

Programme/Class: Diploma	Year: Second	Semester: Third
Subject: ZOOLOGY		
Course Code: B050301T	Course Title: Molecular Biology, Bioinstrumentation & Biotechniques	
Course outcomes: The student at the completion of the course will be able to have: <ul style="list-style-type: none"> • A detailed and conceptual understanding of molecular processes viz. DNA to trait. • A clear understanding of the processes of central dogma viz. transcription, translation etc. underlying survival and propagation of life at molecular level. • Understanding of how genes are ultimately expressed as proteins which are responsible for the structure and function of all organisms. • Learn how four sequences (3 letter codons) generate the transcripts of life and determine the phenotypes of organisms. • How genes are regulated differently at different time and place in prokaryotes and eukaryotes. 		
Credits: 4		Core: Compulsory
Max. Marks: 25+75		Min. Passing Marks: as per rules
Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P:4-0-0		
Unit	Topic	Total No. of Lectures (60)
I	Process of Transcription <ul style="list-style-type: none"> • Fine structure of gene • RNA polymerases • Transcription factors and machinery • Formation of initiation complex • Initiation, elongation and termination of transcription in prokaryotes and eukaryotes 	7
II	Process of Translation <ul style="list-style-type: none"> • The Genetic code • Ribosome • Factors involved in translation • Aminoacylation of tRNA, tRNA-identity, aminoacyltRNAsynthetase • Initiation, elongation and termination of translation in prokaryotes and eukaryotes 	7
III	Regulation of Gene Expression I <ul style="list-style-type: none"> • Regulation of gene expression in prokaryotes: <i>lac</i> and <i>trp</i> operons in <i>E. coli</i> • Regulation of gene expression in eukaryotes: Role of chromatin in gene expression • Regulation at transcriptional level, Post-transcriptional 	8

	modifications: Capping, Splicing, Polyadenylation <ul style="list-style-type: none"> • RNA editing. 	
IV	Regulation of Gene Expression II <ul style="list-style-type: none"> • Regulation of gene expression in eukaryotes: • Regulation at translational level, Post- translational modifications: protein folding etc. • Intracellular protein degradation • Gene silencing, RNA interference (RNAi) 	8
V	Principle and Types of Microscopes <ul style="list-style-type: none"> • Principle of Microscopy and Applications • Types of Microscopes: light microscopy, dark field microscopy, phase-contrast microscopy, • Fluorescence microscopy, confocal microscopy, electron microscopy 	6
VI	Centrifugation and Chromatography <ul style="list-style-type: none"> • Principle of Centrifugation • Types of Centrifuges: high speed and ultracentrifuge • Types of rotors: Vertical, Swing-out, Fixed-angle etc. • Principle and Types of Chromatography: paper, ion-exchange, gel filtration, HPLC, affinity 	8
VII	Spectrophotometry and Biochemical Techniques <ul style="list-style-type: none"> • Biochemical techniques: Measurement of pH, Preparation of buffers and solutions • Principle of Colorimetry/Spectrophotometry: Beer-Lambert law • Measurement, applications and safety measures of radio-tracer techniques 	8
VIII	Molecular Techniques <ul style="list-style-type: none"> • Detection of nucleic acid by gel electrophoresis • DNA sequencing DNA fingerprinting, RFLP • Polymerase Chain Reaction (PCR) • Detection of proteins, PAGE, ELISA, Western blotting 	8
Suggested Readings: <ol style="list-style-type: none"> 1. Lodish et al: Molecular Cell Biology: Freeman & Co, USA (2004). 2. Alberts et al: Molecular Biology of the Cell: Garland (2002). 3. Cooper: Cell: A Molecular Approach: ASM Press (2000). 4. Karp: Cell and Molecular Biology: Wiley (2002). 5. Watson et al. Molecular Biology of the Gene. Pearson (2004). 6. Lewin. Genes VIII. Pearson (2004). 7. Pierce B. Genetics. Freeman (2004). 8. Sambrook et al. Molecular Cloning Vols I, II, III. CSHL (2001). 9. Primrose. Molecular Biotechnology. Panima (2001). 10. Clark & Switzer. Experimental Biochemistry. Freeman (2000) <p style="text-align: center;">Course Books published in Hindi may be prescribed by the Universities and Colleges</p>		

<p>This course can be opted as an elective by the students of following subjects:</p> <p>The eligibility for this paper is 10+2 with Biology as one of the subject</p>
<p>Suggested Continuous Evaluation Methods:</p> <p>House Examination/Test: 10 Marks</p> <p>Written Assignment/Presentation/Project / Term Papers/Seminar: 10 Marks</p> <p>Class performance/Participation: 5 Marks</p>
<p>Further Suggestions: None</p>

At the End of the whole syllabus any remarks/ suggestions: None

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Programme/Class: Diploma	Year: Second	Semester: Third
Subject: ZOOLOGY		
Course Code: B050302P	Course Title: Bioinstrumentation & Molecular Biology Lab	
Course outcomes: The student at the completion of the course will be able to <ul style="list-style-type: none"> • Understand the basic principles of microscopy, working of different types of microscopes • Understand the basic techniques of centrifugation and chromatography for studying cells and separation of biomolecules • Understand the principle of measuring the concentrations of macromolecules in solutions by colorimeter and spectrophotometer and use them in Biochemistry. • Learn about some of the commonly used advance DNA testing methods. 		
Credits: 2	Core: Compulsory	
Max. Marks: 25+75	Min. Passing Marks: as per rules	
Total No. of Lectures-Tutorials-Practical (in hours per week): L-T-P: 0-0-4		
Unit	Topic	Total No. of Lectures (60)
I	<ol style="list-style-type: none"> 1. To study the working principle and Simple, Compound and Binocular microscopes. 2. To study the working principle of various lab equipments such as pH Meter, Electronic balance, use of glass and micropipettes, Laminar flow, Incubator, Waterbath, Centrifuge, Chromatography apparatus, etc. 	15
II	<ol style="list-style-type: none"> 1. To prepare solutions and buffers. 2. To measure absorbance in Colorimeter or Spectrophotometer. 3. Demonstration of differential centrifugation to fractionate different components in a mixture. 	15
III	<ol style="list-style-type: none"> 1. To prepare dilutions of Riboflavin and verify the principle of spectrophotometry. 2. To identify different amino acids in a mixture using paper chromatography. 3. Demonstration of DNA extraction from blood or tissue samples. 4. To estimate amount of DNA using spectrophotometer. 	15
IV	Virtual Labs (Suggestive sites) www.labinapp.com www.uwlax.edu www.labster.com www.onlinelabs.in www.powershow.in https://vlab.amrita.edu	15

	info@premiereducationaltechnologyies.com https://li.wsu.edu	
<p>Suggested Readings:</p> <ol style="list-style-type: none"> 1. Sambrook <i>et al</i> .Molecular Cloning Vols I, II, III. CSHL (2001). 2. Primrose. Molecular Biotechnology. Panima (2001). 3. Clark & Switzer. Experimental Biochemistry. Freeman (2000) <p style="text-align: center;">Course Books published in Hindi may be prescribed by the Universities and Colleges</p>		
<p>This course can be opted as an elective by the students of following subjects:</p> <p style="text-align: center;">The eligibility for this paper is 10+2 from Arts/Commerce/Science</p>		
<p>Suggested Continuous Evaluation Methods:</p> <p>House Examination/Test: 10 Marks</p> <p>Written Assignment/Presentation/Project / Term Papers/Seminar: 10 Marks</p> <p>Class performance/Participation: 5 Marks</p>		
<p>Further Suggestions: None</p>		

At the End of the whole syllabus any remarks/ suggestions: University must ensure incorporation of all 04 units including virtual labs in practical evaluation.