Faculty of Science

Bachelor of Science (B.Sc.)

SUBJECT: B.SC. INDUSTRIAL MICROBIOLOGY

B.Sc. II Semester

Paper- Minor 2

Microbes in Environment and Health

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	To have knowledge of development of Industrial Microbiology.	U, K
CO 2	To understand role and scope of Industrial Microbiology for human welfare	U

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	3	30	70	100
Practical	1	30	70	100
Total	4	200		

St. Aloysius College (Autonomous), Jabalpur, Madhya Pradesh

Department of Botany & Microbiology

Session 2025-2026

Syllabus of Theory Paper			
Part A Introduction			
Program: Certificate	**Class: B.Sc.**	**Year: First**	**Session: 2025-26**
Subject: Industrial Microbiology			
1.	**Course Code**		
2.	**Course Title**	**Microbes in Environment and Health**	
3.	**Course Type**	**Minor 2**	
4.	**Pre-requisite (if any)**	To study this course, a student must have had the subject BIOLOGY in class 12th/ certificate/ Diploma	
5.	**Course Learning outcomes (CLO)**	To have knowledge of development of Industrial Microbiology. To understand role and scope of Industrial Microbiology for human welfare.	
6.	**Credit Value**	3	
7. Total Marks	Max. Marks: 30+70	Min. Passing Marks: 35	

Part B Content of the Course

Total no. of Lectures- Tutorials-Practical (in hours per week) - L-T-P:45 hrs

Unit	Topics	No. of Lectures
1	Significant contributions by Indian sages and scientists to the understanding and development of microbiology.	**12**

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	Context of microbiology in ancient texts (Sushruta and Charaka). Contribution of modern Indian scientists in advanced microbiological research. **Introduction to Microbes** • Definition and types of microbes: Bacteria, Viruses, Fungi, Protozoa, Algae • Beneficial vs. Harmful microbes • Role of microbes in nature **Activity:** Organize a quiz based on the topic	
2	**Microbes in the Environment** **Microbial Ecology** • Microbial diversity in soil, water and air • Role of microbes in biogeochemical cycles (Carbon, Nitrogen, Sulfur, Phosphorus) • Symbiotic relationships (Rhizobium & leguminous plants, Mycorrhizae) **Biodegradation & Bioremediation** • Microbes in waste management (sewage treatment, landfill degradation) • Biodegradation of pollutants (oil spills, plastic degradation, heavy metal detoxification) • Bioremediation case studies **Microbes and Climate Change** • Role of microbes in greenhouse gas production (methanogens) • Microbes in carbon sequestration (cyanobacteria, phytoplankton) • Impact of climate change on microbial ecology **Activity:** Prepare Chart/Poster on the topic	**11**
3	**Microbes in Human Health**	**11**

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	Human Microbiome • Normal flora of the human body • Importance of gut microbiota in digestion and immunity **Pathogenic Microbes and Diseases** • Bacterial diseases (Tuberculosis, Cholera, Typhoid) • Viral diseases (Influenza, Hepatitis, HIV/AIDS, COVID-19) • Fungal infections (Candidiasis, Ringworm) • Protozoan diseases (Malaria, Amoebiasis) **Microbial Control Measures** • Antibiotics and their mechanisms • Vaccines and immunization • Sterilization and disinfection **Activity:** Organize a Scientific Talk Session	
4	**Microbes in Food and Industry** **Microbes in Food** Fermented foods (Idli, Dosa, Dahi, Buttermilk, Cheese, Yoghurt) Probiotics and their health benefits Food spoilage and preservation methods **Microbes in Biotechnology and Medicine** Production of antibiotics (Penicillin) Role in vaccine production (Recombinant vaccines) Industrial applications (Ethanol production, Biogas, Enzymes) **Activity:** Prepare Models on the topic	**11**

Keywords/Tags: Use of Microbes in industry.

Part C- Learning Resources

Text Books, Reference Books, Other Resources

1 Suggested Readings:

1. Dubey R. C. and D. K. Maheswari (2004). A text book of Microbiology, I st Edition; S. C. Chand and Company Ltd.

2. Sukshmjeevanu in Vedas: The Forgotten Past of Microbiology in Indian Vedic Knowledge, U. Kuhad, G. Goel, P. K. Maurya, R. C. Kuhad, Indian J Microbiol. https://doi.org/10.1007/s12088-020-00911-5

2. Suggestive digital platforms web links

https://nptel.ac.in/courses/102/103/102103015/microbiology

Suggested equivalent online courses:

https://www.researchgate.net/publication/325320951_VEDIC_MICROBIOLOGY_Microbiology_in_the_Vedas-_A_Revived_History
https://www.researchgate.net/profile/Chakradhar-Frend/publication/325320951_VEDIC_MICROBIOLOGY_Microbiology_in_the_Vedas-_A_Revived_History/links/5df708d94585159aa4808738/VEDIC-MICROBIOLOGY-Microbiology-in-the-Vedas-A-Revived-History.pdf
http://krepublishers.com/02-Journals/JBD/JBD-07-0-000-16-Web/JBD-07-2-000-16-Abst-PDF/JBD-07-2-101-16-055-Padhy-S/JBD-07-2-101-16-055-Padhy-S-Tx[3].pmd.pdf

Part D - Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100

Continuous Comprehensive Evaluation (CCE):30 marks Final Exam (UE): 70 marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE): 30	Class Test - 2 Assignment/ Presentation – 1 (3 CCE will be taken)	15 marks each (Best two will be considered) 30
External Assessment: Final Exam: 70	**Section(A):** Objective type questions (1X5=5) **Section (B):** Short questions (200 words each/ 5X5=25) **Section (C):** Long questions (500 words each/ 8X5=40)	70

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