SEMESTER II

PCZOG20 -PRACTICAL I

INVERTEBRATA, CHORDATA, MOLECULAR BIOLOGY, GENETICS, BIOTECHNOLOGY AND MICROBIOLOGY

Year	SEM	Course code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
I	I & II	PCZOG20	Practical -I	Practical	Core	3	4	100

Course Outcomes:

On completion of the course the student will be able to…

CO1: Demonstrate and dissect different systems of specimen.

CO2: Identify structural modification of chordates, adaptive feature based on mode of life and chromosomes.

CO3: Identify and explain various inborn errors of metabolism, describe karyotyping and identify functional gene in given sequence.

CO4: Gain practical insights on various instruments used in molecular biology.

CO5: Identify /explain various microorganisms, transgenic animals and GM plants.

CO/PSO	PSO					
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	H	H	H	M	H
CO2	H	H	H	H	M	H
CO3	H	H	H	H	M	H
CO4	H	M	H	H	M	H
CO5	H	H	H	H	M	H

CO/PSO	PO					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	H	M	H	M	H
CO2	H	H	M	H	M	H
CO3	H	H	M	H	M	H
CO4	H	M	M	H	M	H
CO5	H	H	M	H	M	H

Major: Dissections:

1. Invertebrata: Digestive system- Prawn, Cockroach and Sepia
Nervous system – Prawn, Cockroach and sepia

2. Chordata: 9^{th} and 10^{th} Cranial nerves of Shark
Arterial system of Shark

3. Minor: Mounting:

Appendages of Prawn
Mouth parts – Cockroach, Mosquito, House fly, Honey bee
Sting of Honey Bee
Brain of frog and calotes (Museum Specimen)

4. Study of museum specimen and slides relevant to

- Structural modifications of chordates - Hippocampus, Acipenser and Ambystoma.
- Adaptive features for their mode of life - Echeneis, Hyla, and Draco.

5. Molecular Biology and Genetics:

a. Giant chromosome - polytene chromosomes 1. Chironomous Larva (Slide),
2. Lampbrush chromosomes - chart

b. Identification of a functional gene in the given nucleotide sequence.

6.Karyotyping using human metaphase chromosome plates: Identification of syndromes:

(i) Down (ii) Klinefelter (iii) Turner

7. Study on Inborn errors of metabolism using Chromosomal Charts.

Lipid metabolism	-	Tay-Sachs and Niemann-Pick
Protein metabolism	-	PKU and Alkaptonuria
Carbohydrate metabolism	-	Galactosemia and Pompe's disease

8. Visit to a Molecular Biology laboratory.

9. Biotechnology and Microbiology:

a) Aspergillus, Rhizopus, Pseudomonas,Bacillus
b) *Salmonella, Lactobacillus, Saccharomyces cerevisiae*
c) GM Papaya, GM Tomato, Bt Cotton, BtBrinjal
d) Hybridoma Technology
e) Transgenic Animals- Fish, Goat.

10. Determination of Bacterial Growth by Turbidity Measurement – Demonstration.

SEMESTER II

PCZOH20 - PRACTICAL II - RESEARCH METHODOLOGY, APPLIED ENTOMOLOGY, BIODIVERSITY AND WILDLIFE CONSERVATION

Year	SEM	Course code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
I	I &II	PCZOH20	Practical II	Practical	Core	3	4	100

Course Outcomes:

On completion of the course the student will be able to…

CLO1: Apply basic concepts of instrumentation.

CLO2: Gain skills in techniques of chromatography, electrophoresis and spectroscopy.

CLO3: Demonstrate Histochemical staining techniques.

CLO4: Summarize the insect pest and their control measures.

CLO5: Explain biodiversity and explore the fauna existing around for documentation and motivates for further studies and research in the field.

CO/PSO	PSO					
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	H	H	H	M	H
CO2	H	H	H	H	M	H
CO3	H	H	L	H	M	H
CO4	H	M	M	H	M	H
CO5	H	H	H	H	M	H

LOW-L, MEDIUM-M, HIGH- H

CO/PO	PO					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	M	H	M	L	M
CO2	H	H	H	L	M	H
CO3	H	H	H	M	M	L
CO4	H	H	H	H	M	H
CO5	H	M	H	H	L	H

Research Methodology:

1. Electrophoresis – Agarose gel - SDS PAGE
2. Paper Chromatography
3. Gel/ Affinity Chromatography- Demonstration
4. Histochemical staining technique of Carbohydrates, Protein and Lipids
5. Estimation of Urea - DAM Method
6. Estimation of Cholesterol - ZAC'S Method
7. Estimation of Glucose – Ortho Toluidine Method
8. Estimation of Protein – Biuret Method

Spotters: Microscope- Compound, Fluorescent, TEM, SEM

Applied Entomology:

Study on Insect Pests:- Spotters

1. Pest of sugarcane –*Euetheolahumilis,Chilioinfuscatellus*
2. Pest of cotton – *Dysdercuskoenigii,Aphis gossypii*
3. Pest ofpaddy – *Sogatellafurcifera,Leptocorisavaricornis*
4. Pest of coconut- *Oryctes rhinoceros,Rhyncophorusferrugineus*
5. Pest of Wheat- *Meromyza Americana,Triticumvulgare*
6. Pest of Fruits- *Batocerarufamaculata,Papiliodemoleus*

7. Pest of vegetables- *Epilachnavigintioctopunctata,Leucinodesorbonalis*
8. House hold pest- *Ctenolepismasaccharina, Anthrenapimpinella*
9. Stored products pest- *Sitophilusoryzae, Leptocorisavaricornis*
10. Collection of Insects and preservation Techniques- Insect box

Biodiversity and Wild Life Conservation:

1. Observation and documentation of fauna inside the College campus – Soil microarthropods- Annelids, Amphibians, Reptiles and Birds
2. Spotters of endemic species- Laughing thrush, Grey headed bulbul.
3. Endangered species of India- Red crowned roofed turtle, Javan rhinoceros.
4. Zoo geographical realms:
   -Holartic realm-Hoary bat, Elk
   -Paleotropical realm- Hyena, Gibbon
   -Notogaean realm- Flying fox, Bandicoot
   -Antartic realm – Leopard seal, Orca
5. Hotspots of Tamil Nadu- Western Ghats- Lion tailed macaque, Dwarf Malabar Pufferfish, NilgiriLangur.
6. Endemism- Komodo dragon, Kangaroo, Kiwi

SEMESTER IV

PCZOP20 - PRACTICAL III - ENVIRONMENTAL BIOLOGY, LIMNOLOGY, TOXICOLOGY AND ANIMAL BEHAVIOUR

Year	SEM	Course code	Title of the Course	Course Type	Course Category	H/ W	Credits	Marks
II	III & IV	PCZOP20	Practical III	Practical	Core	3	4	100

Course Learning Outcomes:

On completion of the course the student will be able to…

CO1: Perform practical procedures in ecology.

CO2: Describe the adaptive features of animals with reference to their habitat and ethology.

CO3: Prepare slides of planktons.

CO4: Perform Toxicology studies.

CO5: Discuss water treatment through water treatment plant visits.

CO/PSO	PSO					
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	H	H	H	M	M
CO2	H	H	H	H	M	M
CO3	H	H	H	H	L	M
CO4	H	H	H	H	H	M
CO5	H	M	H	H	H	M

CO/PO	PO					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	H	H	H	M	H
CO2	H	H	H	H	M	M
CO3	H	H	H	H	L	M
CO4	H	H	H	H	H	M
CO5	H	H	H	H	M	M

I. ENVIRONMENTAL BIOLOGY

1. Estimation:
    a) Estimation of dissolved Oxygen
    b) Estimation of CO_2
    c) Estimation of Salinity
    d) Estimation of Carbonates and Bicarbonates

2. Analysis of Industrial effluent – BOD

3. Study of different fauna with special reference to the adaptations:
    a) Study of Sandy shore fauna
    b) Study of Muddy shore fauna
    c) Study of Rocky shore fauna

II. LIMNOLOGY AND TOXICOLOGY

4. Estimation:
    a) Estimation of Chromium
    b) Estimation of Nitrites
    c) Estimation of Phosphates

5. Mounting:
    a) Observation of fresh water planktons
    b) Observation of marine planktons

6. Lentic Adaptations: Daphnia, Crab, Prawn, Clams, Snail, Water Strider, Salamander, Alligator

7. Lotic Adaptations: Limpet, Crayfish, Salmon, Eel, Crocodile, Hippopotamus, Brook trout, Lung fish.

8. Toxicity induced diseases: a) Minamata disease b) Itai-itai c) Painter's colic

9. Visit to water treatment plant.

III. ANIMAL BEHAVIOUR:

10. Animal Association
a.) Parasitism
i) Ectoparasites – Ticks, Mites
ii) Endoparasites – *Taeniasolium*, *Ascarislumbricoides*
b.) Mutualism – Termites and Trichonympha, Sea Anemone and Hermit Crab
c) Commensalisms – Shark and Echeneis, Whale and Barnacles
d) Parental Care in Fish – Hippocampus, Male ring- tailed Cardinals, Gouramis
e) Parental Care in Amphibians – Midwife toad, Icthyophis, Marsupial frog.

SEMESTER IV

PCZOQ20 - PRACTICAL IV

PHYSIOLOGY, ENDOCRINOLOGY, DEVELOPMENTAL BIOLOGY, IMMUNOLOGY AND EVOLUTION

Year	SEM	Course code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
II	III & IV	PCZOQ20	Practical- IV	Practical	Core	3	4	100

Course Outcomes:

On completion of the course the student will be able to…

CO1: Analyze physiological parameters.

CO2: Interpret Endocrine glands and Endocrine disorders.

CO3: Explain immunological importance of WBC and principle on antigen antibody reaction in ABO grouping.

CO4: Identify the developmental stages, placenta, and histology in development biology.

CO5: Compare the evolutionary significance, mimicry and adaptation in animals.

CO/PSO	PSO					
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	H	H	H	H	H	H
CO2	H	H	H	H	H	H
CO3	H	H	H	H	H	H
CO4	H	H	H	M	H	H
CO5	H	H	H	H	H	H

CO/PO	PO					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	H	H	H	H	H	H
CO2	H	H	H	H	H	H
CO3	H	H	H	H	H	H
CO4	H	H	H	H	H	H
CO5	H	H	H	H	M	H

Physiology

a) Estimation of RQ in Fish with reference to temperature.
b) Salt loss and Salt gain in fish.
c) Study of Human salivary amylase activity in relation to temperature
d) Study of Human salivary amylase activity in relation to pH
e) Oxygen consumption by fish in relation to body weight
f) Estimation of digestive enzyme activity in Cockroach

Endocrinology:

a) Slides: Pituitary gland, Thyroid gland, Parathyroid gland , Adrenal gland, Pancreas.
b) Abnormalities of hormones: Hypersecretion – Gigantism, Grave's disease, Cushing's syndrome.
c) Hyposecretion- Dwarfism, Cretinism, Myxoedema, Addison's disease.

Developmental Biology and Immunology

a) Immunoelectrophoresis – chart
b) Immunodiffusion - chart
c) Antigen and Antibody reaction – ABO Blood grouping
d) Differential count of WBC
e) Pregnancy test

Spotters/Charts/ Slides

a) Blastula and Gastrula of Frog
b) T.S of Testis – T.S. of Ovary – Graffian Follicles (mammals)
c) Placentation – Placenta of Shark and Sheep
d) Embryo of Mammals – Sheep and Pig
e) Developmental stages in Chick – 18 hours, 24hrs, 48hrs, and 72hrs
f) Histology of Lymphoid organs – Thymus, Spleen, Bone marrow, Lymph node

Evolution:

Spotters/Charts/ Slides

a) Evolutionary importance of Peripatus, Limulus, Tornaria
b) Adaptations – Arboreal - Squirrel, Fossorial- Rat, Cursorial- Ostrich and Aerial- Bat
c) Cryptic coloration -Leaf and stick insects
d) Batesian mimicry - Monarch and Viceroy butterflies.
e) Study of Paleontological Fossils - Trilobites, Ammonites, Seymouria, Nautilus.