

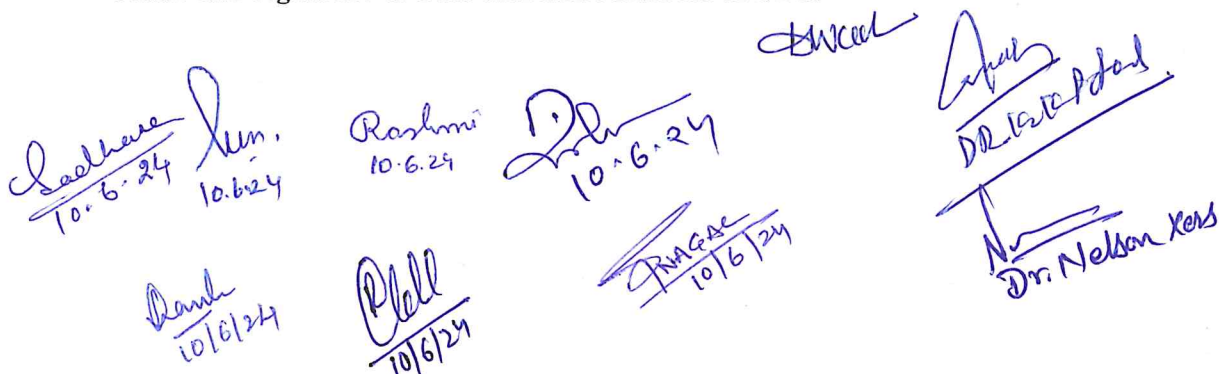
**FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)**

**DEPARTMENT OF MICROBIOLOGY**

**COURSE CURRICULUM**

<b>PART – A: Introduction</b>			
<b>Program: Bachelor in Life Science (Diploma/Degree/Honors)</b>		<b>Semester - IV</b>	<b>Session: 2024-25</b>
<b>1</b>	<b>Course Code</b>	<b>MBSC – 04 T</b>	
<b>2</b>	<b>Course Title</b>	<b>Bioinstrumentation and Biostatistics</b>	
<b>3</b>	<b>Course Type</b>	<b>DSC</b>	
<b>4</b>	<b>Prerequisite (If Any)</b>	<b>As per Program</b>	
<b>5</b>	<b>Course Learning Outcomes (CLO)</b>	<b>At the end of this course the student will able to –</b> <ul style="list-style-type: none"> <li>➤ recall the principle of microscopy and compare the types of microscopes for specialized viewing</li> <li>➤ identify the basic analytical instruments for performing microbiological manipulations</li> <li>➤ relate the techniques used for processing the microbial samples</li> <li>➤ recognize the basics of radiobiology and its applications</li> <li>➤ illustrate basic concept of Biostatistics and develop their application</li> </ul>	
<b>6</b>	<b>Credit Value</b>	<b>03 Credits</b>	<b>Credit = 15 Hours - Learning &amp; Observation</b>
<b>7</b>	<b>Total Marks</b>	<b>Max. Marks: 100</b>	<b>Minimum Passing marks: 40</b>
<b>PART – B: Content of the Course</b>			
<b>Total No. of Teaching-Learning Periods (01 Hr. per period) - 45 Periods (45 Hours)</b>			
<b>UNIT</b>	<b>TOPIC (Course Contents)</b>		<b>No. of Periods</b>
<b>I</b>	<b>Microscopy:</b> Principle, Mechanism and application of different types of microscopes- Bright field, Dark field and Phase Contrast microscope; Fluorescence microscopy, Confocal microscopy, Scanning and Transmission Electron Microscopy (SEM & TEM). <b>Micrometry</b> <b>pH metry:</b> Principle, Types of electrodes, factors affecting pH measurement, application of pH meter.		<b>12</b>
<b>II</b>	<b>Centrifugation:</b> Principle and Types of Centrifugal Machines, Analytical, Preparatory, differential, Rate zonal and ultracentrifugation and their applications. <b>Chromatography:</b> Principle and techniques with applications of Partition, ion-exchange, exclusion and affinity chromatography. <b>Electrophoresis:</b> Principle of Agarose and Polyacrylamide Gel Electrophoresis, Components, working and applications.		<b>11</b>
<b>III</b>	<b>Spectrophotometry:</b> Electromagnetic spectrum, Basic principles and Law of absorption; principle, mechanism and applications of Visible and UV spectrophotometer. <b>Radiobiology:</b> Radioactivity, forms of radioactive emissions, biological effects of radiation exposure, characters of radioisotopes and their applications, Principles and methods of radioactive detection, GM counter, Scintillation counter and Autoradiography.		<b>11</b>
<b>IV</b>	<b>Biostatistics:</b> Definitions, Basic concepts, sample and population, Measurement scales, Statistical inference and parameters, methods of sampling, Classification of Data, Tabulation, Frequency distribution, diagrammatic and Graphical presentation of data, Data analysis- Central Tendencies (Mean, Median and Mode). Deviation (Variance, SD and SE).		<b>11</b>
<b>Key Words</b>	<b>Microscope, Centrifuge, pH meter, Chromatography, Electrophoresis, Spectrophotometer, Radiobiology, Biostatistics</b>		

**Name and Signature of Convener and Members of CBoS**


  
 Sanjay 10.6.24  
 Roshmi 10.6.24  
 Dr. 10.6.24  
 Dr. Nelson Kers  
 Dr. 10.6.24  
 Dr. 10.6.24  
 Dr. 10.6.24

## Part – C: Learning Resources

### Text Books, Reference Books and Others

#### Text Books Recommended:

1. Biophysical Chemistry, Principles and Techniques – A. Upadhyay, K. Upadhyay and N. Nath, Himalaya Pub.
2. Biotechniques: Theory and Practice – S.V.S. Rana, Rastogi Pub.
3. Analytical Chemistry – G. Chatwal and Anand, Himalaya Pub.
4. Statistical Methods; S.P. Gupta
5. Fundamentals of Biostatistics; Khan and Khanum, Ukaaz Publications, Hyderabad.

#### Reference Books:

1. Fundamental of light Microscopy & Electron Imaging. 1<sup>st</sup> Edition. Murphy D.B.
2. Fundamentals and techniques of biophysics and molecular biology (2016) Pranav Kumar.
3. Techniques and methods in biology PHI publication (2011) K L Ghatak.
4. Biostatistics; Sunder Rao

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

- <https://www.sathyabama.ac.in/sites/default/files/course-material/2020-10/SCY2.pdf>
- [https://faculty.ksu.edu.sa/sites/default/files/instrumental\\_chemical\\_analysis.pdf](https://faculty.ksu.edu.sa/sites/default/files/instrumental_chemical_analysis.pdf)
- [https://www.academia.edu/31125635/Biotechniques\\_Theory\\_and\\_Practice\\_eBook](https://www.academia.edu/31125635/Biotechniques_Theory_and_Practice_eBook)
- [https://cbpbu.ac.in/userfiles/file/2020/STUDY\\_MAT/ZOO/PK%20\(2\).pdf](https://cbpbu.ac.in/userfiles/file/2020/STUDY_MAT/ZOO/PK%20(2).pdf)

## 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

<b>Continuous Internal Assessment (CIA):</b> (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	

<b>End Semester Exam (ESE):</b>	<b>Two Section – A &amp; B</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
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Name and Signature of Convener and Members of CBoS

*Plab*  
10/6/24

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10-6-24

*Sadhane*  
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*INAGAE*  
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*Dr. Nelson X*



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**DEPARTMENT OF MICROBIOLOGY**  
**COURSE CURRICULUM**

<b>PART – A: Introduction</b>		
<b>Program: Bachelor in Life Science (Diploma/Degree/Honors)</b>		<b>Semester IV</b>
		<b>Session: 2024-25</b>
<b>1</b>	<b>Course Code</b>	<b>MBSC - 04 P</b>
<b>2</b>	<b>Course Title</b>	<b>Lab. Course – MBSC-04</b>
<b>3</b>	<b>Course Type</b>	<b>Laboratory Course</b>
<b>4</b>	<b>Prerequisite (If Any)</b>	<b>As per Program</b>
<b>5</b>	<b>Course Learning Outcomes (CLO)</b>	<b>At the end of this course the student will able to –</b> <ul style="list-style-type: none"> <li>➤ identify microorganisms on the basis of microscopic features</li> <li>➤ relate common analytical techniques in microbiology</li> <li>➤ infer the concept of Biostatistics</li> <li>➤ explain the significance of central tendencies</li> </ul>
<b>6</b>	<b>Credit Value</b>	<b>1 Credit</b>   <i>Credit = 30 Hours. Laboratory or Field learning/ Training</i>
<b>7</b>	<b>Total Marks</b>	<b>Max. Marks: 50</b>   <b>Min. Passing marks: 20</b>

**PART – B: Content of the Course**

**Total No. of learning-Training/ Performance Periods: 30 Periods (30 Hours)**

<b>Module</b>	<b>Topics (Course contents)</b>	<b>No. of Period</b>
<b>Lab./ Field Training/ Experiment contents of Course</b>	1. Study of different parts of microscope. 2. Determination of $\lambda$ max of given coloured solution and Confirmation of Beer's law. 3. Separation of components of a given mixture using a laboratory scale centrifuge. 4. Separation of Ink components/ chlorophyll / Amino acids by Paper Chromatography. 5. Separation of Amino acids by Thin Layer Chromatography. 6. Demonstration of Gel Filtration Chromatography. 7. Measurement of pH of water and soil samples and maintenance of required pH. 8. Demonstration of SDS-PAGE and Submarine Gel Electrophoresis. 9. Preparation of Tables, Bar diagrams and Histograms from given data. 10. Calculation of Mean, Median and Mode from grouped and ungrouped data.	<b>30</b>
<b>Key Words</b>	<b>Microscopy, Spectrophotometry, Chromatography, Centrifugation, Electrophoresis, Presentation of Data, Calculation of Central Tendencies</b>	

**PART – C: Learning Resources**

**Text Books, Reference Books and Others**

**Text Books Recommended:**

1. An Introduction to practical Biochemistry; McGraw Hill Publication 1987. D.T Plummer.
2. Principles and Techniques in Practical Biochemistry; Wilson & Walker.
3. Biotechniques: Theory and Practice; S.V.S. Rana, Rastogi Pub.
4. Statistical Methods; S.P. Gupta

**Online Resources:**

- <https://books.google.co.in/books?id=Wh9OTbjcsfUC&printsec=age&q&f=false>
- <https://www.academia.edu/31125635/Biotechniques Theory and Practice eBook>

**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**

<b>Continuous Internal Assessment (CIA): (By Course Teacher)</b>	<b>Internal Test/ Quiz – (2): 10 &amp; 10</b> <b>Assignment/ Seminar + Attendance: 05</b> <b>Total Marks: 15</b>	Better Marks out of the two Test/ Quiz + obtained marks in Assignment shall be considered against 15 Marks
<b>End Semester Exam (ESE):</b>	<b>Laboratory/ Field Skill Performance: On spot Assessment</b> <b>A. Performed the Task based on lab. work – 20 Marks</b> <b>B. Spotting based on tools &amp; technology (written) - 10 Marks</b> <b>C. Viva-voce (based on principle/ technology) – 05 Marks</b>	<b>Managed by course teacher as per lab. status</b>

**Name and Signature of Convener and Members of CBoS**

Convener: *[Signature]* 10.6.24  
 Members: *[Signatures]* 10.6.24