_coursematerial/uploads/SMB2203.pdf
- <http://www.cpe.rutgers.edu/courses/current/If0401wa.html>
- <https://www.classcentral.com/course/swayam-food-microbiology-and-food-safety-17609>

Part – D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz – (2):	20+20	Better marks out of the two Test/ Quiz + obtained marks in Assignment shall be considered against 30 Marks
	Assignment/ Seminar –	10	
	Total Marks –	30	

End Semester Exam (ESE):	Two Section – A & B
	Section A: Q1. Objective 10 X 1 = 10 Mark; Q2. Short answer type – 5X4= 20 Marks
	Section B: Descriptive answer type qts., 1 out of 2 from each unit – 4X10 = 40 Marks

Name and Signature of Convener and Members of CBoS

[Handwritten signatures and dates]

10/6/24
10.6.24
Rashmi
10.6.24
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10.6.24
Dr. Nelson Ness

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DEPARTMENT OF MICROBIOLOGY

COURSE CURRICULUM

PART – A: Introduction		
Program: Bachelor in Life Science (Diploma/Degree/Honors)	Semester IV	Session: 2024-25
1	Course Code	MBSE-02 P
2	Course Title	Lab. Course - MBSE-02
3	Course Type	Laboratory course
4	Prerequisite (If Any)	As per Program
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to – <ul style="list-style-type: none"> ➤ recall Laboratory discipline, instrumentation and techniques involved in industrial microbiology ➤ develop skill to culture and identify industrially important microbes ➤ relate about design of Fermenter ➤ experiment with the whole steps of Fermentation
6	Credit Value	1 Credit <i>Credit = 30 Hours. Laboratory or Field learning/ Training</i>
7	Total Marks	Max. Marks: 50 Min. Passing marks: 20
PART – B: Content of the Course		
Total No. of learning-Training/ Performance Periods: 30 Periods (30 Hours)		
Module	Topics (Course contents)	No. of Period
Lab./ Field Training/ Experiment contents of Course	<ol style="list-style-type: none"> 1. Study of Bioreactor used in large scale production. 2. Isolation and characterization of Industrial microorganisms. 3. Isolation of antibiotic producing microorganisms from soil. 4. Demonstration of production of Amylase/ Protease/ Cellulase by microorganisms. 5. Demonstration of Production of lipase by microorganisms. 6. Production of ethanol by Yeast. 7. Production of Citric acid by <i>Aspergillus niger</i>. 	30
Key Words	Fermenter, Bioreactor, Industrial Microorganisms, Production, Preservation techniques	
PART – C: Learning Resources		
Text Books, Reference Books and Others		
Text Books Recommended:		
<ol style="list-style-type: none"> 1. Practical Microbiology: Dubey, R.C. and Maheshwari. D.K. 2012., S. Chand & Company, Pvt. Ltd. 2. Experiments in Microbiology, Pathology and Tissue Culture: Aneja, K.R. 1993., Vishwa Prakashan. 		
Online Resources:		
<ul style="list-style-type: none"> • http://www.onlinelabs.in • http://www.vlab.co.in • http://asm.org/articles/2020/december/virtual-resources-to-teach-microiology-techniques • http://www.vlab.amrita.edu 		
PART – D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks: 50 Marks		
Continuous Internal Assessment (CIA): 15 Marks		
End Semester Exam (ESE): 35 Marks		
Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test/ Quiz – (2): 10 & 10 Assignment/ Seminar + Attendance: 05 Total Marks: 15	Better Marks out of the two Test/ Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	Laboratory/ Field Skill Performance: On spot Assessment A. Performed the Task based on lab. work – 20 Marks B. Spotting based on tools & technology (written) - 10 Marks C. Viva-voce (based on principle/ technology) – 05 Marks	Managed by course teacher as per lab. status

Name and Signature of Convener and Members of CBoS

Signatures: [Convener], [Member 1], [Member 2], [Member 3], [Member 4], [Member 5], [Member 6], [Member 7]

 Dates: 10/6/24, 10.6.24, 10.6.24, 10.6.24, 10/6/24, 10.6.24, 10.6.24