B.Sc I Year (Semester I) Zoology Core Paper 1

Cytology, Genetics and Infectious Diseases (Theory)

Programme/Class: Certificate	Year: 1	Semester: 1
Subject: Zoology		
Course Code: **B050101T**	Course Title: **Cytology, Genetics and Infectious Diseases**	

Course outcomes:

The student at the completion of the course will be able to:

- Understand the structure and function of all the cell organelles.
- Know about the chromatin structure and its location.
- 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.
- How one cell communicates with its neighboring cells?
- Understand the basic principles of genetics and how genes (earlier called factors) are inherited from one generation to another.
- Understand the Mendel's laws and the deviations from conventional patterns of inheritance.
- Comprehend how environment plays an important role by interacting with genetic factors.
- How to detect chromosomal aberrations in humans and study the pattern of inheritance by pedigree analysis in families.

Credits: 4	Core Compulsory
Max. Marks: 25+75	Min. Passing Marks: 33
Total No. of Lectures= 60	

Unit	Topics	Total No. of Lectures (60)
I	**Structure and Function of Cell Organelles I** • Plasma membrane: chemical structure-lipids and proteins • Cell-cell interaction: cell adhesion molecules, cellular junctions • Endomembrane system: protein targeting and sorting, endocytosis, exocytosis **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)**	6
II	**Structure and Function of Cell Organelles II** • Cytoskeleton: microtubules, microfilaments, intermediate filaments • Mitochondria: Structure, oxidative phosphorylation • Peroxisome and ribosome: structure and function	6

III	**Nucleus and Chromatin Structure** • Structure and function of nucleus in eukaryotes • Chemical structure and base composition of DNA and RNA • DNA supercoiling, chromatin organization, structure of chromosomes • Types of DNA and RNA	8
IV	**Cell cycle, Cell Division and Cell Signalling** • Cell division: mitosis and meiosis • Cell cycle and its regulation, apoptosis • Signal transduction: intracellular signaling and cell surface receptors, via G-protein linked receptors, JAK-STAT pathway	8
V	**Mendelism and Sex Determination** • Basic principles of heredity: Mendel's laws, monohybrid and dihybrid crosses • Complete and Incomplete Dominance • Penetrance and expressivity • Genic Sex-Determining Systems, Environmental Sex Determination, Sex Determination in Drosophila, Sex Determination in Humans • Sex-linked characteristics and Dosage compensation	**8**
VI	**Extensions of Mendelism, Genes and Environment** • Extensions of Mendelism: Multiple Alleles, Gene Interaction • The Interaction Between Sex and Heredity: Sex-Influenced and Sex- Limited Characteristics • Cytoplasmic Inheritance, Genetic Maternal Effects • Genomic Imprinting, Anticipation • Interaction Between Genes and Environment: Environmental Effects on Gene Expression, Inheritance of Continuous Characteristics	**8**
VII	**Human Chromosomes and Patterns of Inheritance** • Human karyotype • Chromosomal anomalies: Structural and numerical aberrations with examples • Pedigree analysis • Patterns of inheritance: autosomal dominant, autosomal recessive, X-linked recessive, X-linked dominant	**8**
VIII	**Infectious Diseases** • Introduction to pathogenic organisms: viruses, bacteria, fungi, protozoa, and worms. • Structure, life cycle, pathogenicity, including diseases, causes, symptoms and control of common parasites: Trypanosoma, Giardia and Wuchereria	**8**

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 KubyKuby 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. Shetty Nandini Immunology Introductory Textbook. New Age International. (2005)

Suggested Continuous Evaluation Methods:

- Seminar/ Presentation on any topic of the above syllabus
- Test with multiple choice questions/ short and long answer questionsAttendance

Further Suggestions:

It widens the scope for students to join Government and Non-Government organization up skillingthe people at different levels as per their socio-economic structure.

At the End of the whole syllabus any remarks/ suggestions:

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B.Sc. I Year (Semester I) Zoology Paper 2
Cell Biology & Cytogenetics Lab (Practical)

Programme/Class: Certificate	Year: 1	Semester: 1
Subject: Zoology		
Course Code: **B050101P**	Course Title: **Cell Biology & Cytogenetics Lab**	

Course outcomes:
Course outcomes:
At the completion of the course students will learn Hands-on:
1. To use simple and compound microscopes.
2. To prepare slides and stain them to see 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.
6. The antigen-antibody reaction.

Credits: 2	Core Compulsory
Max. Marks: 25+75	Min. Passing Marks: 40

Total No. of Lab Periods/Practical= 30 (60 hours)

Unit	Topics	Total No. of Lectures
I	1. To study different cell typessuch asbuccal epithelial cells, neurons, striated muscle cells using Methylene blue. 2. To study the different stages of Mitosis in root tip of onion. 3. To study the different stages of Meiosis in grasshopper testis. 4. To prepare molecular models of nucleotides, amino acids, dipeptides using bead and stick method. 5. To check the permeability of cells using salt solution of different concentrations.	08
II	1. Study of parasites (eg. Protozoans, helminths etc.) from permanent slides. 2. To learn the procedures for preparation of temporary and permanent stained/unstained slides.	07
III	1. Study of mutant phenotypes of Drosophila. 2. Preparation of polytene chromosomes. 3. Study of sex chromatin (Barr bodies) in buccal smear and hair bud cells (Human). 4. Preparation of human karyotype and study the chromosomal aberrations with respect to number, translocation, deletion etc. from the pictures provided. 5. To prepare family pedigrees**.**	07

IV	Virtual Labs (Suggestive sites) https://www.vlab.co.in https://zoologysan.blogspot.com www.vlab.iitb.ac.in/vlab www.onlinelabs.in www.powershow.com https://vlab.amrita.edu https://sites.dartmouth.edu	08

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. 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

Suggested Continuous Evaluation Methods:

- Seminar/ Presentation on any topic of the above syllabus
- Test with multiple choice questions/ short and long answer questionsAttendance

Further Suggestions:

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At the End of the whole syllabus any remarks/ suggestions:

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I Year (Semester I) Zoology GE 1/Minor Elective

Animal Diversity

Programme/Class: Certificate	Year: 1	Semester: 1
Subject: Zoology		
Course Code: **B050104T**	Course Title: **Animal Diversity**	

Course outcomes:

At the end of the course students will be able to understand:

- Understand the importance of animal diversity and their role in nature.
- Students will become familiar with different species of animals with their specific features.
- Explain structural and functional diversity of non-chordate and chordates
- Explain evolutionary relationship amongst non-chordate and chordate groups
- Get employment in different applied sectors

Credits: 4 Theory	**GE 1/Minor Elective**
Max. Marks: 30+70	

Total No. of Lectures-60

Units	Topic	No of Lectures 60
I	**Protista** General characters of Protozoa; Life cycle of Plasmodium **Porifera** General characters and canal system in Porifera **Radiata** General characters of Cnidarians and polymorphism	15
II	**Aceolomates** General characters of Helminthes; Life cycle of *Taenia solium* **Pseudocoelomates** General characters of Nemethehelminthes; Parasitic adaptations **Coelomate Protostomes** General characters of Annelida; Metamerism	15
III	**Arthropoda** General characters. Social life in insects **Mollusca** General characters of mollusca; Pearl Formation **Coelomate Deuterostomes** General characters of Echinodermata, Water Vascular system in Starfish **Protochordata** Salient features	15

IV	**Pisces** Osmoregulation, Migration of Fishes **Amphibia** General characters, Adaptations for terrestrial life, Parental care in Amphibia **Amniotes** Origin of reptiles. Terrestrial adaptations in reptiles **Aves** The origin of birds; Flight adaptations **Mammalia** Early evolution of mammals; Primates; Dentition in mammals	15

Suggested Readings:

- Menon, N. (2008). Sexualities: Issues in contemporary Indian feminism. New Delhi: Sage.
- Mohanty, M. (2008). Class, caste and gender. New Delhi: Sage.
- Saikia, N. (2008). Indian women: A socio-legal perspective. New Delhi: Serials publications.
- Bajpai, A.(2006). Child rights in India: Law, policy and practice. New Delhi: Oxford University Press.
- Bhargava, V. (2005). Adoption in India: Policies and experiences. New Delhi: Sage.
- Virani,). (2000). Bitter chocolate: Child Sexual abuse in India. New Delhi: Penguin
- Weiner, M., Burra, N., Bajpai, A. (2007). Born unfree: Child labour, Education, and thestate in India. New Delhi: Oxford University Press.

This course can be opted as an elective by the students of following subjects: Open for all
The eligibility for this paper is 10+2 with any subject

Suggested Continuous Evaluation Methods:
- Seminar/ Presentation on any topic of the above syllabus
- Test with multiple choice questions/ short and long answer questions

Attendance

Course prerequisites: To study this course, a student must have had the subject ALL in class12th.
The eligibility for this paper is 10+2 with any subject

Further Suggestions:
It widens the scope for students to join Government and Non-Government organization upskilling the people at different levels as per their socio-economic structure.

At the End of the whole syllabus any remarks/ suggestions:
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I Year (Semester I) Zoology SEC 1/Vocational Course
Apiculture

Programme/Class: Certificate	Year: 1	Semester: 1
Subject: Zoology		
Course Code: **B050105T**	Course Title: **Apiculture**	

Course outcomes:
At the end of the course students will be able to understand:

- To understand the importance of industrial entomology and rearing of beneficial insects such as honey bees.
- The importance and significance of apiculture in honey production industry and different quality control measures in honey processing industries.
- To understand pests and diseases related to apiculture and their control and management practices.
- After completing this course, students will have working knowledge of honey bee biology and the economic products of apiculture industry.
- Get employment and entrepreneurship in different applied sectors

Credits: 3 Theory	**SEC 1/Vocational Course**
Max. Marks: 30+70	

Total No. of Lectures- 60

Units	**Topic**	**No of Lectures 60**
I	**Biology of Bees** History, Classification and Biology of Honey Bees Social Organization of Bee Colony	15
II	**Rearing of Bees** Artificial Bee rearing (Apiary), Beehives - Newton and Langstroth Bee Pasturage Selection of Bee Species for Apiculture Bee Keeping Equipment Methods of Extraction of Honey (Indigenous and Modern)	15
III	**Diseases and Enemies** Bee Diseases and Enemies Control and Preventive measures **Bee Economy** Products of Apiculture Industry and its Uses (Honey, Bees Wax, Propolis), Pollen etc	15
IV	**Entrepreneurship in Apiculture** Bee Keeping Industry- Recent Efforts, Modern Methods in employing artificial Beehives for cross pollination in horticultural gardens	15

Suggested Readings:

- Prost, P. J. (1962). Apiculture. Oxford and IBH, New Delhi.
- Bisht D.S., Apiculture, ICAR Publication.
- Singh S., Beekeeping in India, Indian council of Agricultural Research, NewDelhi.

This course can be opted as an elective by the students of following subjects: Open for all
The eligibility for this paper is 10+2 with any subject

Suggested Continuous Evaluation Methods:

- Seminar/ Presentation on any topic of the above syllabus
- Test with multiple choice questions/ short and long answer questions

Attendance

Course prerequisites: To study this course, a student must have had the subject ALL in class12th.
The eligibility for this paper is 10+2 with any subject

Further Suggestions:
It widens the scope for students to join Government and Non-Government organization upskilling the people at different levels as per their socio-economic structure.

At the End of the whole syllabus any remarks/ suggestions:
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