



M. C. E. Society's

Abeda Inamdar Senior College

Of Arts, Science and Commerce, Camp, Pune-1

(Autonomous) Affiliated to Savitribai Phule Pune University

NAAC accredited 'A' Grade

F.Y.B.Sc Zoology

(CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Invertebrate Diversity I
Course Code	21SBZO111
Semester	I
No. of Credits	2 (36 lectures of 50 minutes)

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To understand the Invertebrate animal diversity around us.
2.	To understand the underlying principles and terminology needed in classification of animals.
3.	To understand the differences and similarities in the various aspects of classification.
4.	To be able to understand the possible group of the invertebrate observed in nature and classify them
5.	To understand our role as a caretaker and promoter of life around us.
6.	To understand the economic importance of various invertebrates

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	The student will be able to understand classify and identify diverse invertebrates.
2.	The student understands the importance of classification can effectively use the six levels of classification.

3.	The student knows the general characters of kingdom Animalia, phylum Protozoa, Porifera, Coelenterata, and Platyhelminthes
4.	The student can describe habit, habitat, external morphology, feeding and reproduction in <i>Paramecium</i>
5.	The student understands the economic importance of various invertebrates and can use it judiciously for the betterment of mankind

Syllabus

Unit No	Title with Contents	No. of Lectures
Unit I	Principles of Classification:	06
	<p>1. Taxonomy & Systematics</p> <p>i. Taxonomy: Basic terminology and Introduction</p> <p>a. Alpha, Beta and Gamma levels of taxonomy, Microtaxonomy</p> <p>b. Macro taxonomy: Phenetics (numerical taxonomy, Cladistics (Phylogenetic systematics), Evolutionary taxonomy (evolutionary systematics)</p> <p>c. Classical taxonomy and experimental or neo taxonomy (biochemical taxonomy and Cytotaxonomy)</p> <p>d. Significance of Taxonomy</p> <p>ii. Systematics: Definition and introduction</p> <p>2. Linnaean system of classification (Six levels of classification: Phylum, class, order, family, genus, species)</p> <p>3. Concept of Species: Biological and Evolutionary concept</p> <p>4. Nomenclature:</p> <p>i. Introduction to Binomial</p> <p>ii. Trinomial Nomenclature</p> <p>iii. Rules of Zoological nomenclature</p> <p>5. Introduction to Five kingdom system</p>	

Unit II	General Features of kingdom Animalia	02
	1. General characters of Kingdom Animalia 2. Classification- Protozoa and Metazoa	
Unit III	Kingdom Protista (Phylum: Protozoa)	09
	1. Introduction to Phylum Protozoa 2. Salient features of Phylum Protozoa 3. Classification of Phylum Protozoa up to classes with two examples of each class (names only). i. Class Rhizopoda (e.g.: <i>Entamoeba histolytica</i> , <i>Arcella</i>) ii. Class Mastigophora (e.g.: <i>Euglena viridis</i> , <i>Trypanosoma gambiense</i>) iii. Class Ciliata (e.g. <i>Paramecium caudatum</i> , <i>Opalina ranarum</i>) iv. Class Sporozoa (e.g. <i>Plasmodium vivax</i> , <i>Toxoplasma gondii</i>) 4. Locomotion in Protozoa: Amoeboid, Ciliary and Flagellar with examples 5. Type Study: <i>Paramecium caudatum</i>: i. Classification ii. Habit and Habitat, iii. External morphology iv. Feeding and digestion v. Excretion vi. Reproduction (binary fission and conjugation) 6. Economic importance of Protozoa	
Unit IV	Organization, symmetry, body wall and coelom in metazoa	02
	1. Grades of organization, Symmetry and Body wall: Diploblastic, Triploblastic 2. Coelom: Acoelomate, Pseudocoelomate, Eucoelomate	

Unit V	Phylum Porifera	06
	<p>1. Introduction and salient features of Phylum Porifera</p> <p>2. Classification of Phylum Porifera up to classes with two examples of each class (names only)</p> <ul style="list-style-type: none"> i. Class Calcarea (e.g.: <i>Leucosolenia</i>, <i>Sycon</i> (<i>Scypha</i>)) ii. Class Hexactinellida (e.g.: <i>Euplectella</i> (Venus flower basket), <i>Hyalonema</i> (Glass sponge)) iii. Class Demospongiae (e.g.: <i>Chalina</i> (Mermaid’s gloves), <i>Spongilla</i> (fresh water sponge)) <p>3. Canal system in sponges:</p> <ul style="list-style-type: none"> i. Ascon ii. Sycon iii. Leucon iv. Rhagon <p>4. Skeleton in sponges:</p> <ul style="list-style-type: none"> i. Types of Spicules: Microscleres & Megascleres, Monoaxon – monactinal, diactinal, Amphidiscs, Triaxon, Polyaxon ii. Spongin fibres. <p>5. Regeneration in sponges.</p> <p>6. Economic importance of Phylum Porifera.</p>	
Unit VI	Phylum: Cnidaria	05
	<p>1. Introduction and salient features of Phylum Cnidaria</p> <p>2. Classification of Phylum Cnidaria up to class level with given examples of each class (names only)</p> <ul style="list-style-type: none"> i. Class Hydrozoa (e.g.: <i>Hydra</i>, <i>Physalia</i> (Portuguese man of war)) ii. Class Scyphozoa (e.g.: <i>Aurelia</i> (Jelly fish), <i>Leucernaria</i> (trumpet shaped Jellyfish)) iii. Class Anthozoa (e.g.: <i>Metridium</i> (Common sea anemone)) <p>3. Polymorphism in Hydrozoa</p> <p>4. Economic importance of Cnidarians with reference to Corals and Coral reefs.</p>	

Unit VII	Phylum Platyhelminthes	03
	1. Introduction and salient features of Phylum Platyhelminthes 2. Classification of Phylum Platyhelminthes up to classes with two examples of each class (names only) i. Class: Turbellaria (e.g.: <i>Dugesia</i> , <i>Bipalium</i>) ii. Class: Trematoda (e.g.: <i>Fasciola hepatica</i> , <i>Schistosoma haematobium</i>) iii. Class Cestoda: (e.g., <i>Taenia saginata</i> (Beef tape worm), <i>Echinococcus granulosus</i> (Dog tapeworm)) 7.3. Economic importance of Platyhelminthes	
Unit VIII	Model organisms	03
	1. Introduction and salient features of model organisms 2. Hydra as a model organism	

References:

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2. Barnes, R.D.: Invertebrate Zoology, V Edition 1982, Holt Saunders International Edition
3. Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I.: The Invertebrates: A New Synthesis, III Edition 2002, Blackwell Science
4. Barrington, E.J.W.: Invertebrate Structure and Functions. II Edition 1979, E.L.B.S. and Nelson
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8. Hyman, L. H: Invertebrates Vol I, Protozoa through ctenophore. 1940, McGraw Hill, New York
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F.Y.B.Sc Zoology

(CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Ecology
Course Code	21SBZO112
Semester	I
No. of Credits	2 (36 lectures of 50 minutes)

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To know the basic concepts of ecosystem, population, community, biodiversity and conservation.
2.	To be able to speak about and write about the major concepts in ecology.
3.	To Know the wild life of India and latest technology used for conservation.
4.	To investigate current environmental problem and relate it to classroom concepts.
5.	To analyze interconnections among the major concepts of ecology.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	The learners will be able to identify and critically evaluate their own beliefs, values and actions in relation to professional and societal standards of ethics and its impact on ecosystem and biosphere due to the dynamics in population.

2.	To understand anticipate, analyze and evaluate natural resource issues and act on a lifestyle that conserves nature
3.	The Learner understands and appreciates the diversity of ecosystems and applies beyond the syllabi to understand the local lifestyle and problems of the community.
4.	The learner will be able to link the intricacies of food chains, food webs and link it with human life for its betterment and for non-exploitation of the biotic and abiotic components.
5.	The working in nature to save environment will help development of leadership skills to promote betterment of environment.

Syllabus

Unit No.	Title with Content	No. of Lectures
Unit I	Introduction to Ecology	03
	1. Concepts of Ecology: <ul style="list-style-type: none"> i. Environment ii. Population iii. Community iv. Ecosystem v. Biosphere vi. Biomes vii. Autecology and synecology. 	
Unit II	Ecosystem	08
	1. Types of ecosystems: <ul style="list-style-type: none"> i. Aquatic (Freshwater, estuarine, Marine) ii. Terrestrial (Forest, Grassland and Desert) 2. Composition of Ecosystem <ul style="list-style-type: none"> i. Abiotic components ii. Biotic components 	

	<p>3. Food chain: Detritus and grazing food chains, Food web</p> <p>4. Energy flow in Ecosystem</p> <p>5. Concept of Eutrophication in lakes and rivers.</p>	
Unit III	Population	05
	<p>1. Characteristic of population: Density, Natality, Mortality, age ratio, sex ratio,</p> <p>2. Exponential and logistic growth, Gause's Principle with laboratory experiment example</p> <p>3. Quadrature method of sampling.</p>	
Unit IV	Community	05
	<p>1. Community characteristics:</p> <ul style="list-style-type: none"> i. Species richness ii. Dominance iii. Diversity iv. Abundance v. Vertical stratification, <p>2. Eco tone and edge effect</p> <p>3. Ecological succession with one example, Hydrosere and Xerosere</p>	
Unit V	Animal interactions	05
	<p>1. Introduction to Animal interactions</p> <p>2. Types of Animal interactions with at least two suitable examples of each</p> <ul style="list-style-type: none"> i. Competition: Interspecific and intraspecific ii. Beneficial Associations: Commensalism iii. Mutualism Antagonistic associations: Parasitism Prey predation 	

Unit VI	Biodiversity and conservation	10
	1. Biodiversity and diversity conservation of natural resources. 2. Wildlife of India. 3. Introduction <ul style="list-style-type: none"> i. Remote sensing ii. GIS and radio tagging for wild life monitoring iii. Sustainable development iv. In-situ and Ex-situ conservation 4. Pollution and its impact on biosphere <ul style="list-style-type: none"> i. Air pollution ii. Water pollution iii. land pollution 	

References:

1. Colinvaux, P. A.: Introduction to Ecology. II Edition 1993, Wiley, John and Sons, Inc.
2. Krebs, C. J. : Ecology: The Experimental Analysis of Distribution and Abundance, 6th Edition, 2001 Pearson
3. Odum, E.P.: Fundamentals of Ecology 2008, Indian Edition. Brooks/Cole
4. Robert Leo Smith: Ecology and field biology, Harper and Row publisher
5. Ricklefs: Ecology. V Edition, 2000, R.E. Chiron Press
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F.Y.B.Sc Zoology

(CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Practical based on 21SBZO111 and 21SBZO112
Course Code	21SBZO113
Semester	I
No. of Credits	1.5 (46.8 lectures of 50 minutes)

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	The student will be able to identify and classify animals based on their characters of phyla - Protozoa, Porifera, Coelenterata, and Platyhelminthes
2.	The student will be able to prepare <i>Paramecium</i> culture to study their structure and reproduction
3.	The student can interpret the body organization through permanent slides.
4.	The student can maintain <i>Hydraculture</i> in laboratory
5.	The student can analyze and estimate physicochemical parameters of water
6.	The student can calculate and analyze various components of biodiversity such as density, abundance etc.
7.	The student can maintain and use basic equipments needed in wildlife studies

Syllabus

Sr. no.	Unit- Invertebrate Diversity –I
1.	Museum Study of phylum Protozoa: <i>Euglena</i> , <i>Paramecium</i> , <i>Amoeba</i> and <i>Plasmodium</i> sp.
2.	Museum study of Phylum Porifera: <i>Sycon</i> , <i>Euplectella</i> , <i>Chalina</i> and <i>Spongilla</i> .
3.	Museum study of phylum Cnidaria: <i>Hydra</i> , <i>Physalia</i> , <i>Aurelia</i> and <i>Metridium</i> .
4.	Museum Study of phylum Platyhelminthes: <i>Planaria</i> , <i>Faciola hepatica</i> and <i>Taenia saginata</i>
5.	Study of <i>Paramecium</i> : Culture, External morphology, Conjugation and Binary fission.
6.	Study of permanent slides: <ol style="list-style-type: none"> i. Spicules and Gemmules in Sponges ii. T.S. of <i>Sycon</i> and T.S. of <i>Hydra</i> iii. <i>Taenia solium</i>: Scolex and Gravid proglottid
7.	Identification of any three museum specimen with help of taxonomic identification key.
8.	Visit to Zoological survey of India/ Museum/National Park.
9.	<ol style="list-style-type: none"> i. Culture and maintenance of <i>Hydra</i>, ii. Regeneration and Foot staining in <i>Hydra</i>
Sr. no.	Unit – IIEcology
1.	Estimation of Dissolved oxygen from given water sample.
2.	Estimation of Water Alkalinity from given water sample.
3.	Study of animal community structure by quadrat method (Field or Simulation) and determination of density, frequency and abundance of species.
4.	Demonstration of basic equipment needed in wildlife studies use, care

	and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System, Various types of Cameras and lenses)
5.	Study of microscopic fauna of freshwater ecosystem (from pond).
6.	Estimation of water holding capacity of given soil sample.
7.	Estimation of free carbon dioxide from water sample.
8.	Study of Eutrophication in lake/river. OR Study of polluted site to check the impact of human activities.



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F.Y.B.Sc Zoology

(CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Invertebrate Diversity –II
Course Code	21SBZO121
Semester	II
No. of Credits	2 (36 lectures of 50 minutes)

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To understand the Invertebrate animal diversity around us.
2.	To be able to understand the possible group of the invertebrate observed in nature and classify them
3.	To understand our role as a caretaker and promoter of life around us.
4.	To understand the economic importance of various invertebrates
5.	To understand external and internal morphology of invertebrates

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	The student will be able to describe the general characters of phyla – Aschelminthes, Annelida, Arthropoda, Mollusca and Echinodermata
2.	The student will be able to identify and classify members of phyla – Aschelminthes, Annelida, Arthropoda, Mollusca and Echinodermata up to class
3.	The student can evaluate the economic importance of various

	invertebrates from phyla – Aschelminthes, Annelida, Arthropoda, Mollusca and Echinodermata and is capable of using it judiciously for the betterment of mankind
4.	Discuss the importance of earthworm as friend of farmer w.r.t vermicomposting
5.	Describe habit, habitat, external characters, feeding and reproduction and regeneration of <i>Asterias rubens</i> as a representative case of Echinodermata

Syllabus

Unit No	Title with Contents	No. of Lectures
Unit I	Phylum Aschelminthes	07
	1. Introduction and salient features of phylum Aschelminthes 2. Classification of Phylum Aschelminthes (Class Nematoda only with two examples – <i>Ascaris lumbricoides</i> (common round worm), <i>Wuchereria bancrofti</i> (Elephantiasis). 3. Type Study: <i>Ascaris lumbricoides</i> : Habit, habitat and lifecycle 4. Economic importance of class Nematoda.	
Unit II	Phylum Annelida	05
	1. Introduction and salient features to Phylum Annelida 2. Classification of Phylum Annelida up to classes with examples of following classes (names only). i. Class Polychaeta e.g.: <i>Nereis pelagica</i> (<i>nereis</i> / sand worm), <i>Aphrodita aculeata</i> (Aphrodite/ sea mouse) ii. Class Oligochaeta e.g.: <i>Pheretima posthuma</i> (earthworm), iii. Class Hirudinea e.g.: <i>Hirudinaria granulosa</i> (common cattle leech) 3. Economic importance of Annelida with reference to earthworms as friend of farmer and in their role in vermicomposting.	

Unit III	Phylum Arthropoda	08
	<p>1. Introduction and Salient features of Phylum Arthropoda</p> <p>2. Classification of Phylum Arthropoda with specific classes and mentioned examples (names only)</p> <ul style="list-style-type: none"> i. Class: Crustaceae.e.g. <i>Palaemon palaemon</i> (Prawn) <i>Brachyura</i> spp.(crabs) ii. Class: Chilopoda e.g. <i>Scolopendra</i> sp. (centipede) iii. Class: Diplopoda e.g. <i>Julus</i> sp. (millipede) iv. Class Insecta e.g.: <i>Periplaneta americana</i> (American Cockroach), <i>Anopheles stephensii</i> (mosquito). v. Class: Arachnida e.g. Spiders, <i>Buthus</i> sp. (scorpion) <p>3. Mouth parts in insects:</p> <ul style="list-style-type: none"> i.Mandibulate (cockroach) ii.Piercing and sucking (female <i>Anopheles</i> mosquito) iii.Siphoning type (housefly) <p>4. Economic importance of Arthropoda with emphasis on useful and harmful insects</p>	
Unit IV	Phylum Mollusca	05
	<p>Introduction to Phylum Mollusca</p> <p>1. Salient features of Phylum Mollusca</p> <p>2. Classification of Phylum Mollusca with specific classes and mentioned examples (names only)</p> <ul style="list-style-type: none"> i. Class Gastropoda e.g. <i>Pila globosa</i> (apple snail) ii. Class Pelecypoda e.g.: <i>Lamellidens marginalis</i>(Bivalve) iii. Class Polyplacophora e.g. <i>Chiton</i> iv. Class: Cephalopoda e.g. <i>Octopus vulgaris</i> (common octopus), <i>Sepia officinalis</i> (common Cuttle fish) <p>3. Economic importance of Mollusca.</p>	

Unit IV	Study of Phylum Echinodermata	11
	<ol style="list-style-type: none"> 1. Introduction to Phylum Echinodermata 2. Salient features of Phylum Echinodermata. 3. Classification of Phylum Echinodermata with specific classes and mentioned examples (names only) <ol style="list-style-type: none"> i. Class Asteroidea e.g. <i>Asterias rubens</i> (sea stars or starfish) Class: Holothuroidea e.g. <i>Holothuria sp.</i> (sea cucumbers) ii. Class: Echinoidea e.g. <i>Echinus esculentis</i> (common sea urchins) iii. Class: Crinoidea (sea lilies or feather stars), 4. Type study: <i>Asterias rubens</i> (Sea Star): <ol style="list-style-type: none"> i. Classification ii. Habit Habitat iii. External Morphology iv. Digestive system v. Water vascular System vi. Autotomy and regeneration 5. Pedicellaria in Echinodermata: <ol style="list-style-type: none"> i. Straight ii. Crossed iii. Valvate iv. Tridactylous v. Globigerous 6. Economic importance of Echinodermata. 	

References:

1. Anderson, D.T (Ed): Invertebrate Zoology 1988, Oxford University Press
2. Barnes, R.D.: Invertebrate Zoology, V Edition 1982, Holt Saunders International Edition
3. Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I.: The Invertebrates: A New Synthesis, III Edition 2002, Blackwell Science
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F.Y.B.Sc Zoology

(CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Cell biology
Course Code	21SBZO122
Semester	II
No. of Credits	2 (36 lectures of 50 minutes)

Aims & Objectives of the Course

Sr. No.	Objectives
1.	To know the basic concepts of cell biology, its branches and application in recent world,
2.	To be able to differentiate between prokaryotic and eukaryotic cells
	To know the cellular components are their function and interrelations.
3.	To know the recent technique used in cell biology research.
4.	To link knowledge of cell biology with cause of diseases related to cell physiology.
5.	To understand the cellular components and mechanisms of cell division and cause of abnormal cellgrowth.

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	The learner will understand the importance of cell as a structural and functional unit of life.
2.	The learner understands the difference between the prokaryotic and eukaryotic cells and extrapolates it to the aspect of development and

	evolution.
3.	The learner understands the dynamism of bio membranes and its working mechanism responsible for our performance in life
4.	The learner understands the cellular mechanisms its functioning that depends on endo-membranes and structures. They are best studied with microscopy.

Syllabus

Unit No	Title with Contents	No. of Lectures
Unit I	Introduction:	04
	1. Introduction cell biology 2. Importance of Cell Biology and its applications in industry. 3. Introduction to Prokaryotic and Eukaryotic cells. 4. Structure of Prokaryotic cell (<i>E. coli</i>) 5. Structure Eukaryotic cells (Animal)	
Unit II	Techniques in Cell Biology:	08
	1. Introduction 2. Microscopy and principle of various microscopes: <ol style="list-style-type: none"> i. Phase contrast microscope ii. Confocal microscopy iii. Electron microscopy (EM)- scanning EM and scanning transmission EM (STEM) iv. Fluorescence microscopy; 3. Analytical tools and techniques <ol style="list-style-type: none"> i. Flow cytometry- fluorochromes, ii. Separation-Sub-cellular fractionation- differential and density gradient centrifugation; 4. Stains and dyes: Types of Stain: Acidic, basic and neutral. Dyes	

Unit III	Plasma Membrane:	06
	<p>1. Introduction of plasma membrane</p> <p>2. Structure of plasma membrane: Fluid mosaic model.</p> <p>3. Transport across membranes:</p> <ul style="list-style-type: none"> i. Active and Passive transport ii. Facilitated transport iii. exocytosis, endocytosis, phagocytosis iv. Vesicles and their importance in transport. <p>4. Other functions of Cell membrane in brief Protection, cell recognition, shape, storage, cell signaling.</p> <p>5. Cell Junctions:</p> <ul style="list-style-type: none"> i. Tight junctions ii. Gap junctions iii. Desmosomes. 	
Unit IV	Nucleus: Structure and function	04
	<p>1. Introduction to Nucleus</p> <p>2. Structure of Nucleus:</p> <ul style="list-style-type: none"> i. Nuclear envelope ii. Nuclear pore complex iii. Nucleoplasm iv. Nucleolus <p>3. Chromatin: Eu-chromatin and Hetero-chromatin, nature and differences. organization of chromatin,</p> <p>4. Chromosome- Sex chromosomes, sex determination in <i>Drosophila</i> and man.</p>	
Unit V	Endomembrane System	04
	<p>1. Introduction</p> <p>2. Structure, location and Functions:</p> <ul style="list-style-type: none"> i. Endoplasmic Reticulum ii. Golgi apparatus iii. Lysosomes. 	

Unit VI	Mitochondria and Peroxisomes	03
	1. Introduction 2. Mitochondria: ultrastructure and function of mitochondrion. 3. Mitochondrial DNA and importance	
Unit VII	Cell Division	07
	1. Introduction 2. Cell cycle (G1, S, G2, M phases), 3. Mitosis. 4. Meiosis. 5. Abnormal cell growth	

References:

1. Karp, G.: Cell and Molecular Biology: Concepts and Experiments. VI Edition 2010, John Wiley and Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F.: Cell and Molecular Biology. VII Edition. 2006, Lippincott Williams and Wilkins, Philadelphia.
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Abeda Inamdar Senior College

Of Arts, Science and Commerce, Camp, Pune-1

(Autonomous) Affiliated to Savitribai Phule Pune University

NAAC accredited 'A' Grade

(CBCS – Autonomy 21 Pattern)

Course/ Paper Title	Practical based on 21SBZO121and 21SBZO122
Course Code	21SBZO123
Semester	II
No. of Credits	1.5 (46.8 lectures of 50 minutes)

Expected Course Specific Learning Outcome

Sr. No.	Learning Outcome
1.	The student will be able to identify and classify animals based on their characters of phyla –Aschelminthes to Echinodermata
2.	The student will be able explain different types of mouth parts observed in insects.
3.	The student can interpret the role of insects w.r.t. human beings
4.	The student can identify and analyze different mitotic stages in onion root tips.
5.	The student can estimate the size of buccal epithelial cells using micrometry, observe mitochondria and blood cells from smear
6.	The student can discuss and associate various cell organelles with their detailed structures on the basis of micrograph
7.	The student can demonstrate the processes like osmosis and diffusion.

Syllabus

Sr. no.	Invertebrate Diversity –II
1.	Museum study of Phylum Aschelminthes: <i>Ascaris lumbricoides</i> ,
2.	Museum study of phylum Annelida: <i>Nereis</i> , Earthworm and Leech.

3.	Museum study of phylum Arthropoda: Prawn, Cockroach, Centipede, Millipede and Crab
4.	Museum study of phylum Mollusca: <i>Pila</i> , <i>Chiton</i> , Bivalve and <i>Octopus</i> .
5.	Museum study of phylum Echinodermata: Sea Star, Sea urchin, Brittle Star and sea cucumber.
6.	Study of permanent slides: Mouthparts of Insects -Mandibulate, Piercing and sucking, Chewing and Lapping.
7.	Types of foot and shell in Mollusca: <i>Pila</i> , Bivalve, <i>Chiton</i> and <i>Sepia</i> .
8.	Economic importance of honey bees, Lac insects silk worms, Red cotton bug, Anopheles mosquito and Pearl oyster
9.	Visit to a vermicomposting unit / preparation and maintenance of vermicomposting bin
10.	Collection and identification of insect pest from your locality/nearby area
Sr. no.	Cell Biology
1.	Study of Microscope: Simple and Compound microscope, electron microscope
2.	Micrometry: Measurement of microscopic objects
3.	Study of mitochondria from human buccal epithelial cells using vital stain Janus green B
4.	Preparation of blood smears to observe the blood cells
5.	Temporary preparation of mitotic cell from onion roots
6.	Study of Cell organelles (any three) by using microphotographs
7.	To study Osmosis Across a Membrane using Dialysis bags