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 2025-26

Faculty of Science

Bachelor of Science (B.Sc.)

SUBJECT: INDUSTRIAL MICROBIOLOGY

B.Sc. VI Semester

Paper - Core Course (Major)

BACTERIOLOGY AND VIROLOGY - Group B

S3INMB3D

Course Outcomes

CO. No.	Course Outcomes	Cognitive Level
CO 1	Understand diversity of microbes	U, A
CO 2	Understand the structure and reproduction of bacteria	U, A
CO 3	Understand the structure and production of viruses	U, A
CO 4	Understand the economic importance of bacteria and viruses	U, A
CO 5	Understand the bacterial and viral diseases	U, A
CO 6	Understand the basics of cancer	U, A

Credit and Marking Scheme

	Credits	Marks		Total Marks
		Internal	External	
Theory	4	40	60	**100 (Minimum passing marks 35)**
Practical	2	40	60	**100 (Minimum passing marks 35)**
Total	**6**	**200**		

Evaluation Scheme

	Marks	
	Internal	**External**
Theory	3 Internal Exams of 20 Marks (During the Semester) (Best 2 will be taken)	1 External Exams (At the End of Semester)
Practical	2 Internal Exams (30 marks) + Attendance (10 marks) (During the Semester) (Both will be taken)	1 External Exams (At the End of Semester)

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Content of the Course

Theory

No. of Lectures (in hours per week): 2 Hrs. per week **Maximum Marks:** 60

Total No. of Lectures: 60 Hrs.

Unit	Topics	No. of Lectures (1 Hour Each)
1	**PROKARYOTIC CELL ORGANIZATION** Cell size, shape, and arrangement, glycocalyx, capsule, flagella, endoflagella, fimbriae and pili. Cell-wall: Composition and detailed structure of Gram- positive and Gram-negative cell walls, Archaebacterial cell wall, Gram staining mechanisms, sphaeroplasts, Effect of antibiotics and enzymes on the cell wall. Cell Membrane: Structure, function and chemical composition of bacterial and archaeal cell membranes. Ribosomes, mesosomes, inclusion bodies, nucleoid, chromosome, and plasmids	**12**
2	**BACTERIAL SYSTEMATICS, ARCHAEAL AND EUBACTERIAL GROUPS** Aim and principles of bacterial classification, conventional and molecular approaches to polyphasic bacterial taxonomy. Differences between eubacteria and archaea **Eubacteria:** Morphology, metabolism, ecological significance and economic importance of following groups: ***Gram Negative:*** General characteristics with reference to *Chlamydia, Chlorobium, Rhizobium, Ricketssia* and *Agrobacterium* ***Gram Positive:*** General characteristics with reference to *Lactobacillus, Bacillus, Clostridium* Economic importance of Bacteria and archaea.	**12**
3	**GROWTH, NUTRITION AND REPRODUCTION IN BACTERIA** Nutritional requirements in bacterial, Culture media: components of media, natural and synthetic media, chemically defined media, complex media,	**12**

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	Physical methods of microbial control: heat, low temperature, high pressure, filtration, desiccation, osmotic pressure, radiation. Chemical methods of microbial control: disinfectants, types and mode of action. Asexual methods of reproduction, phases of growth, calculation of generation time and specific growth rate. Transformation, transduction and conjugation in Bacteria	
4	**VIROLOGY** Discovery of viruses, nature and definition of viruses, general properties, concept of viroids, virusoids, satellite viruses and Prions. Theories of viral origin. Structure of Viruses: Capsid symmetry, enveloped and non-enveloped viruses. Isolation, purification, and cultivation of viruses Classification and nomenclature of different groups of viruses, lytic and lysogenic phages (lambda phage) Viral Transmission, Salient features of viral nucleic acids and Replication	**12**
5	**APPLICATIONS OF VIROLOGY** Introduction to oncogenic viruses, Types of oncogenic DNA and RNA viruses: Concepts of oncogenes and proto-oncogenes **Prevention & control of viral diseases:** Antiviral compounds and their mode of action. Interferon and their mode of action. General principles of viral vaccination. Viral vectors in cloning and expression, Gene therapy, Important plant and animal viral diseases	**12**

Keywords/Tags: Bacteria, Viruses, Oncogene, vaccination, Viral Diseases

Learning Resources

Text Books, Reference Books, Other resources

Suggested Readings:

1. Atlas R M. (1997). Principles of Microbiology. 2nd edition. WM.T. Brown Publishers.
2. Black J G. (2008). Microbiology: Principles and Explorations. 7th edition. Prentice Hall
3. Madigan MT, and Martinko JM. (2014). Brock Biology of Micro-organisms. 14th edition. Parker J. Prentice Hall International, Inc.
4. Pelczar Jr MJ, Chan ECS, and Krieg NR. (2004). Microbiology. 5th edition Tata McGraw Hill.
5. Srivastava S and Srivastava PS. (2003). Understanding Bacteria. Kluwer Academic Publishers, Dordrecht.
6. Stanier RY, Ingraham JL, Wheelis ML and Painter PR. (2005). General Microbiology. 5th edition McMillan
7. Carter J and Saunders V (2007). Virology: Principles and Applications. John Wiley and Sons.

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8. Prescott's Microbiology 9. M.P. Hindi Grant academy Publications www.eshiksha.mp.gov.in			
Suggested equivalent online courses: https://onlinecourses.swavam2.ac.in/cec20btlS/preview https://archive.nptel.ac.in/courses/102/103/102103015/			
Assessment and Evaluation			
Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test Assignment/ Presentation	40	**40+60=100**
External Assessment: Exam Section Time: 03.00 Hours	**Section (A)**: Objective Type Questions **Section (B)**: Short Questions **Section (C)**: Long Questions	Total 60	

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