

Scheme of B. Sc./ B.Sc. (Hons.) Microbiology

Year	Course Code	Subject Name	Theory/ Practical/Project	Total Credit	Total Marks	
					Max	Min
First year	MICRO -1T	Microbial World and Microbial Techniques	Theory	4	50	17
	MICRO -2T	Bacteriology, Virology & Protozoology	Theory	4	50	17
	MICRO -1P	LAB 1: BASIC MICROBIOLOGY	Practical	2	50	17
Second year	MICRO -3T	Cell Biology, Biochemistry and Bioinstrumentation	Theory	4	50	17
	MICRO -4T	Microbial Genetics, Molecular Biology & Genetic Engineering	Theory	4	50	17
	MICRO -2P	LAB 2: Bacterial cell, Biochemistry & Molecular Biology	Practical	2	50	17
Third year	MICRO -5T	Environmental, Agriculture, Industrial Microbiology & Biostatistics	Theory	4	50	17
	MICRO -6T	Immunology and Medical Microbiology	Theory	4	50	17
	MICRO -3P	LAB 3: Applied Microbiology	Practical	2	50	17
Total (I+II+III years)				30	450	--

Note: There shall be four extra credits in each year for internship/apprenticeship. The certificate of extra credits for this would be provided by the concern University and is not mandatory.

D. N. Chakrabarti

Part - A: Introduction			
Program: <i>Diploma Course</i>		Class: B. Sc. Part - II	Year: 2023 Session: 2023-2024
1	Course Code	MICRO -3T	
2	Course Title	Cell biology, Biochemistry and Bioinstrumentation	
3	Course Type	Core course	
4	Pre-requisite (if, any)	As per Government norms	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to -- <ul style="list-style-type: none"> • - <i>clarify the basic concept of feature, types, function and importance of living cell as a structural & functional unit of living body</i> • - <i>get acquaintance of the knowledge about biochemical reactions and cellular mechanism to provide bio energy for living activities</i> • - <i>know about basic principle, procedure and application of various instruments and techniques to explore the biological system</i> • - <i>exercise the various experiments and perform fundamental biological techniques operating the concern instruments</i> 	
6	Credit Value	04	
7	Total Marks	Max. Marks: 50	Min Passing Marks: 17

PART B: Content of the Course

Total No. of Teaching Hours – 40 / Periods - 60		
Unit	Topics (Course contents)	No. of Period / Hour
I	Structure and organization of Cell Cell Organization –Plant and animal cells: Plasma membrane: Structure and functions, Cell Wall: Eukaryotic cell wall. Cell-Cell Interactions - adhesion junctions, tight junctions, gap junctions, and plasmodesmata (only structural aspects). Mitochondria, endoplasmic reticulum, Golgibody, Ribosomes, Lysosomes, Chloroplasts and Peroxisomes.	12 / 08
II	Biomolecules - Structure, classification, function and properties Carbohydrates Monosaccharide, Oligosaccharides (Disaccharides) and Polysaccharides. Protein - Amino acids, peptides and Proteins structural organisation. Lipids Saturated and unsaturated.	12 / 08
III	Metabolism Glycolysis, TCA cycle and Oxidative Phosphorylation. Anaerobic catabolism of glucose; Fat Biosynthesis, alpha and beta oxidation of fatty acids, Decarboxylation, Deamination, trans-amination and Urea cycle.	12 / 08

Signature

IV	Bioinstrumentation - I: Principle, Instrumentation and applications pH Meter, Microscopy (Light compound, Phase-contrast microscope & Electron microscope), Colorimeter, Spectrophotometer, Turbidometer, Centrifuge - differential & density gradient centrifugation techniques	12 / 08
V	Bioinstrumentation –II: Principle, Instrumentation and applications Electrophoresis - types, Gel electrophoresis, Chromatography - Paper Chromatography, Thin Layer Chromatography, Column Chromatography Ion Exchange Chromatography, High Pressure Liquid Chromatography and Gas Chromatography	12 / 08
Keywords <i>cell biology, bio-molecules, metabolism, bioinstrumentation</i>		

PART - C

Learning Resources: Text Books, Reference Books and Others

Suggested Readings:

Text Books Recommended -

1. Watson JD, Baker TA, Bell SP, Gann A, Levine M and Losick R (2008) Molecular Biology of the
2. De Robertis EDP and De Robertis EMF (2006) Cell and Molecular Biology, 8th edition. Lippincott
3. Williams and Wilkins, Philadelphia
4. Karp G (2010) Cell and Molecular Biology: Concepts and Experiments, 6th edition, John Wiley & Sons. Inc.
5. Sambrook J and Russell DW. (2001). Molecular Cloning: A Laboratory Manual. 4th Edition, ColdSpring Harbour Laboratory press.
6. Krebs J, Goldstein E, Kilpatrick S (2013). Lewin's Essential Genes, 3rd Ed., Jones and Bartlett Learning
7. Wiley JM, Sherwood LM and Woolverton CJ. (2008). Prescott, Harley and Klein's Microbiology. McGraw Hill Higher Education
8. Wilson K and Walker J. (2010). Principles and Techniques of Biochemistry and Molecular Biology. 7th Ed., Cambridge University Press.
9. Nelson DL and Cox MM. (2008). Lehninger Principles of Biochemistry, 5th Ed., W.H. Freeman and Company.

Online Resources –


➤ e-Resources / e-books and e-learning portals


➤ Use of following sites


1. <https://nptel.ac.in/courses/102103015>
2. https://onlinecourses.swayam2.ac.in/cec19_bt11/preview
3. <https://www.britannica.com>

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Part D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks:		50 Marks
Continuous Comprehensive Evaluation (CCE):		NA
Annual /University Exam(UE):		50 Marks
Internal Assessment:		
Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment /Field work	NA



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 Head Microbiology Institute
 LTD, ABVV, Bilaspur

Part - A: Introduction			
Program: <i>Diploma Course</i>		Class: B. Sc. Part - II	Year: 2023 Session: 2023-2024
1	Course Code	MICRO - 4T	
2	Course Title	Microbial Genetics, Molecular Biology & Genetic Engineering	
3	Course Type	Core course	
4	Pre-requisite (if, any)	As per Government norms	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to -- <ul style="list-style-type: none"> • - <i>clarify the basic concept of Genetics, Microbial genetics, mode of recombination microbes as basis of sexuality in living beings</i> • - <i>get acquaintance of the knowledge about the Gene expression & regulation with concept of central dogma of Molecular biology</i> • - <i>know about basic principle, procedure and application of Recombinant DNA Technology</i> 	
6	Credit Value	04	
7	Total Marks	Max. Marks: 50	Min Passing Marks: 17

PART B: Content of the Course

Total No. of Teaching Hours – 40 / Periods - 60

Unit	Topics (Course contents)	No. of Period / Hour
I	Microbial Genetics: Mechanisms of Genetic Exchange Transformation, Conjugation and Transduction. Types of plasmids – F plasmid, R Plasmids, colicinogenic plasmids, Ti plasmids, linear plasmids. Plasmid replication and partitioning. Prokaryotic transposable elements – Insertion Sequences, Replicative and Non replicative transposition, composite and non-composite transposons, Mutations and mutagenesis.	12 / 08
II	Genetic material: Miescher to Watson and Crick- historic perspective, DNA structure, Types of DNA, Organization of DNA Prokaryotes, Viruses, and Eukaryotes. RNA Structure, Organelle DNA-mitochondria and chloroplast DNA. Replication of DNA (Prokaryotes). DNA Repair system and its types.	12 / 08
III	Fundamentals of Molecular genetics: Central dogma of Molecular biology. Transcription, Translation in Prokaryotes, Post Translational Processing. Regulation of gene Expression in Prokaryotes. Principles of transcriptional regulation, regulation at initiation with examples from lac- and trp- operons.	12 / 08

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IV	<p>Introduction to Genetic Engineering: Molecular Cloning- Tools; Restriction modification systems: Types I, II and III. Mode of action, nomenclature, DNA modifying enzymes and their applications. Cloning Vectors: Definition and Properties Plasmid vectors: pBR and pUC series. Bacteriophage lambda and M13 based vectors. Cosmids, BACs, YACs. Expression vectors: E.coli lac and T7 promoter-based vectors, SV40-based expression vectors.</p>	12 / 08
V	<p>Molecular Cloning and Transformation: Methods in Molecular Cloning and Transformation of DNA: Chemical method, Electroporation, Gene delivery: Microinjection, electroporation, DNA, RNA and Protein analysis: Agarose gel electrophoresis, Southern - and Northern - blotting techniques, dot blot, DNA microarray analysis, SDS-PAGE and Western blotting. Applications of Recombinant DNA Technology</p>	12 / 08
<p>Keywords <i>Genetics, Microbial genetics, Nucleic acid, Central dogma, Gene, Gene expression</i></p>		

PART - C

Learning Resources: Text Books, Reference Books and Others

Suggested Readings:

Text Books Recommended -

1. Genetics by P. K. Gupta, Rastogi Publication, New Delhi
2. Watson JD, Baker TA, Bell SP, Gann A, Levine M and Losick R (2008) Molecular Biology
3. De Robertis EDP and De Robertis EMF (2006) Cell and Molecular Biology, 8th edition. Lippincott
4. Karp G (2010) Cell and Molecular Biology: Concepts and Experiments, 6th edition, John Wiley & Sons.
5. Sambrook J and Russell DW. (2001). Molecular Cloning: A Laboratory Manual. 4th Edition, Cold Spring Harbour Laboratory press.
6. Wiley JM, Sherwood LM and Woolverton CJ. (2008). Prescott, Harley and Klein's Microbiology McGraw Hill Higher Education
7. Wilson K and Walker J. (2010). Principles and Techniques of Biochemistry and Molecular Biology. 7th Ed., Cambridge University Press.
8. Nelson DL and Cox MM. (2008). Lehninger Principles of Biochemistry, 5th Ed., W.H. Freeman and Company.

Online Resources –

- e-Resources / e-books and e-learning portals
- Use of following sites
 1. <https://nptel.ac.in/courses/102103015>
 2. https://onlinecourses.swayam2.ac.in/cec19_bt11/preview
 3. <https://www.britannica.com>

Dr. Anil Kumar

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks
 Continuous Comprehensive Evaluation (CCE): NA
 Annual /University Exam(UE): 50 Marks

Internal Assessment:

Continuous Comprehensive Evaluation (CCE)

Class Test/Assignment /Field work

NA

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Part A: Introduction

Program: <i>Diploma Course</i>		Class: B. Sc. Part - II	Year: 2023	Session: 2023-2024
1	Course Code	MICRO - 2P		
2	Course Title	Bacterial cell, Biochemistry & Molecular Biology		
3	Course Type	Laboratory course		
4	Pre-requisite (if, any)	As per Govt. norms		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to <ul style="list-style-type: none"> • - <i>understand the microscopy, cytometry and relevant biochemical techniques</i> • - <i>handle the instruments / equipments applied for biochemical & molecular experiments</i> • - <i>perform the exercise /experiments of molecular biology</i> 		
6	Credit Value	02		
7	Total Marks	Max. Marks: 50	Min Passing Marks : 17	

PART B: Content of the Course

Total No. of Teaching Hours - 20 / Periods -30		
L. C.	Topics (Course contents)	No. of Period/Hours
A	1. Study of cell morphology – Prokaryotic & Eukaryotic cell 2. Study of cell division stages using Onion root tip. 3. Determination of antibiotic resistance by plating method. 4. Assaying of microbial enzymes; Catalase, Amylase 5. Separation of mixtures by paper / thin layer chromatography. 6. Demonstration of column packing in any form of column chromatography. 7. Separation of protein mixtures by any form of chromatography. 8. Determination of pH of various water and soil sample. 9. Testing of Lambert beer's law. 9. Production of any metabolite using batch fermentation.	15 / 10
B	1. Isolation of genomic DNA from <i>E. coli</i> 2. Isolation of DNA from plant cell (Onion/Mustard/Banana) 3. Transformation of <i>E. coli</i> – Preparation of competent cell 4. Conjugation in <i>E. coli</i> using plate method 5. Estimation of RNA using colorimeter or UV spectrophotometer 6. Resolution and visualization of DNA by Agarose Gel Electrophoresis. 7. Study survival curve of bacteria after exposure to ultraviolet (UV) light 8. Isolation of Plasmid DNA from <i>E. coli</i> 9. Separation of protein mixtures by Polyacrylamide Gel Electrophoresis (PAGE)	15 / 10
Keywords	Biochemical techniques, Chromatography, DNA isolation, RNA estimation, Plasmid	

PART – C

Learning Resources: Text Books, Reference Books and Others

Suggested Readings:

Text Books Recommended –

1. Aneja K. R., Laboratory Manual Of Microbiology And Biotechnology, Medtech; 1st edition, 2017 2 Text books and Laboratory manuals as mentioned in MICRO – 3T and 4T

Online Resources –

<https://thebookee.net/>

http://site.iugaza.edu.ps/mwhindi/files/Laboratory_Manual_And_Workbook_In_Microbiology.pdf

<http://site.iugaza.edu.ps/ydahdouh/files/General-Microbiology-Laboratory-pdf.pdf>

BWANI

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50 Marks
 Continuous Comprehensive Evaluation (CCE): NA
 Annual /University Exam(UE): 50 Marks

Internal Assessment:

Continuous Comprehensive Evaluation (CCE)

Class Test/Assignment /Field work

NA

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