



ST. ALOYSIUS COLLEGE(AUTONOMOUS), JABALPUR

Reaccredited 'A++' Grade by NAAC(CGPA:3.58/4.00)

College with Potential for Excellence by UGC

DST-FIST Supported & STAR College Scheme by DBT

SESSION 2026-27

Faculty of Science

Master of Science (M.Sc.) I Semester

SUBJECT: MICROBIOLOGY

Paper-CC11

Principles of Microbiology

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
The students should be able to:		
CO 1	Understand the general features and characteristics of microbes	U, A
CO 2	Know about the history of microbiology and microorganisms	U, A,
CO 3	Identify major categories of microorganisms and analyze their classification, diversity, and ubiquity	U, A
CO 4	Learn about general methods and techniques to isolate and culture of microorganisms.	A

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	6	40 (Minimum Passing marks 16)	60 (Minimum Passing marks 24)	100
Practical	4	40 (Minimum Passing marks 16)	60 (Minimum Passing marks 24)	100
Total	10	200		

Evaluation Scheme

	Marks	
	Internal	External
Theory	3 Internal Exams of 20 Marks (Two written and one assignment) (Best 2 will be taken)	1 External Exams (At the End of Semester)
Practical	Class interaction (10 marks), Quiz (10 marks) Assignment (10 marks), Seminar (10 marks)	1 External Exams (At the End of Semester)

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Content of the Course

Theory

No. of Lectures (in hours per week): 5 Hrs. per week

Total No. of Lectures: 60 Hrs.

Maximum Marks: 60

CC 11	Principles of Microbiology	Session 2026-27
Unit	Topics	No. of Lectures 60
1	Ancient History of Microbiology from Atharva Veda, Contribution of Risi Karva, Atri, Jamdagni and Agastya, origin and Prevalence of germs. Nomenclature of germs in Vedas, their classification based on Caraka, Historical development and scope of Microbiology-Contribution of scientists and spontaneous generation and germ theory, Classification and identification of microorganisms, polyphasic taxonomy. Bergey's Manual of determinative Bacteriology. <i>Activity</i> 1. Discussion on ancient origin of Life in Vedas. 2. Slide preparation of microorganism from different environment. 3. Chart preparation on Biodiversity of pathogenic and nonpathogenic microorganism. 4. Demonstration of Bergey's, Manual of determinative Bacteriology.	18
2	Techniques in Microbiology- Isolation, pure and enrichment culture, staining procedure, physical & chemical sterilization methods, physical and chemical agents-Antiseptics and disinfectants, Control of Microorganisms by Narrow and broad-spectrum antibiotics, Antifungal antibiotics, Preservation of bacterial cultures. Cultivation of bacteria aerobic, anaerobic, types of culture media. <i>Activity:</i> 1. Demonstration of pasteurization by visit to dairy industry. 2. Survey of antiseptics and disinfectants available in local market. 3. Preparation of chart of antifungal antibiotics with their biochemical activity.	18
3	Morphology and ultrastructure of bacteria size, shape and arrangement, structure and chemical composition and function of cell walls of Gram positive and Gram-negative bacteria; Structure, composition and function of cell membrane, capsule; flagella, pili, gas vesicles, cytoplasmic matrix, reserve food materials; chromosomes, carboxysomes, magnetosomes and phycobilisomes; nucleoid. Reproduction and Recombination in bacteria. Nature and properties of spores: Bacterial exo and endospores, Germination of spores. Antibiotic resistance mechanisms and multiple drug resistance. Diversity of Microbes archaea, Photosynthetic bacteria and Cyanobacteria <i>Activity:</i> 1. Preparation of model of Gram positive and Gram-negative cell wall. 2. Comparative chart preparation of prokaryotic & Eukaryotic cells 3. Quiz of diversity of cyanobacteria and Photosynthetic activity	18

4	Current status of fungi; their classification with reference to Ainsworth; General characters, somatic structure, asexual and sexual reproduction of microbiologically important genera of Myxomycota, Mastigomycotina, Zygomycotina, Ascomycotina, Basidiomycotina and Deuteromycotina; Heterothallism; sex hormones in fungi; physiological specialization and phylogeny of fungi. Parasexual life cycle; Symbiotic associations of fungi with algae; Economic importance of fungi. General characters of algae; classification of algae; Somatic structure, asexual and sexual reproduction of Chlorophyceae, Phaeophyceae, Bacillariophyceae and Rhodophyceae. Microbial ecology General characteristics, structure, nomenclature and classification of microbial, animal and plant viruses. Disease symptomatology, transmission and diagnostic techniques of animal and plant viruses. Bacteriophages: structural organization, lytic and lysogenic cycle. Viroids, and virusoids. Prions and its diseases. General characters of protozoans; Structure and reproduction in protozoans: Entamoeba, Giardia, Trichomonas, Leishmania, Trypanosoma and Plasmodium, Paragonimus, Fasciola hepatica, Schistosoma <i>Activity</i> 1. Make tree chart of imported gene of fungi. 2. Collection of Symbiotic associations of fungi with algae from forest. 3. Chart preparation of fresh water algae from marshy water bodies	18
5	The definition of microbial growth, Growth in batch culture, Mathematical representation of bacterial growth, Bacterial generation time, Specific growth rate, Monoauxic, Diauxic and synchronized growth curves, Measurement of microbial growth, Factors affecting microbial growth. Brief account of growth in fungi, Culture collection and maintenance of microbial cultures, Principles of microbial nutrition Chemoautotrophs, chemoheterotrophs, photoautotrophs and photo heterotrophs. <i>Activity</i> 1. Chart making on Monoauxic, Diauxic and synchronized growth curves, 2. Demonstrate of various methods of microbial growth measurement. 3. Visit to different microbial culture collection centre.	18

Books and other Learning Resources

Suggested Readings:

1. Tortora, Funke & Case. Microbiology: An Introduction 7th Edition. 2001
2. M.J. Pelczar, E.C.S. Chan, N.R. Krieg. Microbiology VI Edition: New York: McGrawHill. 2001.
3. R. Y. Stainier, J. L. Ingraham, M. L. Wheelis and P.R. General Microbiology: Painter. Publisher: Macmillan.
4. Matthai, W., Berg, C.Y. & Black, J.G. Boston, MA: Microbiology, Principles and Explorations: John Wiley & Son. 2005.
5. Willey, J.M., Sherwood, L., Woolverton, C.J., Prescott, L.M. & Willey, J.M., Prescott's . Microbiology: New York: McGraw-Hill. 2011.
6. Pommerville, J.C., Alcamo's Jones and Bartlett Fundamentals of Microbiology (10th Ed.): Learning. 2013.

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7. Madigan, MT, Bender, K.S., Buckley, D.H., Sattley, W.M. & Stahl, D.A., Biology of Microorganisms (15th Ed.): Brock Pearson/ Benjamin Cummings. 2018.
8. Sequeira, M., Kapoor, K.K., Yadav, K.S. & Tauro, P., An Introduction to Microbiology (3rd Ed.): New Age International Publishers. 2019.
9. Relevant book published in Hindi Granth Academy.
10. Dubey R.C. & Maheshwari D.K., A Textbook of Microbiology, 5th edition S. Chand Publishing, 2023.
11. H. D. Kumar, Daya Agricultural Biotechnology Publishing House, 2006
12. P.S. Bisen and Kavita Verma, Handbook of Microbiology, CBS publishers and distributors Pvt Ltd 2021
13. B. D. Singh, Biotechnology, 4th Edition Kalyani Publishers, 2010.
14. Books published by M.P. Hindi Granth Academy, Bhopal

Part D : Assessment and Evaluation (Theory)

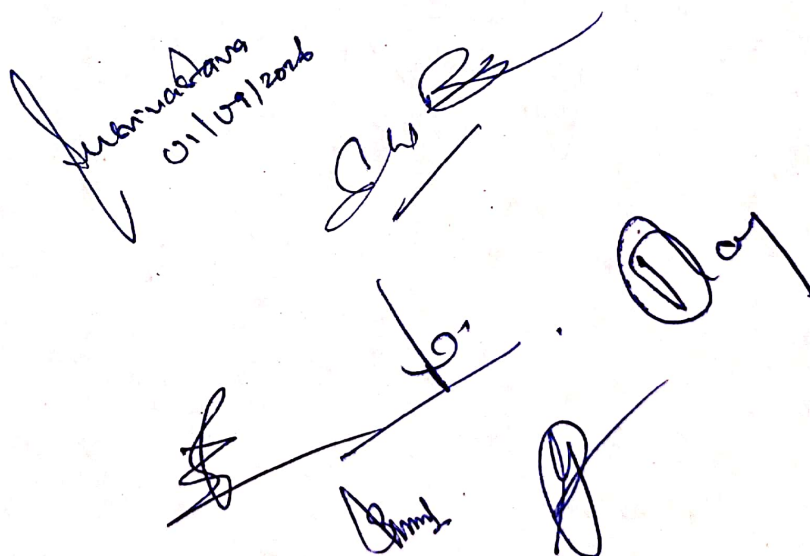
Maximum Marks:		100
Continuous Comprehensive Evaluation (CCE): University Exam		40
(UE):		60
Time: 03.00 Hours		
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test	20
	Assignment/Presentation	20
	Total	40
External Assessment: University Exam	Section (A) : Objective Type	01 x 05 = 05
	Section (B) : Short Questions	04 x 05 = 20
	Section (C) : Long Questions	07 x 05 = 35
	Total	60

M.Sc. Microbiology, I Semester

S.No.	Course Code	Course Name	Total Marks	Credit (s)	End Semester Exam Marks Max.	End Semester Exam Marks Min.	Internal Marks Max.	Internal Marks Min.
1.	CC-11	Principles of Microbiology	100	6	60	24	40	16
2.	CC-12	Microbial Biochemistry and Genetics	100	6	60	24	40	16
3.	PC-11	Practical – I	100	4	60	24	40	16
4.	PC-12	Practical – II	100	4	60	24	40	16
5.	Seminar /Intrnship		100	2	100	40		

Grand Total: 500 Marks, 22 Credits

Note: As per ordinance of PG program NEP 2020 the Minimum passing marks are 40% of the Maximum marks.



 Submissions
 01/09/2026