

<b>Programme/Class:</b> Certificate	<b>Year:</b> First	<b>Semester:</b> First
<b>Subject:</b> ZOOLOGY		
<b>Course Code:</b> B050101T	<b>Course Title:</b> Cytology, Genetics and Infectious Diseases	
<b>Course outcomes:</b> The student at the completion of the course will be able to: <ul style="list-style-type: none"> <li>• Understand the structure and function of all the cell organelles.</li> <li>• Know about the chromatin structure and its location.</li> <li>• To be familiar with the basic principle of life, how a cell divides leading to the growth of an organism and also reproduces to form new organisms.</li> <li>• How one cell communicates with its neighboring cells?</li> <li>• Understand the basic principles of genetics and how genes (earlier called factors) are inherited from one generation to another.</li> <li>• Understand the Mendel's laws and the deviations from conventional patterns of inheritance.</li> <li>• Comprehend how environment plays an important role by interacting with genetic factors.</li> <li>• How to detect chromosomal aberrations in humans and study the pattern of inheritance by pedigree analysis in families.</li> </ul>		
<b>Credits:</b> 4		<b>Core:</b> Compulsory
<b>Max. Marks:</b> 25+75		<b>Min. Passing Marks:</b> as per rules
Total No. of Lectures-Tutorials-Practical (in hours per week): <b>L-T-P:4-0-0</b>		
<b>Unit</b>	<b>Topics</b>	<b>Total No. of Lectures (60)</b>
<b>I</b>	<b>Structure and Function of Cell Organelles I</b> <ul style="list-style-type: none"> <li>• Plasma membrane: chemical structure—lipids and proteins</li> <li>• Cell-cell interaction: cell adhesion molecules, cellular junctions</li> <li>• Endomembrane system: protein targeting and sorting, endocytosis, exocytosis</li> </ul> <p><b>Introduction to all national and international Biologists (Zoologists) who have contributed/contributing to Zoological and Life Sciences as a mark of tribute to ancient and modern biology will be included as part of the Continuous Internal Evaluation (CIE)</b></p>	<b>6</b>
<b>II</b>	<b>Structure and Function of Cell Organelles II</b> <ul style="list-style-type: none"> <li>• Cytoskeleton: microtubules, microfilaments, intermediate filaments</li> <li>• Mitochondria: Structure, oxidative phosphorylation</li> <li>• Peroxisome and ribosome: structure and function</li> </ul>	<b>6</b>
<b>III</b>	<b>Nucleus and Chromatin Structure</b> <ul style="list-style-type: none"> <li>• Structure and function of nucleus in eukaryotes</li> <li>• Chemical structure and base composition of DNA and RNA</li> <li>• DNA supercoiling, chromatin organization, structure of chromosomes</li> <li>• Types of DNA and RNA</li> </ul>	<b>8</b>

<b>IV</b>	<b>Cell cycle, Cell Division and Cell Signalling</b> <ul style="list-style-type: none"> <li>• Cell division: mitosis and meiosis</li> <li>• Cell cycle and its regulation, apoptosis</li> <li>• Signal transduction: intracellular signaling and cell surface receptors, via G-protein linked receptors, JAK-STAT pathway</li> </ul>	<b>8</b>
<b>V</b>	<b>Mendelism and Sex Determination</b> <ul style="list-style-type: none"> <li>• Basic principles of heredity: Mendel's laws, monohybrid and dihybrid crosses</li> <li>• Complete and Incomplete Dominance</li> <li>• Penetrance and expressivity</li> <li>• Genic Sex-Determining Systems, Environmental Sex Determination, Sex Determination in <i>Drosophila</i>, Sex Determination in Humans</li> <li>• Sex-linked characteristics and Dosage compensation</li> </ul>	<b>8</b>
<b>VI</b>	<b>Extensions of Mendelism, Genes and Environment</b> <ul style="list-style-type: none"> <li>• Extensions of Mendelism: Multiple Alleles, Gene Interaction</li> <li>• The Interaction Between Sex and Heredity: Sex-Influenced and Sex-Limited Characteristics</li> <li>• Cytoplasmic Inheritance, Genetic Maternal Effects</li> <li>• Genomic Imprinting, Anticipation</li> <li>• Interaction Between Genes and Environment: Environmental Effects on Gene Expression, Inheritance of Continuous Characteristics</li> </ul>	<b>8</b>
<b>VII</b>	<b>Human Chromosomes and Patterns of Inheritance</b> <ul style="list-style-type: none"> <li>• Human karyotype</li> <li>• Chromosomal anomalies: Structural and numerical aberrations with examples</li> <li>• Pedigree analysis</li> <li>• Patterns of inheritance: autosomal dominant, autosomal recessive, X-linked recessive, X-linked dominant</li> </ul>	<b>8</b>
<b>VIII</b>	<b>Infectious Diseases</b> <ul style="list-style-type: none"> <li>• Introduction to pathogenic organisms: viruses, bacteria, fungi, protozoa, and worms.</li> <li>• Structure, life cycle, pathogenicity, including diseases, causes, symptoms and control of common parasites: <i>Trypanosoma</i>, <i>Giardia</i> and <i>Wuchereria</i></li> </ul>	<b>8</b>
<b>Suggested Readings:</b> <ol style="list-style-type: none"> <li>1. Lodish et al: Molecular Cell Biology: Freeman &amp; Co, USA (2004).</li> <li>2. Alberts et al: Molecular Biology of the Cell: Garland (2002).</li> <li>3. Cooper: Cell: A Molecular Approach: ASM Press (2000).</li> <li>4. Karp: Cell and Molecular Biology: Wiley (2002). Pierce B. Genetics. Freeman (2004).</li> <li>5. Lewin B. Genes VIII. Pearson (2004).</li> <li>6. Watson et al. Molecular Biology of the Gene. Pearson (2004).</li> <li>7. Thomas J. Kindt, Richard A. Goldsby, Barbara A. Osborne, Janis KubyKuby Immunology. W H Freeman (2007).</li> <li>8. Delves Peter J., Martin Seamus J., Burton Dennis R., Roitt Ivan M. Roitt's Essential Immunology, 13th Edition. Wiley Blackwell (2017).</li> <li>9. Shetty Nandini Immunology Introductory Textbook. New Age International. (2005)</li> </ol>		

**Course Books published in Hindi may be prescribed by the Universities and Colleges**

**Course prerequisites:** To study this course, a student must have had the subject biology in class/12<sup>th</sup>

Suggested Continuous Evaluation Methods:

**Total Marks: 25**

**House Examination/Test:** 10 Marks

**Written Assignment/Presentation/Project / Term Papers/Seminar:** 10 Marks

**Class performance/Participation:** 5 Marks

Further Suggestions: None

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

<b>Programme/Class:</b> Certificate	<b>Year:</b> First	<b>Semester:</b> First
<b>Subject:</b> ZOOLOGY		
<b>Course Code:</b> B050102P	<b>Course Title:</b> Cell Biology & Cytogenetics Lab	
<b>Course outcomes:</b> At the completion of the course students will learn Hands-on: <ol style="list-style-type: none"> <li>To use simple and compound microscopes.</li> <li>To prepare slides and stain them to see the cell organelles.</li> <li>To be familiar with the basic principle of life, how a cell divides leading to the growth of an organism and also reproduces to form new organisms.</li> <li>The chromosomal aberrations by preparing karyotypes.</li> <li>How chromosomal aberrations are inherited in humans by pedigree analysis in families.</li> <li>The antigen-antibody reaction.</li> </ol>		
<b>Credits:</b> 2	<b>Core:</b> Compulsory	
<b>Max. Marks:</b> 25+75	<b>Min. Passing Marks:</b> as per rules	
Total No. of Lectures-Tutorials-Practical (in hours per week): <b>L-T-P:</b> 0-0-4		
<b>Unit</b>	<b>Topics</b>	<b>Total No. of Lectures (60)</b>
<b>I</b>	<ol style="list-style-type: none"> <li>To study different cell types such as buccal epithelial cells, neurons, striated muscle cells using Methylene blue.</li> <li>To study the different stages of Mitosis in root tip of onion.</li> <li>To study the different stages of Meiosis in grasshopper testis.</li> <li>To prepare molecular models of nucleotides, amino acids, dipeptides using bead and stick method.</li> <li>To check the permeability of cells using salt solution of different concentrations.</li> </ol>	<b>15</b>
<b>II</b>	<ol style="list-style-type: none"> <li>Study of parasites (eg. Protozoans, helminths etc.) from permanent slides.</li> <li>To learn the procedures for preparation of temporary and permanent stained/unstained slides.</li> </ol>	<b>15</b>
<b>III</b>	<ol style="list-style-type: none"> <li>Study of mutant phenotypes of <i>Drosophila</i>.</li> <li>Preparation of polytene chromosomes.</li> <li>Study of sex chromatin (Barr bodies) in buccal smear and hair bud cells (Human).</li> <li>Preparation of human karyotype and study the chromosomal aberrations with respect to number, translocation, deletion etc. from the pictures provided.</li> <li>To prepare family pedigrees.</li> </ol>	<b>15</b>
<b>IV</b>	<b>Virtual Labs (Suggestive sites)</b> <a href="https://www.vlab.co.in">https://www.vlab.co.in</a> <a href="https://zoologysan.blogspot.com">https://zoologysan.blogspot.com</a> <a href="http://www.vlab.iitb.ac.in/vlab">www.vlab.iitb.ac.in/vlab</a> <a href="http://www.onlinelabs.in">www.onlinelabs.in</a> <a href="http://www.powershow.com">www.powershow.com</a> <a href="https://vlab.amrita.edu">https://vlab.amrita.edu</a> <a href="https://sites.dartmouth.edu">https://sites.dartmouth.edu</a>	<b>15</b>

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1. Lodish et al: Molecular Cell Biology: Freeman & Co, USA (2004).
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3. Cooper: Cell: A Molecular Approach: ASM Press (2000).
4. Karp: Cell and Molecular Biology: Wiley (2002). Pierce B. Genetics. Freeman (2004).
5. Thomas J. Kindt, Richard A. Goldsby, Barbara A. Osborne, Janis KubyKuby Immunology. W H Freeman (2007).
6. Kesar, Saroj and Vashishta N. (2007). Experimental Physiology: Comprehensive Manual. Heritage Publishers, New Delhi

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**Course prerequisites:** To study this course, a student must have had the subject biology in class/12<sup>th</sup>  
The eligibility for this paper is 10+2 from Arts/ Commerce/ Science

Suggested Continuous Evaluation Methods:

**Total Marks: 25**

**House Examination/Test:** 10 Marks

**Written Assignment/Presentation/Project / Term Papers/Seminar:** 10 Marks

**Class performance/Participation:** 5 Marks

Further Suggestions: None

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