

Part A: Introduction			
Program: Diploma Course		Class: B.Sc. II Year	Year: 2023
		Session: 2023-2024	
1	Course Code	BIOT-3T	
2	Course Title	Molecular Biology and Biophysics	
3	Course Type	Theory	
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"> • Understand on fundamentals of molecular biology and instrumentation • Understand the concept of tools applied in the study of biotechnology • Understand the expression of gene 	
6	Credit Value	Theory: 4	
7	Total Marks	Max. Marks: 50	Min Passing Marks: 17

Part B: Content of the Course		
Total No. of Teaching – Periods- 60 / Hours – 40		
Unit	Topics	No. of Period / Hour
1	1. Nucleic Acid: Bases, Nucleosides and Nucleotides, Structure, types and functions of DNA and RNA. 2. Structure, types and functions of Plasmids. 3. Transposons: Repetitive elements, Retro-transposons, LINEs & SINEs, Structure of Gene.	12 Periods / 08 Hours
2	1. DNA Replication: Enzymes involved and mechanism of DNA Replication in Prokaryotes. 2. Mutation: Molecular level of Mutation, Types of Mutagens, Spontaneous and Induced Mutation. 3. DNA Repair: Direct, NER, BER, Mismatch and Recombination.	12 Periods / 08 Hours
3	1. Transcription: Initiation, Elongation and Termination in prokaryotes. 2. Genetic Code: Features, Codon Assignment and Wobble hypothesis 3. Translation: Initiation, Elongation and Termination Translation machinery in Prokaryotes. 4. Operon- Concept of Operator, Regulator, Promoter gene, Inducer and Co-repressor.	12 Periods / 08 Hours
4	1. Biophysics : Introduction, Scope and Application 2. Principle, Types, Instrumentation and Functions of the following: a. Microscope b. Colorimeter and UV-VIS Spectrophotometer c. Electrophoresis (Agarose and PAGE) d. Centrifuge e. Chromatography (Paper, TLC and HPLC).	12 Periods / 08 Hours
5	1. Radioisotopes techniques: Radioactive decay, Measurement of radioactivity, Ionization Chambers, Geiger Muller and Scintillation Counter. 2. Autoradiography, DNA Fingerprinting, 3. Blotting techniques: Southern Northern and western blotting.	12 Periods / 08 Hours
Keywords: DNA, RNA, Replication, Transcription, Translation, Bioinstruments, Biophysics		

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Part C - Learning Resource

Text Books, Reference Books, Other Resources

Suggested Readings:

1. Gerald Karp - Cell and Molecular biology, 4th Edition (2005).
2. Lewis J.Klein Smith and Valerie M.Kish-Principles of cell and molecular biology-Third Edition (2002)
3. P.K. Gupta- Cell and molecular biology, Second Edition (2003), Rastogi publications.
4. Richard M-Twyaman-Advanced Molecular Biology, First South Asian Edition (1998), VivaBooks Pvt. Ltd.
5. K. Wilson and J. Walker (2012) Principle and Techniques of Biotechnology and Molecular Biotechnology.
6. DSVGK Kaladhar, Molecular Biochemistry (2018) RBSA Publishers ISBN 9788176117708.
7. Upadhy and Upadhy : Biophysical Chemistry.
8. David, I. Nelson and Michael M.Cox :Lehninger : Principal of Biochemistry 4th Edition. W.H. Freeman and Company, New York.
9. Buchanan, Gruissemen & Jones (2015) Biochemistry & Molecular Biology of Plant, 2nd edition.

E-learning Resources

<https://ncert.nic.in/textbook/pdf/lech205.pdf>
<https://www.pdfdrive.com/biomolecules-books.html>
<https://swayam.gov.in/>
<https://www.edx.org/search?q=biomolecules&tab=course>
<https://britannica.com>
<https://en.wikibooks.org/wiki/Biochemistry>
<https://nptel.ac.in>

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50

Continuous Comprehensive Evaluation (CCE): Not Applicable

University Exam(UE): 50 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable
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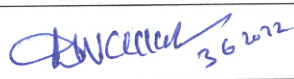
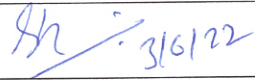
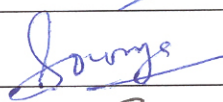
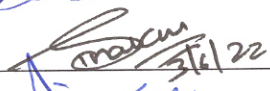

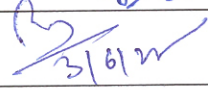
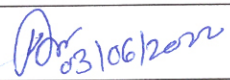
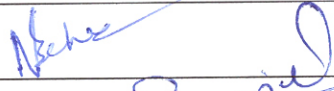
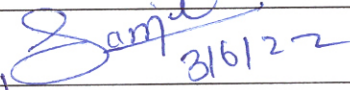
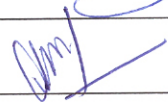
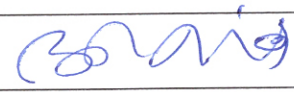
External assessment University Exam (UE)	As per Govt. norms
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Time 3Hours

Any remarks/ Suggestions: -

Declaration

Syllabus is framed as per the ToR

Name	Signature
Dr DSVGK Kaladhar, Prof & Chairperson CBoS Biotechnology, UTD ABVV	 3/6/22
Dr Pramod Kumar Mahish, Asst. Professor Govt. Digvijay College Rajnandgaon	 3/6/22
Dr Saumya Khare, Asst Prof, Kalyan PG. College Bhilai	
Dr Shubha Thakur, Asst Prof, St. Thomas College Bhilai	 3/6/22
Dr Akanksha Jain, Asst Prof. Shri Shankaracharya Mahavidyalaya, Bhilai	 3/6/22
Dr Arun Kumar Kashyap, Asst Professor, Govt. E raghavendra Rao PG. Science College Bilaspur	 3/6/22
Dr Tarun Kumar Patel, Asst Professor, Sant Guru Ghasidas PG. College Kurud	 03/06/2022
Dr Neha Behar, Asst Prof. DLS PG. College Bilaspur	
Dr Sanjana Bhagat, Asst Prof. Govt Ngarjuna PG. Science College, Raipur	 3/6/22
Dr Kamlesh Shukla, PRSU, Raipur	
Dr Ashish Kumar, Sant Gahira Guru Vishwavidyalay Sarguja	

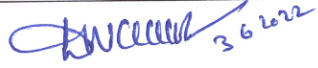
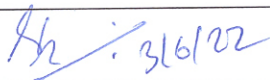
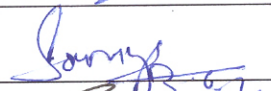
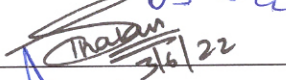
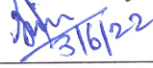
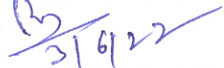
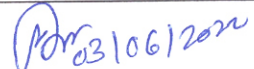
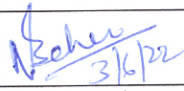
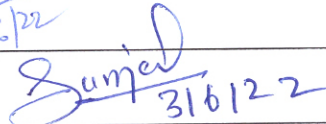
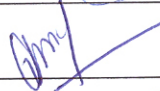
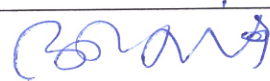
Part A: Introduction			
Program: Diploma Course		Class: B.Sc. II Year	Year: 2023
		Session: 2023-2024	
1	Course Code	BIOT-4T	
2	Course Title	RECOMBINANT DNA TECHNOLOGY AND GENOMICS	
3	Course Type	Theory	
4	Pre-requisite (if any)	As per Govt. norms	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: <ul style="list-style-type: none"> • Understand the fundamentals of Genetic engineering and biological databases • learn the basic techniques of RDT • Understand the concept of genomics 	
6	Credit Value	Theory: 4	
7	Total Marks	Max. Marks: 50	Min Passing Marks: 17

Part B: Content of the Course		
Total No. of Teaching – Periods- 60 / Hours – 40		
Unit	Topics	No. of Period / Hour
1	1. Recombinant DNA technology: General concept. Steps in gene cloning and application. 2. Restriction Modification System, Ligases and Polymerases, Klenow fragment, Taq, Pfu polymerase and Nuclease (Endo, Exo and restriction endonuclease). 3. Modification Enzyme (Kinase, Phosphates and terminal deoxynucleotidyl transferase). Reverse Transcriptase.	12 Periods / 08 Hours
2	1. Vectors: Plasmid, Bacteriophages, Cosmid, Phagemid, BAC, YAC and Expression vectors. 2. Gene Library: Genomic and cDNA library. 3. Selection and Screening of Recombinants: Genetic (Blue White Screening) and Hybridization methods- Colony hybridization and immunoblotting	12 Periods / 08 Hours
3	1. PCR: Types of PCR, Steps (Denaturation, Annealing and Extension); Applications, Advantages and Limitation of PCR. 2. Molecular Marker-RFLP, RAPD, AFLP, SSR SNP . 3. Site Directed Mutagenesis, Gene Silencing (siRNA, miRNA)	12 Periods / 08 Hours
4	1. Basic concept of Gene Transfer Methods: Microinjection, Electroporation, Lipofection. 2. Gene Therapy: In vivo and Ex vivo, Germ line and Somatic gene therapy. 3. Basic idea of Stem cell technology: Types of stems cell cultures and their Significance.	12 Periods / 08 Hours
5	1. Basic concept of Genomics: Structural and Functional Genomics 2. Shot Gun and Whole Genome Sequencing 3. Comparative Genomics: RT-PCR, SAGE, Microarray 4. Human Genome Project.	12 Periods / 08 Hours
Keywords: Genetic engineering, Gene therapy, Bioinformatics, Genomics, Molecular Markers, PCR		

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Name	Signature
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Part A: Introduction			
Program: Diploma Course		Class: B.Sc. II Year	Year: 2023 Session: 2023-2024
1	Course Code	BIOT-2P	
2	Course Title	LAB 2: Molecular Biology, Bioinstrumentation, and Genomics	
3	Course Type	Practical	
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"> • Understand on fundamentals of Recombinant DNA Technology. • Understand on estimation of DNA and RNA. • Understand on the concept of bioinformatics 	
6	Credit Value	Practical: 2	
7	Total Marks	Max. Marks: 50	Min Passing Marks : 17

Part B: Content of the Course	
Total No. of Teaching Hours – 20 / 30 Periods	
Tentative Practical List	<p>Note: This is tentative list; the teachers concern can add more program as per requirement.</p> <ol style="list-style-type: none"> 1. Preparation of LB broth and agar 2. Isolation of DNA from Plant cell. 3. Estimation of DNA by DPA method. 4. Isolation RNA from yeast cells 5. Use of Centrifugation 6. Determination of glucose concentration using Spectrophotometer/Colorimeter 7. Electrophoresis, Agarose gel and SDS PAGE 8. Isolation of primary metabolites and Secondary metabolites from Paper chromatography/TLC 9. Retrieve DNA /Protein sequence from Biological Data Bases (NCBI). 10. Use of Bioinformatics tools studied 11. Primer designing 12. Study of similar sequence alignment using BLAST and Clustal W 13. Generating phylogenetic tree using MEGA 14. Tertiary structure prediction using SWISSMODEL
Keywords: DNA/RNA Isolation, NCBI, BLAST, Electrophoresis, TLC	

Part C - Learning Resource	
Text Books, Reference Books, Other Resources	
Suggested Readings:	
<ol style="list-style-type: none"> 1. Lehninger: Principles of Biochemistry (2013) 6th ed., /Nelson, D.L. and Cox, M.M., W H Freeman and Company (New York), ISBN:13: 978-1-4641-0962-1 / ISBN:10:1-4292- 3414-8. 2. Devlin, T.M., Textbook of Biochemistry with Clinical Correlations (2011) 7th ed., John Wiley & Sons, Inc. (New York), ISBN: 978-0-470-28173-4 / BRV ISBN: 978-0-470- 60152-5. 3. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley& Sons. Inc. 4. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition. Lippincott Williams and Wilkins, Philadelphia. 5. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASM Press & Sunderland, Washington, D.C.; Sinauer Associates, MA. 6. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009 The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco. 7. Donald, V. and Judith G.V., Biochemistry (2011) 4th ed., John Wiley & Sons Asia Pvt. Ltd. (New Jersey), ISBN:978-1180-25024. 8. Nicholas C.P. and Lewis S Fundamentals of Enzymology (1999) 3rd ed., Oxford University Press Inc. (New York), ISBN:0 19 850229 X. 	

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9. Berg, J.M., Tymoczko, J.L. and Stryer L., Biochemistry (2012) 7th ed., W.H. Freeman and Company (New York), ISBN:10:1-4292-2936-5, ISBN:13:978-1-4292-2936-4
 10. Akanksha Jain, Sonia Bajaj, Sushma Solanki (2022) Text book of Biotechnology, Probecell Press

E-learning Resources:

https://ia600105.us.archive.org/30/items/FundamentalsBiochemistry4e_201802/FundamentalsBiochemistry4e.pdf
<https://vlab.amrita.edu/?sub=3&brch=273>
<https://britannica.com>
<https://en.wikibooks.org/wiki/Biochemistry>
<https://nptel.ac.in>
<https://www.biointeractive.org/classroom-resources/bacterial-identification-virtual-lab>
<https://www.vlab.co.in/>

Part D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 50

Continuous Comprehensive Evaluation (CCE): Not Applicable

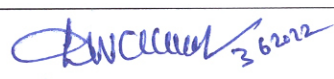
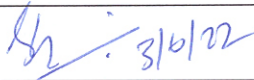
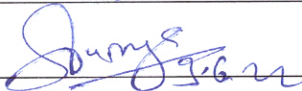
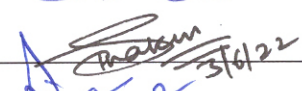
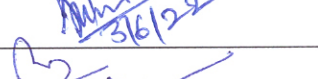
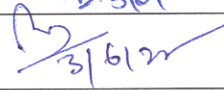
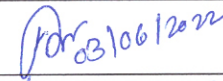
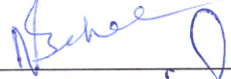
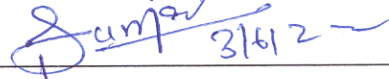

University Exam(UE): 50 Marks

Internal Assessment:		
Continuous Comprehensive Evaluation (CCE)	Class Test/Assignment/Presentation	Not Applicable
External assessment University Exam (UE)	As per Govt. norms.	

DWCCM

Declaration

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