

I Semester BSc Zoology Core Course Content

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| Course Title/Code: Cytology, Genetics and Infectious Diseases | Course Credits: 4 |
| Course Code: DSCC5Z00T1 | L-T-P per week: 4-0-0 |
| Total Contact Hours: 56 | Duration of ESA: 3 Hours |
| Formative Assessment Marks: 40 | Summative Assessment Marks: 60 |
| Model Syllabus Authors: | |

Core Course prerequisite: To study Zoology in undergraduate, student must have studied Biology or equivalent subject in Class 12.

Course Outcomes (COs):

At the end of the course the student should be able to understand:

1. The structure and function of the cell organelles.
2. The chromatin structure and its location.
3. The basic principle of life, how a cell divides leading to the growth of an
4. Organism and also reproduces to form a new organism.
5. How a cell communicates with its neighboring cells?
6. The principles of inheritance, Mendel's laws and the deviations.
7. How environment plays an important role by interacting with genetic factors.
8. Detect chromosomal aberrations in humans and study of pedigree analysis.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

| Course Outcomes (COs) / Program Outcomes (POs) | CC T1 | CC 2 | CC 3 | CC 4 | CC 5 | CC 6 | CC 7 | CC 8 | CC 9 | CC 10 | CC 11 |
|------------------------------------------------|-------|------|------|------|------|------|------|------|------|-------|-------|
| I Core competency | X | | | | | | | | | | |
| II Critical thinking | X | | | | | | | | | | |
| III Analytical reasoning | X | | | | | | | | | | |
| IV Research skills | X | | | | | | | | | | |
| V Team work | X | | | | | | | | | | |

Note: Course Articulation Matrix relates course outcomes of course with the corresponding program outcomes whose attainment is attempted in this course. Mark =X 'in the intersection cell if a course outcome addresses a particular program outcome.

Semester I- Zoology Core Course I Content:

| Content | Hours |
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| Unit | 14 |
| Chapter 1. Ultra structure and Function of Cell Organelles I in Animal Cell <ul style="list-style-type: none"> • Plasma membrane: Chemical composition—Fluid mosaic model • Endomembrane system: protein targeting and sorting, transport, endocytosis and exocytosis, types of cell junctions | |

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| Chapter 2. Structure and Function of Cell Organelles II in Animal Cell <ul style="list-style-type: none"> • Cytoskeleton: microtubules, microfilaments, intermediate filaments • Mitochondria: Structure, oxidative phosphorylation; electron transport system. • Endoplasmic reticulum: Structure, and function. • Peroxisome and Ribosome: structure and function | |
| Unit II | 14 |
| Chapter 3. Nucleus and Chromatin Structure <ul style="list-style-type: none"> • Structure and function of nucleus in eukaryotes • Chemical structure and base composition of DNA and RNA • Ultra structure of eukaryotic chromosome, Chromatin Organization-Nucleosome model • Types of DNA and RNA | |
| Chapter 4. Cell cycle, Cell Division and Cell Signaling <ul style="list-style-type: none"> • Cell division: mitosis and meiosis • Introduction to Cell cycle and its regulation, apoptosis • Signal transduction: intracellular signaling and cell surface receptors, via G-protein linked receptors. • Cell-cell interaction: -autocrine, paracrine and endocrine types. | |
| Unit III | 14 |
| Chapter 5. Mendelism and Sex Determination <ul style="list-style-type: none"> • Basic principles of heredity: Mendel 's laws- monohybrid cross and dihybridcross • Incomplete Dominance • Genetic Sex-Determining Systems, Environmental Sex Determination, • Chromosomal Sex Determination and mechanism in <i>Drosophila melanogaster</i>. • Sex-linked characteristics in humans and dosage compensation. | |
| Chapter 6. Extensions of Mendelism, Genes and Environment <ul style="list-style-type: none"> • Extensions of Mendelism: Multiple Alleles, Gene Interaction-inheritance of comb pattern in fowl. • The Interaction Between Sex and Heredity: Sex-Influenced and Sex-Limited Characteristics • Cytoplasmic Inheritance- Kappa particles in Paramecium, Genetic Maternal Effects. • Interaction between Genes and Environment. • Inheritance of Continuous Characteristics. | |
| Unit IV | 14 |
| Chapter 7. Human Chromosomes and Patterns of Inheritance <ul style="list-style-type: none"> • Patterns of inheritance: autosomal dominance, autosomal recessive, X-linked recessive, X-linked dominant. • Chromosomal anomalies: Structural and numerical aberrations with examples. • Human karyotyping and Pedigree analysis. | |
| Chapter 8. Infectious Diseases <ul style="list-style-type: none"> • Introduction to human pathogenic organisms- viruses, bacteria, fungi, protozoa and helminths worms. • Structure, life cycle, pathogenicity, including diseases, causes, symptoms and control of common parasites: <i>Trypanosoma</i>, <i>Giardia</i> and <i>Wuchereria</i>. | |

Suggested Readings:

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). Pierce B. Genetics. Freeman (2004).
5. Lewin B. Genes VIII. Pearson (2004).
6. Watson et al. Molecular Biology of the Gene. Pearson (2004).
7. Thomas J. Kindt, Richard A. Goldsby, Barbara A. Osborne, Janis Kuby- Kuby Immunology. W H Freeman (2007).
8. Delves Peter J., Martin Seamus J., Burton Dennis R., Roitt Ivan M. Roitt's Essential Immunology, 13th Edition. Wiley Blackwell (2017).
9. Principles of Genetics by B. D. Singh
10. Cell-Biology by C. B. Pawar, Kalyani Publications
11. Economic Zoology by Shukla and Upadhyaya

Pedagogy: Written Assignment/Presentation/Project / Term Papers/Seminar

| Formative Assessment | |
|-------------------------------------------------------|---------------------|
| Assessment Occasion | Weightage in |
| House Examination/Test | 20 |
| Written Assignment/Presentation/Project / Term | 15 |
| Class performance/Participation | 05 |
| Total | 40 |

Zoology Core Lab Course Content**Semester I**

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|----------------------------------------------|---------------------------------------|
| Course Title: Cell Biology &Cytogenetics Lab | Course Credits:2 |
| Course Code: DSCC5Z00P1 | L-T-P per week: 0-0-4 |
| Total Contact Hours: 56 | Duration of ESA: 4 Hours |
| Formative Assessment Marks: 25 | Summative Assessment Marks: 25 |
| Model Syllabus Authors: | |

Course Outcomes (COs):

At the end of the course the student should be able to:

1. To use simple and compound microscopes.
2. To prepare stained slides to observe the cell organelles.
3. 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.
4. The chromosomal aberrations by preparing karyotypes.
5. How chromosomal aberrations are inherited in humans by pedigree analysis in families. The antigen-antibody reaction.

Course Articulation Matrix: Mapping of Course Outcomes (COs) with Program Outcomes (POs)

| Course Outcomes (COs) / Program Outcomes (POs) | CC P1 | CC 2 | CC 3 | CC 4 | CC 5 | CC 6 | CC 7 | CC 8 | CC 9 | CC 10 | CC 11 |
|-------------------------------------------------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|
| I Core competency | X | | | | | | | | | | |
| II Critical thinking | X | | | | | | | | | | |
| III Analytical reasoning | X | | | | | | | | | | |
| IV Research skills | X | | | | | | | | | | |
| V Team work | X | | | | | | | | | | |

Lab Course Content

| List of labs to be conducted | 56 h rs. |
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| <ol style="list-style-type: none"> 1. Understanding of simple and compound microscopes. 2. To study different cell types such as buccal epithelial cells, striated muscle cells using Methylene blue/any suitable stain (virtual/ slide/slaughtered tissue). 3. To study the different stages of Mitosis in root tip of <i>Allium cepa</i>. 4. To study the different stages of Meiosis in grasshopper testis (virtual/ slides). 5. To check the permeability of cells using salt solution of different concentrations. 6. Study of parasites in humans (e.g. Protozoans, Helminthes in compliance with examples being studied in theory) permanent micro slides. 7. To learn the procedures of preparation of temporary slides (fish scale) and permanent slides, with available mounting material (sex comb of <i>Drosophila</i>/ insect mouth parts). 8. Study of life cycles of <i>Drosophila</i> sp. (from Cultures or Photographs). 9. Preparation of polytene chromosomes (<i>Chironomus</i> larva or <i>Drosophila</i> larva). 10. Preparation of human karyotype and study the chromosomal structural and numerical aberrations from the pictures provided. (Virtual/optional). 11. To prepare family pedigrees. 12. https://www.vlab.co.in 13. https://zoologysan.blogspot.com 14. www.vlab.iitb.ac.in/vlab 15. www.onlinelabs.in 16. www.powershow.com 17. https://vlab.amrita.eduhttps://sites.dartmouth.edu/ | |

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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). Pierce B. Genetics. Freeman (2004).
5. Thomas J. Kindt, Richard A. Goldsby, Barbara A. Osborne, Janis Kuby- Kuby Immunology. W H Freeman (2007).
6. Kesar, Saroj and Vasishta N. 2007 Experimental Physiology: Comprehensive Manual. Heritage Publishers, New Delhi.

Pedagogy: Written Assignment/Presentation/Project / Term Papers/Seminar

| Formative Assessment | |
|--------------------------------------------------------------|--------------------|
| Assessment Occasion | Weightage in Marks |
| House Examination/Test | 05 |
| Written Assignment/Presentation/Project /Term papers/Seminar | 05 |
| Records | 05 |
| Viva | 05 |
| Class performance/Participation | 05 |
| Total | 25 |