

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF MICROBIOLOGY

COURSE CURRICULUM

PART – A: Introduction			
Program: Bachelor in Life Science (Honors/ Honors with Research)		Semester - VIII	Session: 2024-25
1	Course Code	MBSE-11 T	
2	Course Title	Metagenomics, Basic Computer & Bioinformatics	
3	Course Type	Discipline Specific Elective (DSE)	
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"> ➤ explain the concept and importance of metagenomics ➤ examine the perception of Microbiome ➤ develop an understanding of host-microbe interactions ➤ relate computer fundamentals and their applications ➤ examine resources and tools of Bioinformatics 	
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	Metagenomics: Brief history and development of metagenomics, understanding bacterial diversity using metagenomics approach, Prospecting genes of biotechnological importance using Metagenomics, Basic knowledge of viral metagenome, meta transcriptomics, metaproteomics and metabolomics.		12
II	Microbiomes: Importance of microbial communities, VBNC (viable but not culturable bacteria). Modern methods of rapid identification of microbes (PCR, mass spectrometry, fluorescence techniques). CRISPR-Cas system Molecular Basis of Host-Microbe Interaction: Hypersensitive response (HR) to plant pathogens and its mechanism, Type three secretion systems (TTSS) of plant and animal pathogens.		11
III	Computer fundamentals: Basic concept of computer organization, generations of computer, hardware, software, basics of operating systems (windows, unix), Classification of computers and computer languages, MS office. Internet & Web: introduction; importance, requirements of internet, electronic mailing, chatting, search engines, webpages.		11
IV	Concept of Bioinformatics: Aim and branches, Applications, Basic biomolecular concepts: Protein, Amino acids, DNA, RNA sequences, structure and functions, Forms of biological information, Bioinformatics resources: NCBI, EBI, ExPASy, RCSB, DDBJ, available tools, Open access bibliographic resources and literature data bases: PubMed, BioMed Central, Public Library of Science (PloS), CiteXplore.		11
Key Words	Metagenomics, Microbiome, computer fundamentals, Internet and web, Bioinformatics		

Name and Signature of Convener and Members of CBoS

Pradip 10/11/24
 Roshmi 10.6.24
 Dr. Nelson Kees
 10/6/24
 10.6.24
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Part – C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

1. Fundamentals of Gene, Genomics and Genetic Engineering, Irfan Khan and Atiya Khanum, Ukaaz Publications Hyderabad.
2. Basic Bioinformatics, C.R. Hemlata
3. Bioinformatics, R. Sundaralingam, Saras Publications.
4. Bioinformatics and Computational Biology, Dr. Chittaranjan Baruah.
5. Computer Basics, G. Manjunath, Vasana Publications

Reference Books:

1. Introduction to Bioinformatics; Teresa K. Attwood, David J. Parry-Smith, Pearson Education. (1999).
2. Introduction to bioinformatics; Arthur M. Lesk. Oxford University Press (2004)
3. Fundamental Concepts of Bioinformatics; Dan E. Krane and Michael L. Raymer (2002)
4. Gene VII; Benjamin Lewin, Oxford University Press, (2000).
5. Molecular Biology of Gene; Watson. J. D, Baker. T. A, Bell S. P, Gann A. Levine. M. Losick R, 5th Edition.
6. Molecular biology and Microbial genetics; David Frifielder, Stanely R. Maloy, 2nd Edition, Jones and Barlett Publishers. (1994).
7. Molecular Biotechnology; Glick B. R. and Pasternak J.J., 2nd Ed. ASM press. (2003).

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

- https://webstor.srmist.edu.in/web_assets/srm_mainsite/files/files/BI0505%20LAB%20MANUAL.pdf
- <https://www.polygwaliar.ac.in/file/20181204071417842813.pdf>
- <https://handelsmanlab.discovery.wisc.edu/wp-content/uploads/2018/01/Metagenomics-genomic-analysis.pdf>
- <https://handelsmanlab.discovery.wisc.edu/wp-content/uploads/2018/01/Sabree-Rondon-Handelsman-Metagenomics.pdf>
- https://ashishmodi.weebly.com/uploads/1/8/9/7/18970467/computer_fundamental.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

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
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Name and Signature of Convener and Members of CBoS

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10/6/24

Jay
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DEPARTMENT OF MICROBIOLOGY

COURSE CURRICULUM

PART – A: Introduction		
Program: Bachelor in Life Science (Honors/ Honors with Research)		Semester -VIII
		Session: 2024-25
1	Course Code	MBSE -11 P
2	Course Title	Lab. Course - MBSE -11
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"> ➤ experiment with soil to extract DNA and perform PCR ➤ identify hyper-sensitivity responses in plants ➤ develop skills to use computers for analysis of biological data ➤ select tools to retrieve biological data, compare and draw inference
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 Teaching-Learning Periods: 30Hours		
Module	Topics (Course contents)	No. of Period
Lab./ Field Training/ Experiment contents of Course	1. Extraction of metagenomics DNA from soil. 2. PCR amplification of metagenomics DNA. 3. Demonstration of Hyper- sensitivity response in plant disease. 4. Creation of different formats on MS Word. 5. Construction of Bar Chart using MS Excel. 6. Formation of a Power Point Presentation. 7. Introduction to bioinformatics databases: NCBI/PDB/DDBJ, Uniprot, PDB. 8. Demonstration of Sequence retrieval using BLAST.	30
Key Words	Metagenomic analysis, PCR amplification, MS Word, Bioinformatics databases	
PART – C: Learning Resources		
Text Books, Reference Books and Others		
Text Books Recommended:		
1. Experiments in Biotechnology - Nighojkar and Nighojkar 2. Current protocols in molecular biology- Ausbel 3. Bioinformatics- A Practical Guide to the Analysis of Genes and Proteins; Baxevanis, A.D. and Francis Ouellette, B.F., Wiley India Pvt Ltd. (2009).		
Online Resources:		
<ul style="list-style-type: none"> • https://webstor.srmist.edu.in/web_assets/srm_mainsite/files/files/BI0505%20LAB%20MANUAL.pdf • https://www.polygwali.ac.in/file/20181204071417842813.pdf 		
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

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