

Government Arts College for Men, Krishnagiri-635001

PG & Research Department of Zoology

Program Outcome

M.Sc. Zoology

2017 -18

SEMESTER - I
CORE PAPER 1
**ANIMAL TAXONOMY, PHYLOGENY AND BIOLOGY OF
INVERTEBRATES AND CHORDATES**

Learning Objective

- To gain knowledge about Zoological nomenclature and Animal taxonomy.
- To study the external morphology, physiology and affinity of Invertebrate with minor phyla.
- To understand the functional behavior of protozoan to metazoans.
- Gain Knowledge about parasitic invertebrates, its larval stages and their mode of transmission from one stage to another.

Learning Outcomes

- 1: Classify the Animal species based on the Characteristics features.
- 2: Know the locomotion, feeding and digestion of all Invertebrates.
- 3: Know the structure and function of Respiratory and Excretory organs of Invertebrates.
- 4: Learn about the function of nervous system of Non-Chordates.
- 5: Gain Knowledge about various larval forms of Invertebrates.

CORE PAPER - 2

CELL AND MOLECULAR BIOLOGY

Learning objective

- Provide relevant knowledge about the function of various cell internal organelles
- Acquire advanced knowledge of cell membranes in transportation of matters in and out
- To study the principles of cell communication and adhesion.
- To study the oncogenes, cellular morphology and ageing of cells.

Learning out come

- The graduate will be able to explain the functional eukaryotic cell at molecular level.
- The students can explain briefly about the cytoskeleton system of a cell and its function.
- The students can briefly describe the cell adhesion and its communications.
- Graduate can describe the functions of nucleus which control the cell.
- The student will be able to perform the techniques employed by the cell organelles.

CORE PAPER - 3
MOLECULAR GENETICS

Learning Objectives

- Provide relevant knowledge about the function of various cell internal organelles
- Acquire advanced knowledge of cell membranes in transportation of matters in and out
- To study the principles of cell communication and adhesion.
- To study the oncogenes, cellular morphology and ageing of cells.

Learning Outcomes

- The graduate will able to explain the functional eukaryotic cell at molecular level.
- The students can explain briefly about the cytoskeleton system of a cell and its function.
- The students can briefly describe the cell adhesion and its communications.
- Graduate can describe the functions of nucleus which control the cell.
- The student will able to perform the techniques employed by the cell organelles.

CORE PAPER - 4

MICROBIOLOGY AND IMMUNOLOGY

Learning Objectives

- Key features of the structure and classification of bacteria, virus and fungi.
- Knowledge on lab cultivation, media and staining methods.
- To study the microorganism in related to human health aspects.
- To know the application of microorganism in Industrial and Dairy usage.
- To Under Stand the application of microorganisms in soil and aquatic as bio-fertilizer and bio-pesticides.

Learning Outcomes

- To student will able identify microorganisms in our environment and classify them.
- The student will acquire knowledge about how to culture different microbes.
- The graduate can understand the pathogenic microbes and their control measures.
- Gain knowledge about microbes in food industries, developing antibiotics from microbes.
- Understand the application of microbial technology in the production of bio-fertilizers and bio-pesticides.

MAJOR PRACTICAL – I
ANIMAL TAXONOMY, PHYLOGENY AND BIOLOGY OF
INVERTEBRATES AND CHORDATES, CELL AND MOLECULAR
BIOLOGY, MOLECULAR GENETICS AND MICROBIOLOGY AND
IMMUNOLOGY

Learning objective

- To dissect and display the Nervous system of Prawn
- To study the Micrometry – Simple measurement of Cell (Ocular / Stage Micrometer) .
- To prepare the Onion Root Tip – Mitosis (Any one stage).
- To display the Giant Chromosomes in Salivary gland of Chironomous Larva.
- To prepare the Microscopic slide – Microtome (Demo only).

Learning outcome

- The student will acquire knowledge about Nervous system of Prawn
- Gain knowledge about mouth parts of Honey bee, House fly, Mosquito and Placoid scales.
- Understand the Normal Human Karyotype, Down's syndrome, Klinefelter's syndrome, Turner's syndrome

ELECTIVE – I
NUTRITION AND DIETETICS

Learning objective

- To gain knowledge regarding various types of food sources.
- To understand nutritive value of food materials, balanced diet and deficiency of vitamins in food.
- Able to identify the nutritious food sources in related to infectious diseases.
- Gain knowledge to understand principles in related to diet therapy for Acute, chronic infections and diet requirement for pregnant women.

Learning outcome

On successful completion of the course the student able to

- Gain knowledge about nutritional classification various food sources and their nutritive values.
- Able to understand balanced diet and diet for malnutrition, vitamin deficiency persons.
- Understand the nutritional requirement for various disease infected patients.
- Students can understand the principle of nutrition for pregnant women
- Gain knowledge regarding diet for heart, coronary, hypertension patients.

CORE – V
BIOSTATISTICS, COMPUTER APPLICATION AND RESEARCH
METHODOLOGY

Learning objective

The students gain knowledge on

- Identifying research problem and the basic methods of experimentation
- Methods of preparation of articles and its publication ethics
- Instrumentation and its applications in research work.
- Statistical packages and their application

Learning outcome

- Choose the appropriate research design and develop research hypothesis for a research work.
- Develops the ability to apply methods to present, prepare research article for publications.
- Student can acquire knowledge to handle various instruments in related to his research work.
- Gain knowledge regarding tracer techniques.
- Develops appropriate statistical methods required for research work design

CORE – VI
BIOCHEMISTRY AND BIOPHYSICS

Learning objective

- To Study of the function and structure biomolecules.
- To understand the various types of enzymes and its role in living cells/ organsystems.
- To study the structure and function of proteins, carbohydrates, lipids, vitamins in living organisms.

Learning outcome

On successful completion of the course the student will able to

- Understand the chemical structure and function of various bio-molecules.
- Learn about theories on Bio-molecules. CO3: Easily explain enzymes and their role in living organism.
- Learn about the conformation structure of proteins, lipids and nucleic acids.
- Explain the metabolism of carbohydrates, proteins, lipids, vitamins and nucleic acids.

CORE – VII
ENVIRONMENTAL BIOLOGY AND TOXICOLOGY

Learning objective

- To introduce specific examples and cases, and explain how chemical, biological and molecular sciences can apply to identify and address issues of environmental concerns.
- To understand the nature of environmental influences on individual organisms, their populations, and communities, on eco scopes and ultimately at the level of the biosphere
- To describe behavioral and physiological mechanisms by which organisms interact with other organisms and with their physical environment.
- To study biotic and abiotic factors that influences the dynamics of populations.
- To explain the biogeochemistry, energy flow, or biodiversity of ecosystems responds to climate change or another disturbance.

Learning outcome

On successful completion of the course the students can able to

- An Environmental biology will be able to recognize the physical, chemical, and biological components of the earth's systems and show how they function.
- Environmental Biology shall demonstrate the scientific method and quantitative techniques to describe, monitor and understand environmental systems.
- Students will apply knowledge of the sciences within an interdisciplinary context in solving environmental issues such as environmental health, food and agriculture, energy, waste and pollution, climate change, population, resource management, and loss of biodiversity.
- Students will carry out an applied research project in the natural sciences

CORE – PRACTICAL – II
BIOSTATISTICS AND COMPUTER APPLICATIONS, BIOCHEMISTRY,
BIOPHYSICS, ENVIRONMENTAL BIOLOGY AND TOXICOLOGY

Learning objective

- To know the Mean, Standard Deviation, Students 't' test, Chi – square test
- To demonstrate computers accessories and their usages
- To detect the proteins, carbohydrates and lipids in tissue samples
- To demonstrate the amino acids in body fluid of Cockroach or grasshopper using paper chromatography.

Learning outcome

- The student will acquire knowledge on Mean, Standard Deviation, Students 't' test, Chi – square test
- Gain knowledge on computers accessories and their usages
- Understand the amino acids in body fluid of Cockroach or grasshopper using paper chromatography.

Elective – II

Parasitology

Learning objective

- Recognize significant morphological characteristics for identification of parasites to taxonomic group and the life history stage.
- Present the life history of the parasitic group as well as that of genera or species including
- The infective agent for each host and their means of invasion
- Each host in the life cycle and type of development, multiplication, etc., which occurs in each host
- Movement routes and sites of development within hosts, free living stages.
- Understand the treatment, prevention, and control of the parasitic genera and species presented.

Learning outcome

On successful completion of the course the student can able to

- Describe the morphology and classification of parasites of medical importance.
- Acquire knowledge about the life history, mode of transmission, and pathogenesis of various human parasites.
- Explain the parasitic mode of infection by trematodes and nematodes.
- Gain knowledge about many vector borne infections in Human beings.
- Outline the treatments for various parasitic infections, prevention and control measures.

EXTRA DISCIPLINARY COURSE (EDC)
SECOND SEMESTER
FISHERY BIOLOGY & AQUACULTURE

Learning objective

- To learn the importance of aquaculture in nutritional and economical level
- To learn about techniques in pond construction, farming managements, etc.,
- To explore the knowledge about rearing aquatic organisms in ponds.
- To gain knowledge about the infections and their remedial measures

Learning outcome

On successful completion of the course the student will gain

- Easy to get employment / self-employment opportunities in fish farms.
- Able to design and construct aqua farms and know farm managements.
- Learn knowledge how to select cultivable species, rearing and harvesting techniques.
- Gain knowledge about hatchery operations and its managements.
- Understand the fish diseases and its remedial methods.

EXTRA DISCIPLINARY COURSE (EDC)

SECOND SEMESTER

POULTRY FARMING

Learning objective

- To provide self employment opportunities and knowledge for students.
- To understand poultry industry based on the past, present and emphasis of future growth
- To make the students to develop knowledge on the history and the role of poultry in rural development and its structure.
- Students can learn the methods of rearing, breeding and production of poultry and marketing.

Learning outcome

On successful completion of the course the students can able to

- The graduate can explain the scope and future prospectus of poultry industry.
- The student can brief about the daily work in poultry farm activities.
- He will neatly explain the brooders, breeding methods and vaccinations in poultry farms.
- The students are exposed to prepare poultry feed using different ingredients and symptoms of various diseases that affects poultry farms.
- The graduate gain knowledge about getting bank and government funds regarding poultry farms.

HUMAN RIGHTS

Learning objective

1. To describe specific theoretical, conceptual and practical challenges facing the fields of human rights law and sustainable development, adopting an interdisciplinary approach.
2. To articulate critical analysis on the relationship between respect for human rights and sustainable development.
3. To use the analytical and presentation skills covered in the course for developing teamwork and integration of a gender perspective for sustainable development and the protection of human rights.
4. To build networks among students, organizers and experts, from Flanders, the Global South and North.
5. To critically evaluate actors and processes involved in law and development initiatives in a globalized world, both from an 'external' (the transnational actors involved) and an 'internal' (the developing country and its inhabitants) perspective.

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Learning outcome

- understand the historical growth of the idea of human rights
- demonstrate an awareness of the international context of human rights
- demonstrate an awareness of the position of human rights in the UK prior to 1998
- understand the importance of the Human Rights Act 1998
- analyse and evaluate concepts and ideas.

CORE – VIII
DEVELOPMENTAL BIOLOGY

Learning objective

- To understand the basic concepts of developmental biology.
- To learn the cellular and tissue level events happens in gametogenesis.
- To acquire basic knowledge on organogenesis in related to development and differentiation. To understand the regeneration in development of immune system in vertebrates.
- To gain knowledge about various modern reproductive techniques in related to male and female infertility.

Learning outcome

On successful completion of the course, the students will able to

- Understand the cellular and molecular level developments of organisms.
- Students will gain knowledge on gametogenesis and embryological development.
- Students will acquire knowledge about organ formation and their development during embryology.
- Know various stages of regeneration mechanism happen in embryo and adults.
- To understand the modern embryological techniques in related to male and female infertility

CORE – IX
BASIC CONCEPT OF BIOTECHNOLOGY

Learning objective

- To understand principles of animal culture, media preparation .
- To explain Invitro fertilization and embryo transfer technology.
- To describe meristem culture and clonal propagation of plants on a commercial scale.
- To get insight in applications or recombinant DNA technology in agriculture, production of therapeutic proteins.
- To describe commercial production of fuels, microbial enzymes.
- To explain the microbial degradation of pesticides, Bioremediation& Biofertilizers.

Learning outcome

- Have good knowledge of the morphology and functions of the human organism;
- know the cellular and molecular aetiopathogenesis of the most relevant human pathologies
- Know the congenital or acquired pathological conditions in which it is possible to intervene with a biotechnological approach;
- Know the clinical diagnostic process of the main human diseases, including applied technologies.

CORE – X

ANIMAL PHYSIOLOGY

Learning objective

- To understand the physiological functions of animal parts in related to its habitat.
- To study the osmoregulatory mechanism of animals.
- To understand the respiratory physiology of both terrestrial and aquatic forms.
- To know the excretory and endocrine system in the animals.
- To learn the neuromuscular coordination in animals.

Learning outcome

On successful completion of the course the student will able to

- Adaptive nature of animals in related to their habitat.
- Osmoregulatory behaviour of animals in relation to stress, changes in environmental conditions.
- Basic mechanism of respiratory organs
- Learn about the excretory and endocrine system in animals. CO5: Understand the neuromuscular interactions in animals.

CORE – XI
OPTIONAL SUBJECT – I
GENERAL AND APPLIED ENTOMOLOGY

Learning objective

- To study the external morphology, anatomy, physiology and behaviour of insects and their position in animal kingdom by studying their taxonomic characters up to order.
- To know about the economic entomology and special adaptation of insects

Learning outcome

On successful completion of the course the student can able to

- Classify the insects up to order level.
- Explain the morphology and system of insects.
- Understand the various internal systems of the insects.
- Students can acquire knowledge about Sericulture, Apiculture and Lac culture techniques.
- Briefly gain knowledge on pest and its management methods.

CORE – PRACTICAL – III

DEVELOPMENTAL BIOLOGY, BIOTECHNOLOGY, ANIMAL PHYSIOLOGY AND GENERAL AND APPLIED ENTOMOLOGY

(OPTIONAL SUBJECT-I

- To Determine the Salt loss and Salt gain in Fish / Crab.
- To determine the Respiratory Quotient in aquatic animal in relation to Light (Fish /crab). Blastoderm
- To mount the Chick embryo. Problems related to Mean, Standard Deviation, Chi-square test.

Learning objective

- To gain knowledge on determination of Salt loss and Salt gain in Fish / Crab.
- Know Respiratory Quotient in aquatic animal in relation to Light (Fish /crab). Blastoderm
- Knowledge on mount the Chick embryo. Problems related to Mean, Standard Deviation, Chi-square test.

ELECTIVE – III
ENDOCRINOLOGY

Learning objective

- To explain the roles of the endocrine system in maintaining homeostasis, integrating growth and development, responding to environmental insults and promoting successful reproduction.
- To discuss the definition of a hormone in terms of its general properties.
- To differentiate among endocrine, paracrine and autocrine systems.
- To describe the different classes and chemical structures of hormones.
- To identify the glands, organs, tissues and cells that synthesize and secrete hormones, hormone precursors and associated compounds.
- To describe the synthesis and modes of secretion of hormones.
- To explain how the secretion of hormones is regulated, including the principles of negative and positive feedback mechanisms.
- To explain the importance of patterns of hormone secretion such as pulsatile, diurnal and cyclic.

Learning outcome

- Know the properties of polypeptide structure hormones.
- Know the properties of steroid structure hormones.
- Gain knowledge on basic principles of homeostatic regulation of biological systems;
- know the structures and biosynthetic pathways of major families of chemical messengers; recognize the diversity of hormone receptor systems and transduction pathways;
- Acquire a systems-based working knowledge of important hormonally regulated physiological processes;
- Appreciate current scholarly and popular issues in endocrinology; and
- Able to find and access primary literature resources, and to synthesize current knowledge in reporting on a topic of endocrinological interest.

CORE – XII

Evolution

Learning objective

The course will give the student knowledge about evolutionary processes and skills• in evolutionary analysis

- To study molecular evolution and the history of life
- To emphasize the historical nature of evolutionary biology and the evolutionary concepts.

Learning outcome

- CO1: Students learn how evolution is the central theoretical explanation for all of life, for all its diversity of form and function.
- Students learn that evolution is a significant part of understanding who we are as humans.
- Students learn practical skills like constructing phylogenetic trees.
- Describe the molecular methods to study genetic variation within and between species.

CORE – XIV: OPTIONAL SUBJECT – II
SERICULTURE

Learning objective

- To study the external morphology, anatomy, physiology and behaviour of insects and their position in animal kingdom by studying their taxonomic characters up to order.
- To explain the potentialities of sericulture as a source of rural employment and as an export earning enterprise;
- To differentiate different silkworms and their host plants; ”
- To determine various support systems available to strengthen sericulture; and ” identify the organizations involved in sericulture training and skill upgradation.
- To know about the economic entomology and special adaptation of insects•

Learning outcome

- Classify the insects up to order level. CO2: Explain the morphology and system of insects.
- Understand the various internal systems of the insects.
- Students can acquire knowledge about Sericulture, Apiculture and Lac culture techniques.
- Briefly gain knowledge on pest and its management methods.

CORE – PRACTICAL – IV
EVOLUTION, MEDICAL LABORATORY TECHNIQUES, SERICULTURE
(OPTIONAL SUBJECT - II) AND MICROTECHNIQUE

Learning objective

- To Study of Fossils (Ammonoids, Nautiloids & Echinoderm fossils)
- To Estimation of Haemoglobin (Hb) and Erythrocyte Sedimentation Rate (ESR).
- To Identification of common mulberry varieties and their features.
- To Identification of important pest and diseases of silkworm *Bombyx mori*

Learning outcome

- Gain knowledge on Fossils (Ammonoids, Nautiloids & Echinoderm fossils).
- Knowledge on Blood – clotting time, bleeding time – Preparation of Haematin crystals.
- Know Staining procedure for prepared slides.
- Gain knowledge on Various stages of larva and their identification in *Bombyx mori*.

ELECTIVE – IV
ECONOMIC ZOOLOGY

Learning objective

- To know the Morphology and Biology of honey bees
- To know the Medicinal value of honey
- To know Importance of bee colonies in crop pollination.

Learning outcome

- Aware students about knowledge and skill in the fundamentals and systematics of animal kingdom.
- Gain knowledge of anatomical structure and various metabolic functions of organisms.
- Understand various physiological processes at molecular level of animals from different phyla.
- Information and skill of advanced biological techniques for experimental purpose.
- Awareness about environment and its conservation processes,• pollution control and its importance and.
- Gain knowledge of protection of vulnerable and endangered species

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SEMESTER - I
CORE PAPER 1
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INVERTEBRATES AND CHORDATES**

Learning Objective

- To gain knowledge about Zoological nomenclature and Animal taxonomy.
- To study the external morphology, physiology and affinity of Invertebrate with minor phyla.
- To understand the functional behavior of protozoan to metazoans.
- Gain Knowledge about parasitic invertebrates, its larval stages and their mode of transmission from one stage to another.

Learning Outcomes

- 1: Classify the Animal species based on the Characteristics features.
- 2: Know the locomotion, feeding and digestion of all Invertebrates.
- 3: Know the structure and function of Respiratory and Excretory organs of Invertebrates.
- 4: Learn about the function of nervous system of Non-Chordates.
- 5: Gain Knowledge about various larval forms of Invertebrates.

CORE PAPER - 2

CELL AND MOLECULAR BIOLOGY

Learning objective

- Provide relevant knowledge about the function of various cell internal organelles
- Acquire advanced knowledge of cell membranes in transportation of matters in and out
- To study the principles of cell communication and adhesion.
- To study the oncogenes, cellular morphology and ageing of cells.

Learning out come

- The graduate will be able to explain the functional eukaryotic cell at molecular level.
- The students can explain briefly about the cytoskeleton system of a cell and its function.
- The students can briefly describe the cell adhesion and its communications.
- Graduate can describe the functions of nucleus which control the cell.
- The student will be able to perform the techniques employed by the cell organelles.

CORE PAPER - 3
MOLECULAR GENETICS

Learning Objectives

- Provide relevant knowledge about the function of various cell internal organelles
- Acquire advanced knowledge of cell membranes in transportation of matters in and out
- To study the principles of cell communication and adhesion.
- To study the oncogenes, cellular morphology and ageing of cells.

Learning Outcomes

- The graduate will able to explain the functional eukaryotic cell at molecular level.
- The students can explain briefly about the cytoskeleton system of a cell and its function.
- The students can briefly describe the cell adhesion and its communications.
- Graduate can describe the functions of nucleus which control the cell.
- The student will able to perform the techniques employed by the cell organelles.

CORE PAPER - 4

MICROBIOLOGY AND IMMUNOLOGY

Learning Objectives

- Key features of the structure and classification of bacteria, virus and fungi.
- Knowledge on lab cultivation, media and staining methods.
- To study the microorganism in related to human health aspects.
- To know the application of microorganism in Industrial and Dairy usage.
- To Under Stand the application of microorganisms in soil and aquatic as bio-fertilizer and bio-pesticides.

Learning Outcomes

- To student will able identify microorganisms in our environment and classify them.
- The student will acquire knowledge about how to culture different microbes.
- The graduate can understand the pathogenic microbes and their control measures.
- Gain knowledge about microbes in food industries, developing antibiotics from microbes.
- Understand the application of microbial technology in the production of bio-fertilizers and bio-pesticides.

MAJOR PRACTICAL – I
ANIMAL TAXONOMY, PHYLOGENY AND BIOLOGY OF
INVERTEBRATES AND CHORDATES, CELL AND MOLECULAR
BIOLOGY, MOLECULAR GENETICS AND MICROBIOLOGY AND
IMMUNOLOGY

Learning objective

- To dissect and display the Nervous system of Prawn
- To study the Micrometry – Simple measurement of Cell (Ocular / Stage Micrometer) .
- To prepare the Onion Root Tip – Mitosis (Any one stage).
- To display the Giant Chromosomes in Salivary gland of Chironomous Larva.
- To prepare the Microscopic slide – Microtome (Demo only).

Learning outcome

- The student will acquire knowledge about Nervous system of Prawn
- Gain knowledge about mouth parts of Honey bee, House fly, Mosquito and Placoid scales.
- Understand the Normal Human Karyotype, Down's syndrome, Klinefelter's syndrome, Turner's syndrome

ELECTIVE – I
NUTRITION AND DIETETICS

Learning objective

- To gain knowledge regarding various types of food sources.
- To understand nutritive value of food materials, balanced diet and deficiency of vitamins in food.
- Able to identify the nutritious food sources in related to infectious diseases.
- Gain knowledge to understand principles in related to diet therapy for Acute, chronic infections and diet requirement for pregnant women.

Learning outcome

On successful completion of the course the student able to

- Gain knowledge about nutritional classification various food sources and their nutritive values.
- Able to understand balanced diet and diet for malnutrition, vitamin deficiency persons.
- Understand the nutritional requirement for various disease infected patients.
- Students can understand the principle of nutrition for pregnant women
- Gain knowledge regarding diet for heart, coronary, hypertension patients.

CORE – V
BIOSTATISTICS, COMPUTER APPLICATION AND RESEARCH
METHODOLOGY

Learning objective

The students gain knowledge on

- Identifying research problem and the basic methods of experimentation
- Methods of preparation of articles and its publication ethics
- Instrumentation and its applications in research work.
- Statistical packages and their application

Learning outcome

- Choose the appropriate research design and develop research hypothesis for a research work.
- Develops the ability to apply methods to present, prepare research article for publications.
- Student can acquire knowledge to handle various instruments in related to his research work.
- Gain knowledge regarding tracer techniques.
- Develops appropriate statistical methods required for research work design

CORE – VI
BIOCHEMISTRY AND BIOPHYSICS

Learning objective

- To Study of the function and structure biomolecules.
- To understand the various types of enzymes and its role in living cells/ organsystems.
- To study the structure and function of proteins, carbohydrates, lipids, vitamins in living organisms.

Learning outcome

On successful completion of the course the student will able to

- Understand the chemical structure and function of various bio-molecules.
- Learn about theories on Bio-molecules. CO3: Easily explain enzymes and their role in living organism.
- Learn about the conformation structure of proteins, lipids and nucleic acids.
- Explain the metabolism of carbohydrates, proteins, lipids, vitamins and nucleic acids.

CORE – VII
ENVIRONMENTAL BIOLOGY AND TOXICOLOGY

Learning objective

- To introduce specific examples and cases, and explain how chemical, biological and molecular sciences can apply to identify and address issues of environmental concerns.
- To understand the nature of environmental influences on individual organisms, their populations, and communities, on eco scopes and ultimately at the level of the biosphere
- To describe behavioral and physiological mechanisms by which organisms interact with other organisms and with their physical environment.
- To study biotic and abiotic factors that influences the dynamics of populations.
- To explain the biogeochemistry, energy flow, or biodiversity of ecosystems responds to climate change or another disturbance.

Learning outcome

On successful completion of the course the students can able to

- An Environmental biology will be able to recognize the physical, chemical, and biological components of the earth's systems and show how they function.
- Environmental Biology shall demonstrate the scientific method and quantitative techniques to describe, monitor and understand environmental systems.
- Students will apply knowledge of the sciences within an interdisciplinary context in solving environmental issues such as environmental health, food and agriculture, energy, waste and pollution, climate change, population, resource management, and loss of biodiversity.
- Students will carry out an applied research project in the natural sciences

CORE – PRACTICAL – II
BIOSTATISTICS AND COMPUTER APPLICATIONS, BIOCHEMISTRY,
BIOPHYSICS, ENVIRONMENTAL BIOLOGY AND TOXICOLOGY

Learning objective

- To know the Mean, Standard Deviation, Students ‘t’ test, Chi – square test
- To demonstrate computers accessories and their usages
- To detect the proteins, carbohydrates and lipids in tissue samples
- To demonstrate the amino acids in body fluid of Cockroach or grasshopper using paper chromatography.

Learning outcome

- The student will acquire knowledge on Mean, Standard Deviation, Students ‘t’ test, Chi – square test
- Gain knowledge on computers accessories and their usages
- Understand the amino acids in body fluid of Cockroach or grasshopper using paper chromatography.

Elective – II

Parasitology

Learning objective

- Recognize significant morphological characteristics for identification of parasites to taxonomic group and the life history stage.
- Present the life history of the parasitic group as well as that of genera or species including
- The infective agent for each host and their means of invasion
- Each host in the life cycle and type of development, multiplication, etc., which occurs in each host
- Movement routes and sites of development within hosts, free living stages.
- Understand the treatment, prevention, and control of the parasitic genera and species presented.

Learning outcome

On successful completion of the course the student can able to

- Describe the morphology and classification of parasites of medical importance.
- Acquire knowledge about the life history, mode of transmission, and pathogenesis of various human parasites.
- Explain the parasitic mode of infection by trematodes and nematodes.
- Gain knowledge about many vector borne infections in Human beings.
- Outline the treatments for various parasitic infections, prevention and control measures.

EXTRA DISCIPLINARY COURSE (EDC)
SECOND SEMESTER
FISHERY BIOLOGY & AQUACULTURE

Learning objective

- To learn the importance of aquaculture in nutritional and economical level
- To learn about techniques in pond construction, farming managements, etc.,
- To explore the knowledge about rearing aquatic organisms in ponds.
- To gain knowledge about the infections and their remedial measures

Learning outcome

On successful completion of the course the student will gain

- Easy to get employment / self-employment opportunities in fish farms.
- Able to design and construct aqua farms and know farm managements.
- Learn knowledge how to select cultivable species, rearing and harvesting techniques.
- Gain knowledge about hatchery operations and its managements.
- Understand the fish diseases and its remedial methods.

EXTRA DISCIPLINARY COURSE (EDC)

SECOND SEMESTER

POULTRY FARMING

Learning objective

- To provide self employment opportunities and knowledge for students.
- To understand poultry industry based on the past, present and emphasis of future growth
- To make the students to develop knowledge on the history and the role of poultry in rural development and its structure.
- Students can learn the methods of rearing, breeding and production of poultry and marketing.

Learning outcome

On successful completion of the course the students can able to

- The graduate can explain the scope and future prospectus of poultry industry.
- The student can brief about the daily work in poultry farm activities.
- He will neatly explain the brooders, breeding methods and vaccinations in poultry farms.
- The students are exposed to prepare poultry feed using different ingredients and symptoms of various diseases that affects poultry farms.
- The graduate gain knowledge about getting bank and government funds regarding poultry farms.

HUMAN RIGHTS

Learning objective

6. To describe specific theoretical, conceptual and practical challenges facing the fields of human rights law and sustainable development, adopting an interdisciplinary approach.
7. To articulate critical analysis on the relationship between respect for human rights and sustainable development.
8. To use the analytical and presentation skills covered in the course for developing teamwork and integration of a gender perspective for sustainable development and the protection of human rights.
9. To build networks among students, organizers and experts, from Flanders, the Global South and North.
10. To critically evaluate actors and processes involved in law and development initiatives in a globalized world, both from an 'external' (the transnational actors involved) and an 'internal' (the developing country and its inhabitants) perspective.

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Learning outcome

- understand the historical growth of the idea of human rights
- demonstrate an awareness of the international context of human rights
- demonstrate an awareness of the position of human rights in the UK prior to 1998
- understand the importance of the Human Rights Act 1998
- analyse and evaluate concepts and ideas.

CORE – VIII
DEVELOPMENTAL BIOLOGY

Learning objective

- To understand the basic concepts of developmental biology.
- To learn the cellular and tissue level events happens in gametogenesis.
- To acquire basic knowledge on organogenesis in related to development and differentiation. To understand the regeneration in development of immune system in vertebrates.
- To gain knowledge about various modern reproductive techniques in related to male and female infertility.

Learning outcome

On successful completion of the course, the students will able to

- Understand the cellular and molecular level developments of organisms.
- Students will gain knowledge on gametogenesis and embryological development.
- Students will acquire knowledge about organ formation and their development during embryology.
- Know various stages of regeneration mechanism happen in embryo and adults.
- To understand the modern embryological techniques in related to male and female infertility

CORE – IX
BASIC CONCEPT OF BIOTECHNOLOGY

Learning objective

- To understand principles of animal culture, media preparation .
- To explain Invitro fertilization and embryo transfer technology.
- To describe meristem culture and clonal propagation of plants on a commercial scale.
- To get insight in applications or recombinant DNA technology in agriculture, production of therapeutic proteins.
- To describe commercial production of fuels, microbial enzymes.
- To explain the microbial degradation of pesticides, Bioremediation& Biofertilizers.

Learning outcome

- Have good knowledge of the morphology and functions of the human organism;
- know the cellular and molecular aetiopathogenesis of the most relevant human pathologies
- Know the congenital or acquired pathological conditions in which it is possible to intervene with a biotechnological approach;
- Know the clinical diagnostic process of the main human diseases, including applied technologies.

CORE – X

ANIMAL PHYSIOLOGY

Learning objective

- To understand the physiological functions of animal parts in related to its habitat.
- To study the osmoregulatory mechanism of animals.
- To understand the respiratory physiology of both terrestrial and aquatic forms.
- To know the excretory and endocrine system in the animals.
- To learn the neuromuscular coordination in animals.

Learning outcome

On successful completion of the course the student will able to

- Adaptive nature of animals in related to their habitat.
- Osmoregulatory behaviour of animals in relation to stress, changes in environmental conditions.
- Basic mechanism of respiratory organs
- Learn about the excretory and endocrine system in animals. CO5: Understand the neuromuscular interactions in animals.

CORE – XI
OPTIONAL SUBJECT – I
GENERAL AND APPLIED ENTOMOLOGY

Learning objective

- To study the external morphology, anatomy, physiology and behaviour of insects and their position in animal kingdom by studying their taxonomic characters up to order.
- To know about the economic entomology and special adaptation of insects

Learning outcome

On successful completion of the course the student can able to

- Classify the insects up to order level.
- Explain the morphology and system of insects.
- Understand the various internal systems of the insects.
- Students can acquire knowledge about Sericulture, Apiculture and Lac culture techniques.
- Briefly gain knowledge on pest and its management methods.

CORE – PRACTICAL – III

DEVELOPMENTAL BIOLOGY, BIOTECHNOLOGY, ANIMAL PHYSIOLOGY AND GENERAL AND APPLIED ENTOMOLOGY

(OPTIONAL SUBJECT-I

- To Determine the Salt loss and Salt gain in Fish / Crab.
- To determine the Respiratory Quotient in aquatic animal in relation to Light (Fish /crab). Blastoderm
- To mount the Chick embryo. Problems related to Mean, Standard Deviation, Chi-square test.

Learning objective

- To gain knowledge on determination of Salt loss and Salt gain in Fish / Crab.
- Know Respiratory Quotient in aquatic animal in relation to Light (Fish /crab). Blastoderm
- Knowledge on mount the Chick embryo. Problems related to Mean, Standard Deviation, Chi-square test.

ELECTIVE – III
ENDOCRINOLOGY

Learning objective

- To explain the roles of the endocrine system in maintaining homeostasis, integrating growth and development, responding to environmental insults and promoting successful reproduction.
- To discuss the definition of a hormone in terms of its general properties.
- To differentiate among endocrine, paracrine and autocrine systems.
- To describe the different classes and chemical structures of hormones.
- To identify the glands, organs, tissues and cells that synthesize and secrete hormones, hormone precursors and associated compounds.
- To describe the synthesis and modes of secretion of hormones.
- To explain how the secretion of hormones is regulated, including the principles of negative and positive feedback mechanisms.
- To explain the importance of patterns of hormone secretion such as pulsatile, diurnal and cyclic.

Learning outcome

- Know the properties of polypeptide structure hormones.
- Know the properties of steroid structure hormones.
- Gain knowledge on basic principles of homeostatic regulation of biological systems;
- know the structures and biosynthetic pathways of major families of chemical messengers; recognize the diversity of hormone receptor systems and transduction pathways;
- Acquire a systems-based working knowledge of important hormonally regulated physiological processes;
- Appreciate current scholarly and popular issues in endocrinology; and
- Able to find and access primary literature resources, and to synthesize current knowledge in reporting on a topic of endocrinological interest.

CORE – XII

Evolution

Learning objective

The course will give the student knowledge about evolutionary processes and skills• in evolutionary analysis

- To study molecular evolution and the history of life
- To emphasize the historical nature of evolutionary biology and the evolutionary concepts.

Learning outcome

- CO1: Students learn how evolution is the central theoretical explanation for all of life, for all its diversity of form and function.
- Students learn that evolution is a significant part of understanding who we are as humans.
- Students learn practical skills like constructing phylogenetic trees.
- Describe the molecular methods to study genetic variation within and between species.

CORE – XIV: OPTIONAL SUBJECT – II
SERICULTURE

Learning objective

- To study the external morphology, anatomy, physiology and behaviour of insects and their position in animal kingdom by studying their taxonomic characters up to order.
- To explain the potentialities of sericulture as a source of rural employment and as an export earning enterprise;
- To differentiate different silkworms and their host plants; ”
- To determine various support systems available to strengthen sericulture; and ” identify the organizations involved in sericulture training and skill upgradation.
- To know about the economic entomology and special adaptation of insects•

Learning outcome

- Classify the insects up to order level. CO2: Explain the morphology and system of insects.
- Understand the various internal systems of the insects.
- Students can acquire knowledge about Sericulture, Apiculture and Lac culture techniques.
- Briefly gain knowledge on pest and its management methods.

CORE – PRACTICAL – IV
EVOLUTION, MEDICAL LABORATORY TECHNIQUES, SERICULTURE
(OPTIONAL SUBJECT - II) AND MICROTECHNIQUE

Learning objective

- To Study of Fossils (Ammonoids, Nautiloids & Echinoderm fossils)
- To Estimation of Haemoglobin (Hb) and Erythrocyte Sedimentation Rate (ESR).
- To Identification of common mulberry varieties and their features.
- To Identification of important pest and diseases of silkworm *Bombyx mori*

Learning outcome

- Gain knowledge on Fossils (Ammonoids, Nautiloids & Echinoderm fossils).
- Knowledge on Blood – clotting time, bleeding time – Preparation of Haematin crystals.
- Know Staining procedure for prepared slides.
- Gain knowledge on Various stages of larva and their identification in *Bombyx mori*.

ELECTIVE – IV
ECONOMIC ZOOLOGY

Learning objective

- To know the Morphology and Biology of honey bees
- To know the Medicinal value of honey
- To know Importance of bee colonies in crop pollination.

Learning outcome

- Aware students about knowledge and skill in the fundamentals and systematics of animal kingdom.
- Gain knowledge of anatomical structure and various metabolic functions of organisms.
- Understand various physiological processes at molecular level of animals from different phyla.
- Information and skill of advanced biological techniques for experimental purpose.
- Awareness about environment and its conservation processes,• pollution control and its importance and.
- Gain knowledge of protection of vulnerable and endangered species

Government Arts College for Men, Krishnagiri-635001

PG & Research Department of Zoology

Program Outcome

M.Sc. Zoology

2019 -20

SEMESTER - I
CORE PAPER 1
**ANIMAL TAXONOMY, PHYLOGENY AND BIOLOGY OF
INVERTEBRATES AND CHORDATES**

Learning Objective

- To gain knowledge about Zoological nomenclature and Animal taxonomy.
- To study the external morphology, physiology and affinity of Invertebrate with minor phyla.
- To understand the functional behavior of protozoan to metazoans.
- Gain Knowledge about parasitic invertebrates, its larval stages and their mode of transmission from one stage to another.

Learning Outcomes

- 1: Classify the Animal species based on the Characteristics features.
- 2: Know the locomotion, feeding and digestion of all Invertebrates.
- 3: Know the structure and function of Respiratory and Excretory organs of Invertebrates.
- 4: Learn about the function of nervous system of Non-Chordates.
- 5: Gain Knowledge about various larval forms of Invertebrates.

CORE PAPER - 2

CELL AND MOLECULAR BIOLOGY

Learning objective

- Provide relevant knowledge about the function of various cell internal organelles
- Acquire advanced knowledge of cell membranes in transportation of matters in and out
- To study the principles of cell communication and adhesion.
- To study the oncogenes, cellular morphology and ageing of cells.

Learning out come

- The graduate will be able to explain the functional eukaryotic cell at molecular level.
- The students can explain briefly about the cytoskeleton system of a cell and its function.
- The students can briefly describe the cell adhesion and its communications.
- Graduate can describe the functions of nucleus which control the cell.
- The student will be able to perform the techniques employed by the cell organelles.

CORE PAPER - 3
MOLECULAR GENETICS

Learning Objectives

- Provide relevant knowledge about the function of various cell internal organelles
- Acquire advanced knowledge of cell membranes in transportation of matters in and out
- To study the principles of cell communication and adhesion.
- To study the oncogenes, cellular morphology and ageing of cells.

Learning Outcomes

- The graduate will be able to explain the functional eukaryotic cell at molecular level.
- The students can explain briefly about the cytoskeleton system of a cell and its function.
- The students can briefly describe the cell adhesion and its communications.
- Graduate can describe the functions of nucleus which control the cell.
- The student will be able to perform the techniques employed by the cell organelles.

CORE PAPER - 4

MICROBIOLOGY AND IMMUNOLOGY

Learning Objectives

- Key features of the structure and classification of bacteria, virus and fungi.
- Knowledge on lab cultivation, media and staining methods.
- To study the microorganism in related to human health aspects.
- To know the application of microorganism in Industrial and Dairy usage.
- To Under Stand the application of microorganisms in soil and aquatic as bio-fertilizer and bio-pesticides.

Learning Outcomes

- To student will able identify microorganisms in our environment and classify them.
- The student will acquire knowledge about how to culture different microbes.
- The graduate can understand the pathogenic microbes and their control measures.
- Gain knowledge about microbes in food industries, developing antibiotics from microbes.
- Understand the application of microbial technology in the production of bio-fertilizers and bio-pesticides.

MAJOR PRACTICAL – I
ANIMAL TAXONOMY, PHYLOGENY AND BIOLOGY OF
INVERTEBRATES AND CHORDATES, CELL AND MOLECULAR
BIOLOGY, MOLECULAR GENETICS AND MICROBIOLOGY AND
IMMUNOLOGY

Learning objective

- To dissect and display the Nervous system of Prawn
- To study the Micrometry – Simple measurement of Cell (Ocular / Stage Micrometer) .
- To prepare the Onion Root Tip – Mitosis (Any one stage).
- To display the Giant Chromosomes in Salivary gland of Chironomous Larva.
- To prepare the Microscopic slide – Microtome (Demo only).

Learning outcome

- The student will acquire knowledge about Nervous system of Prawn
- Gain knowledge about mouth parts of Honey bee, House fly, Mosquito and Placoid scales.
- Understand the Normal Human Karyotype, Down's syndrome, Klinefelter's syndrome, Turner's syndrome

ELECTIVE – I
NUTRITION AND DIETETICS

Learning objective

- To gain knowledge regarding various types of food sources.
- To understand nutritive value of food materials, balanced diet and deficiency of vitamins in food.
- Able to identify the nutritious food sources in related to infectious diseases.
- Gain knowledge to understand principles in related to diet therapy for Acute, chronic infections and diet requirement for pregnant women.

Learning outcome

On successful completion of the course the student able to

- Gain knowledge about nutritional classification various food sources and their nutritive values.
- Able to understand balanced diet and diet for malnutrition, vitamin deficiency persons.
- Understand the nutritional requirement for various disease infected patients.
- Students can understand the principle of nutrition for pregnant women
- Gain knowledge regarding diet for heart, coronary, hypertension patients.

CORE – V
BIOSTATISTICS, COMPUTER APPLICATION AND RESEARCH
METHODOLOGY

Learning objective

The students gain knowledge on

- Identifying research problem and the basic methods of experimentation
- Methods of preparation of articles and its publication ethics
- Instrumentation and its applications in research work.
- Statistical packages and their application

Learning outcome

- Choose the appropriate research design and develop research hypothesis for a research work.
- Develops the ability to apply methods to present, prepare research article for publications.
- Student can acquire knowledge to handle various instruments in related to his research work.
- Gain knowledge regarding tracer techniques.
- Develops appropriate statistical methods required for research work design

CORE – VI
BIOCHEMISTRY AND BIOPHYSICS

Learning objective

- To Study of the function and structure biomolecules.
- To understand the various types of enzymes and its role in living cells/ organsystems.
- To study the structure and function of proteins, carbohydrates, lipids, vitamins in living organisms.

Learning outcome

On successful completion of the course the student will able to

- Understand the chemical structure and function of various bio-molecules.
- Learn about theories on Bio-molecules. CO3: Easily explain enzymes and their role in living organism.
- Learn about the conformation structure of proteins, lipids and nucleic acids.
- Explain the metabolism of carbohydrates, proteins, lipids, vitamins and nucleic acids.

CORE – VII
ENVIRONMENTAL BIOLOGY AND TOXICOLOGY

Learning objective

- To introduce specific examples and cases, and explain how chemical, biological and molecular sciences can apply to identify and address issues of environmental concerns.
- To understand the nature of environmental influences on individual organisms, their populations, and communities, on eco scopes and ultimately at the level of the biosphere
- To describe behavioral and physiological mechanisms by which organisms interact with other organisms and with their physical environment.
- To study biotic and abiotic factors that influences the dynamics of populations.
- To explain the biogeochemistry, energy flow, or biodiversity of ecosystems responds to climate change or another disturbance.

Learning outcome

On successful completion of the course the students can able to

- An Environmental biology will be able to recognize the physical, chemical, and biological components of the earth's systems and show how they function.
- Environmental Biology shall demonstrate the scientific method and quantitative techniques to describe, monitor and understand environmental systems.
- Students will apply knowledge of the sciences within an interdisciplinary context in solving environmental issues such as environmental health, food and agriculture, energy, waste and pollution, climate change, population, resource management, and loss of biodiversity.
- Students will carry out an applied research project in the natural sciences

CORE – PRACTICAL – II
BIOSTATISTICS AND COMPUTER APPLICATIONS, BIOCHEMISTRY,
BIOPHYSICS, ENVIRONMENTAL BIOLOGY AND TOXICOLOGY

Learning objective

- To know the Mean, Standard Deviation, Students ‘t’ test, Chi – square test
- To demonstration computers accessories and their usages
- To detect the proteins, carbohydrates and lipids in tissue samples
- To demonstrate the amino acids in body fluid of Cockroach or grasshopper using paper chromatography.

Learning outcome

- The student will acquire knowledge on Mean, Standard Deviation, Students ‘t’ test, Chi – square test
- Gain knowledge on computers accessories and their usages
- Understand the amino acids in body fluid of Cockroach or grasshopper using paper chromatography.

Elective – II

Parasitology

Learning objective

- Recognize significant morphological characteristics for identification of parasites to taxonomic group and the life history stage.
- Present the life history of the parasitic group as well as that of genera or species including
- The infective agent for each host and their means of invasion
- Each host in the life cycle and type of development, multiplication, etc., which occurs in each host
- Movement routes and sites of development within hosts, free living stages.
- Understand the treatment, prevention, and control of the parasitic genera and species presented.

Learning outcome

On successful completion of the course the student can able to

- Describe the morphology and classification of parasites of medical importance.
- Acquire knowledge about the life history, mode of transmission, and pathogenesis of various human parasites.
- Explain the parasitic mode of infection by trematodes and nematodes.
- Gain knowledge about many vector borne infections in Human beings.
- Outline the treatments for various parasitic infections, prevention and control measures.

EXTRA DISCIPLINARY COURSE (EDC)
SECOND SEMESTER
FISHERY BIOLOGY & AQUACULTURE

Learning objective

- To learn the importance of aquaculture in nutritional and economical level
- To learn about techniques in pond construction, farming managements, etc.,
- To explore the knowledge about rearing aquatic organisms in ponds.
- To gain knowledge about the infections and their remedial measures

Learning outcome

On successful completion of the course the student will gain

- Easy to get employment / self-employment opportunities in fish farms.
- Able to design and construct aqua farms and know farm managements.
- Learn knowledge how to select cultivable species, rearing and harvesting techniques.
- Gain knowledge about hatchery operations and its managements.
- Understand the fish diseases and its remedial methods.

EXTRA DISCIPLINARY COURSE (EDC)

SECOND SEMESTER

POULTRY FARMING

Learning objective

- To provide self employment opportunities and knowledge for students.
- To understand poultry industry based on the past, present and emphasis of future growth
- To make the students to develop knowledge on the history and the role of poultry in rural development and its structure.
- Students can learn the methods of rearing, breeding and production of poultry and marketing.

Learning outcome

On successful completion of the course the students can able to

- The graduate can explain the scope and future prospectus of poultry industry.
- The student can brief about the daily work in poultry farm activities.
- He will neatly explain the brooders, breeding methods and vaccinations in poultry farms.
- The students are exposed to prepare poultry feed using different ingredients and symptoms of various diseases that affects poultry farms.
- The graduate gain knowledge about getting bank and government funds regarding poultry farms.

HUMAN RIGHTS

Learning objective

11. To describe specific theoretical, conceptual and practical challenges facing the fields of human rights law and sustainable development, adopting an interdisciplinary approach.
12. To articulate critical analysis on the relationship between respect for human rights and sustainable development.
13. To use the analytical and presentation skills covered in the course for developing teamwork and integration of a gender perspective for sustainable development and the protection of human rights.
14. To build networks among students, organizers and experts, from Flanders, the Global South and North.
15. To critically evaluate actors and processes involved in law and development initiatives in a globalized world, both from an 'external' (the transnational actors involved) and an 'internal' (the developing country and its inhabitants) perspective.

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Learning outcome

- understand the historical growth of the idea of human rights
- demonstrate an awareness of the international context of human rights
- demonstrate an awareness of the position of human rights in the UK prior to 1998
- understand the importance of the Human Rights Act 1998
- analyse and evaluate concepts and ideas.

CORE – VIII
DEVELOPMENTAL BIOLOGY

Learning objective

- To understand the basic concepts of developmental biology.
- To learn the cellular and tissue level events happens in gametogenesis.
- To acquire basic knowledge on organogenesis in related to development and differentiation. To understand the regeneration in development of immune system in vertebrates.
- To gain knowledge about various modern reproductive techniques in related to male and female infertility.

Learning outcome

On successful completion of the course, the students will able to

- Understand the cellular and molecular level developments of organisms.
- Students will gain knowledge on gametogenesis and embryological development.
- Students will acquire knowledge about organ formation and their development during embryology.
- Know various stages of regeneration mechanism happen in embryo and adults.
- To understand the modern embryological techniques in related to male and female infertility

CORE – IX
BASIC CONCEPT OF BIOTECHNOLOGY

Learning objective

- To understand principles of animal culture, media preparation .
- To explain Invitro fertilization and embryo transfer technology.
- To describe meristem culture and clonal propagation of plants on a commercial scale.
- To get insight in applications or recombinant DNA technology in agriculture, production of therapeutic proteins.
- To describe commercial production of fuels, microbial enzymes.
- To explain the microbial degradation of pesticides, Bioremediation& Biofertilizers.

Learning outcome

- Have good knowledge of the morphology and functions of the human organism;
- know the cellular and molecular aetiopathogenesis of the most relevant human pathologies
- Know the congenital or acquired pathological conditions in which it is possible to intervene with a biotechnological approach;
- Know the clinical diagnostic process of the main human diseases, including applied technologies.

CORE – X

ANIMAL PHYSIOLOGY

Learning objective

- To understand the physiological functions of animal parts in related to its habitat.
- To study the osmoregulatory mechanism of animals.
- To understand the respiratory physiology of both terrestrial and aquatic forms.
- To know the excretory and endocrine system in the animals.
- To learn the neuromuscular coordination in animals.

Learning outcome

On successful completion of the course the student will able to

- Adaptive nature of animals in related to their habitat.
- Osmoregulatory behaviour of animals in relation to stress, changes in environmental conditions.
- Basic mechanism of respiratory organs
- Learn about the excretory and endocrine system in animals. CO5: Understand the neuromuscular interactions in animals.

CORE – XI
OPTIONAL SUBJECT – I
GENERAL AND APPLIED ENTOMOLOGY

Learning objective

- To study the external morphology, anatomy, physiology and behaviour of insects and their position in animal kingdom by studying their taxonomic characters up to order.
- To know about the economic entomology and special adaptation of insects

Learning outcome

On successful completion of the course the student can able to

- Classify the insects up to order level.
- Explain the morphology and system of insects.
- Understand the various internal systems of the insects.
- Students can acquire knowledge about Sericulture, Apiculture and Lac culture techniques.
- Briefly gain knowledge on pest and its management methods.

CORE – PRACTICAL – III

DEVELOPMENTAL BIOLOGY, BIOTECHNOLOGY, ANIMAL PHYSIOLOGY AND GENERAL AND APPLIED ENTOMOLOGY

(OPTIONAL SUBJECT-I

- To Determine the Salt loss and Salt gain in Fish / Crab.
- To determine the Respiratory Quotient in aquatic animal in relation to Light (Fish /crab). Blastoderm
- To mount the Chick embryo. Problems related to Mean, Standard Deviation, Chi-square test.

Learning objective

- To gain knowledge on determination of Salt loss and Salt gain in Fish / Crab.
- Know Respiratory Quotient in aquatic animal in relation to Light (Fish /crab). Blastoderm
- Knowledge on mount the Chick embryo. Problems related to Mean, Standard Deviation, Chi-square test.

ELECTIVE – III
ENDOCRINOLOGY

Learning objective

- To explain the roles of the endocrine system in maintaining homeostasis, integrating growth and development, responding to environmental insults and promoting successful reproduction.
- To discuss the definition of a hormone in terms of its general properties.
- To differentiate among endocrine, paracrine and autocrine systems.
- To describe the different classes and chemical structures of hormones.
- To identify the glands, organs, tissues and cells that synthesize and secrete hormones, hormone precursors and associated compounds.
- To describe the synthesis and modes of secretion of hormones.
- To explain how the secretion of hormones is regulated, including the principles of negative and positive feedback mechanisms.
- To explain the importance of patterns of hormone secretion such as pulsatile, diurnal and cyclic.

Learning outcome

- Know the properties of polypeptide structure hormones.
- Know the properties of steroid structure hormones.
- Gain knowledge on basic principles of homeostatic regulation of biological systems;
- know the structures and biosynthetic pathways of major families of chemical messengers; recognize the diversity of hormone receptor systems and transduction pathways;
- Acquire a systems-based working knowledge of important hormonally regulated physiological processes;
- Appreciate current scholarly and popular issues in endocrinology; and
- Able to find and access primary literature resources, and to synthesize current knowledge in reporting on a topic of endocrinological interest.

CORE – XII

Evolution

Learning objective

The course will give the student knowledge about evolutionary processes and skills• in evolutionary analysis

- To study molecular evolution and the history of life
- To emphasize the historical nature of evolutionary biology and the evolutionary concepts.

Learning outcome

- CO1: Students learn how evolution is the central theoretical explanation for all of life, for all its diversity of form and function.
- Students learn that evolution is a significant part of understanding who we are as humans.
- Students learn practical skills like constructing phylogenetic trees.
- Describe the molecular methods to study genetic variation within and between species.

CORE – XIV: OPTIONAL SUBJECT – II
SERICULTURE

Learning objective

- To study the external morphology, anatomy, physiology and behaviour of insects and their position in animal kingdom by studying their taxonomic characters up to order.
- To explain the potentialities of sericulture as a source of rural employment and as an export earning enterprise;
- To differentiate different silkworms and their host plants; ”
- To determine various support systems available to strengthen sericulture; and ” identify the organizations involved in sericulture training and skill upgradation.
- To know about the economic entomology and special adaptation of insects•

Learning outcome

- Classify the insects up to order level. CO2: Explain the morphology and system of insects.
- Understand the various internal systems of the insects.
- Students can acquire knowledge about Sericulture, Apiculture and Lac culture techniques.
- Briefly gain knowledge on pest and its management methods.

CORE – PRACTICAL – IV
EVOLUTION, MEDICAL LABORATORY TECHNIQUES, SERICULTURE
(OPTIONAL SUBJECT - II) AND MICROTECHNIQUE

Learning objective

- To Study of Fossils (Ammonoids, Nautiloids & Echinoderm fossils)
- To Estimation of Haemoglobin (Hb) and Erythrocyte Sedimentation Rate (ESR).
- To Identification of common mulberry varieties and their features.
- To Identification of important pest and diseases of silkworm *Bombyx mori*

Learning outcome

- Gain knowledge on Fossils (Ammonoids, Nautiloids & Echinoderm fossils).
- Knowledge on Blood – clotting time, bleeding time – Preparation of Haematin crystals.
- Know Staining procedure for prepared slides.
- Gain knowledge on Various stages of larva and their identification in *Bombyx mori*.

ELECTIVE – IV
ECONOMIC ZOOLOGY

Learning objective

- To know the Morphology and Biology of honey bees
- To know the Medicinal value of honey
- To know Importance of bee colonies in crop pollination.

Learning outcome

- Aware students about knowledge and skill in the fundamentals and systematics of animal kingdom.
- Gain knowledge of anatomical structure and various metabolic functions of organisms.
- Understand various physiological processes at molecular level of animals from different phyla.
- Information and skill of advanced biological techniques for experimental purpose.
- Awareness about environment and its conservation processes,• pollution control and its importance and.
- Gain knowledge of protection of vulnerable and endangered species

Government Arts College for Men, Krishnagiri-635001

PG & Research Department of Zoology

Program Outcome

M.Sc. Zoology

2020 -21

SEMESTER - I
CORE PAPER 1
**ANIMAL TAXONOMY, PHYLOGENY AND BIOLOGY OF
INVERTEBRATES AND CHORDATES**

Learning Objective

- To gain knowledge about Zoological nomenclature and Animal taxonomy.
- To study the external morphology, physiology and affinity of Invertebrate with minor phyla.
- To understand the functional behavior of protozoan to metazoans.
- Gain Knowledge about parasitic invertebrates, its larval stages and their mode of transmission from one stage to another.

Learning Outcomes

- 1: Classify the Animal species based on the Characteristics features.
- 2: Know the locomotion, feeding and digestion of all Invertebrates.
- 3: Know the structure and function of Respiratory and Excretory organs of Invertebrates.
- 4: Learn about the function of nervous system of Non-Chordates.
- 5: Gain Knowledge about various larval forms of Invertebrates.

CORE PAPER - 2

CELL AND MOLECULAR BIOLOGY

Learning objective

- Provide relevant knowledge about the function of various cell internal organelles
- Acquire advanced knowledge of cell membranes in transportation of matters in and out
- To study the principles of cell communication and adhesion.
- To study the oncogenes, cellular morphology and ageing of cells.

Learning out come

- The graduate will be able to explain the functional eukaryotic cell at molecular level.
- The students can explain briefly about the cytoskeleton system of a cell and its function.
- The students can briefly describe the cell adhesion and its communications.
- Graduate can describe the functions of nucleus which control the cell.
- The student will be able to perform the techniques employed by the cell organelles.

CORE PAPER - 3
MOLECULAR GENETICS

Learning Objectives

- Provide relevant knowledge about the function of various cell internal organelles
- Acquire advanced knowledge of cell membranes in transportation of matters in and out
- To study the principles of cell communication and adhesion.
- To study the oncogenes, cellular morphology and ageing of cells.

Learning Outcomes

- The graduate will able to explain the functional eukaryotic cell at molecular level.
- The students can explain briefly about the cytoskeleton system of a cell and its function.
- The students can briefly describe the cell adhesion and its communications.
- Graduate can describe the functions of nucleus which control the cell.
- The student will able to perform the techniques employed by the cell organelles.

CORE PAPER - 4

MICROBIOLOGY AND IMMUNOLOGY

Learning Objectives

- Key features of the structure and classification of bacteria, virus and fungi.
- Knowledge on lab cultivation, media and staining methods.
- To study the microorganism in related to human health aspects.
- To know the application of microorganism in Industrial and Dairy usage.
- To Under Stand the application of microorganisms in soil and aquatic as bio-fertilizer and bio-pesticides.

Learning Outcomes

- To student will able identify microorganisms in our environment and classify them.
- The student will acquire knowledge about how to culture different microbes.
- The graduate can understand the pathogenic microbes and their control measures.
- Gain knowledge about microbes in food industries, developing antibiotics from microbes.
- Understand the application of microbial technology in the production of bio-fertilizers and bio-pesticides.

MAJOR PRACTICAL – I
ANIMAL TAXONOMY, PHYLOGENY AND BIOLOGY OF
INVERTEBRATES AND CHORDATES, CELL AND MOLECULAR
BIOLOGY, MOLECULAR GENETICS AND MICROBIOLOGY AND
IMMUNOLOGY

Learning objective

- To dissect and display the Nervous system of Prawn
- To study the Micrometry – Simple measurement of Cell (Ocular / Stage Micrometer) .
- To prepare the Onion Root Tip – Mitosis (Any one stage).
- To display the Giant Chromosomes in Salivary gland of Chironomous Larva.
- To prepare the Microscopic slide – Microtome (Demo only).

Learning outcome

- The student will acquire knowledge about Nervous system of Prawn
- Gain knowledge about mouth parts of Honey bee, House fly, Mosquito and Placoid scales.
- Understand the Normal Human Karyotype, Down's syndrome, Klinefelter's syndrome, Turner's syndrome

ELECTIVE – I
NUTRITION AND DIETETICS

Learning objective

- To gain knowledge regarding various types of food sources.
- To understand nutritive value of food materials, balanced diet and deficiency of vitamins in food.
- Able to identify the nutritious food sources in related to infectious diseases.
- Gain knowledge to understand principles in related to diet therapy for Acute, chronic infections and diet requirement for pregnant women.

Learning outcome

On successful completion of the course the student able to

- Gain knowledge about nutritional classification various food sources and their nutritive values.
- Able to understand balanced diet and diet for malnutrition, vitamin deficiency persons.
- Understand the nutritional requirement for various disease infected patients.
- Students can understand the principle of nutrition for pregnant women
- Gain knowledge regarding diet for heart, coronary, hypertension patients.

CORE – V
BIOSTATISTICS, COMPUTER APPLICATION AND RESEARCH
METHODOLOGY

Learning objective

The students gain knowledge on

- Identifying research problem and the basic methods of experimentation
- Methods of preparation of articles and its publication ethics
- Instrumentation and its applications in research work.
- Statistical packages and their application

Learning outcome

- Choose the appropriate research design and develop research hypothesis for a research work.
- Develops the ability to apply methods to present, prepare research article for publications.
- Student can acquire knowledge to handle various instruments in related to his research work.
- Gain knowledge regarding tracer techniques.
- Develops appropriate statistical methods required for research work design

CORE – VI
BIOCHEMISTRY AND BIOPHYSICS

Learning objective

- To Study of the function and structure biomolecules.
- To understand the various types of enzymes and its role in living cells/ organsystems.
- To study the structure and function of proteins, carbohydrates, lipids, vitamins in living organisms.

Learning outcome

On successful completion of the course the student will able to

- Understand the chemical structure and function of various bio-molecules.
- Learn about theories on Bio-molecules. CO3: Easily explain enzymes and their role in living organism.
- Learn about the conformation structure of proteins, lipids and nucleic acids.
- Explain the metabolism of carbohydrates, proteins, lipids, vitamins and nucleic acids.

CORE – VII
ENVIRONMENTAL BIOLOGY AND TOXICOLOGY

Learning objective

- To introduce specific examples and cases, and explain how chemical, biological and molecular sciences can apply to identify and address issues of environmental concerns.
- To understand the nature of environmental influences on individual organisms, their populations, and communities, on eco scopes and ultimately at the level of the biosphere
- To describe behavioral and physiological mechanisms by which organisms interact with other organisms and with their physical environment.
- To study biotic and abiotic factors that influences the dynamics of populations.
- To explain the biogeochemistry, energy flow, or biodiversity of ecosystems responds to climate change or another disturbance.

Learning outcome

On successful completion of the course the students can able to

- An Environmental biology will be able to recognize the physical, chemical, and biological components of the earth's systems and show how they function.
- Environmental Biology shall demonstrate the scientific method and quantitative techniques to describe, monitor and understand environmental systems.
- Students will apply knowledge of the sciences within an interdisciplinary context in solving environmental issues such as environmental health, food and agriculture, energy, waste and pollution, climate change, population, resource management, and loss of biodiversity.
- Students will carry out an applied research project in the natural sciences

CORE – PRACTICAL – II
BIOSTATISTICS AND COMPUTER APPLICATIONS, BIOCHEMISTRY,
BIOPHYSICS, ENVIRONMENTAL BIOLOGY AND TOXICOLOGY

Learning objective

- To know the Mean, Standard Deviation, Students ‘t’ test, Chi – square test
- To demonstration computers accessories and their usages
- To detect the proteins, carbohydrates and lipids in tissue samples
- To demonstrate the amino acids in body fluid of Cockroach or grasshopper using paper chromatography.

Learning outcome

- The student will acquire knowledge on Mean, Standard Deviation, Students ‘t’ test, Chi – square test
- Gain knowledge on computers accessories and their usages
- Understand the amino acids in body fluid of Cockroach or grasshopper using paper chromatography.

Elective – II

Parasitology

Learning objective

- Recognize significant morphological characteristics for identification of parasites to taxonomic group and the life history stage.
- Present the life history of the parasitic group as well as that of genera or species including
- The infective agent for each host and their means of invasion
- Each host in the life cycle and type of development, multiplication, etc., which occurs in each host
- Movement routes and sites of development within hosts, free living stages.
- Understand the treatment, prevention, and control of the parasitic genera and species presented.

Learning outcome

On successful completion of the course the student can able to

- Describe the morphology and classification of parasites of medical importance.
- Acquire knowledge about the life history, mode of transmission, and pathogenesis of various human parasites.
- Explain the parasitic mode of infection by trematodes and nematodes.
- Gain knowledge about many vector borne infections in Human beings.
- Outline the treatments for various parasitic infections, prevention and control measures.

EXTRA DISCIPLINARY COURSE (EDC)
SECOND SEMESTER
FISHERY BIOLOGY & AQUACULTURE

Learning objective

- To learn the importance of aquaculture in nutritional and economical level
- To learn about techniques in pond construction, farming managements, etc.,
- To explore the knowledge about rearing aquatic organisms in ponds.
- To gain knowledge about the infections and their remedial measures

Learning outcome

On successful completion of the course the student will gain

- Easy to get employment / self-employment opportunities in fish farms.
- Able to design and construct aqua farms and know farm managements.
- Learn knowledge how to select cultivable species, rearing and harvesting techniques.
- Gain knowledge about hatchery operations and its managements.
- Understand the fish diseases and its remedial methods.

EXTRA DISCIPLINARY COURSE (EDC)

SECOND SEMESTER

POULTRY FARMING

Learning objective

- To provide self employment opportunities and knowledge for students.
- To understand poultry industry based on the past, present and emphasis of future growth
- To make the students to develop knowledge on the history and the role of poultry in rural development and its structure.
- Students can learn the methods of rearing, breeding and production of poultry and marketing.

Learning outcome

On successful completion of the course the students can able to

- The graduate can explain the scope and future prospectus of poultry industry.
- The student can brief about the daily work in poultry farm activities.
- He will neatly explain the brooders, breeding methods and vaccinations in poultry farms.
- The students are exposed to prepare poultry feed using different ingredients and symptoms of various diseases that affects poultry farms.
- The graduate gain knowledge about getting bank and government funds regarding poultry farms.

HUMAN RIGHTS

Learning objective

16. To describe specific theoretical, conceptual and practical challenges facing the fields of human rights law and sustainable development, adopting an interdisciplinary approach.
17. To articulate critical analysis on the relationship between respect for human rights and sustainable development.
18. To use the analytical and presentation skills covered in the course for developing teamwork and integration of a gender perspective for sustainable development and the protection of human rights.
19. To build networks among students, organizers and experts, from Flanders, the Global South and North.
20. To critically evaluate actors and processes involved in law and development initiatives in a globalized world, both from an 'external' (the transnational actors involved) and an 'internal' (the developing country and its inhabitants) perspective.

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Learning outcome

- understand the historical growth of the idea of human rights
- demonstrate an awareness of the international context of human rights
- demonstrate an awareness of the position of human rights in the UK prior to 1998
- understand the importance of the Human Rights Act 1998
- analyse and evaluate concepts and ideas.

CORE – VIII
DEVELOPMENTAL BIOLOGY

Learning objective

- To understand the basic concepts of developmental biology.
- To learn the cellular and tissue level events happens in gametogenesis.
- To acquire basic knowledge on organogenesis in related to development and differentiation. To understand the regeneration in development of immune system in vertebrates.
- To gain knowledge about various modern reproductive techniques in related to male and female infertility.

Learning outcome

On successful completion of the course, the students will able to

- Understand the cellular and molecular level developments of organisms.
- Students will gain knowledge on gametogenesis and embryological development.
- Students will acquire knowledge about organ formation and their development during embryology.
- Know various stages of regeneration mechanism happen in embryo and adults.
- To understand the modern embryological techniques in related to male and female infertility

CORE – IX
BASIC CONCEPT OF BIOTECHNOLOGY

Learning objective

- To understand principles of animal culture, media preparation .
- To explain Invitro fertilization and embryo transfer technology.
- To describe meristem culture and clonal propagation of plants on a commercial scale.
- To get insight in applications or recombinant DNA technology in agriculture, production of therapeutic proteins.
- To describe commercial production of fuels, microbial enzymes.
- To explain the microbial degradation of pesticides, Bioremediation& Biofertilizers.

Learning outcome

- Have good knowledge of the morphology and functions of the human organism;
- know the cellular and molecular aetiopathogenesis of the most relevant human pathologies
- Know the congenital or acquired pathological conditions in which it is possible to intervene with a biotechnological approach;
- Know the clinical diagnostic process of the main human diseases, including applied technologies.

CORE – X

ANIMAL PHYSIOLOGY

Learning objective

- To understand the physiological functions of animal parts in related to its habitat.
- To study the osmoregulatory mechanism of animals.
- To understand the respiratory physiology of both terrestrial and aquatic forms.
- To know the excretory and endocrine system in the animals.
- To learn the neuromuscular coordination in animals.

Learning outcome

On successful completion of the course the student will able to

- Adaptive nature of animals in related to their habitat.
- Osmoregulatory behaviour of animals in relation to stress, changes in environmental conditions.
- Basic mechanism of respiratory organs
- Learn about the excretory and endocrine system in animals. CO5: Understand the neuromuscular interactions in animals.

CORE – XI
OPTIONAL SUBJECT – I
GENERAL AND APPLIED ENTOMOLOGY

Learning objective

- To study the external morphology, anatomy, physiology and behaviour of insects and their position in animal kingdom by studying their taxonomic characters up to order.
- To know about the economic entomology and special adaptation of insects

Learning outcome

On successful completion of the course the student can able to

- Classify the insects up to order level.
- Explain the morphology and system of insects.
- Understand the various internal systems of the insects.
- Students can acquire knowledge about Sericulture, Apiculture and Lac culture techniques.
- Briefly gain knowledge on pest and its management methods.

CORE – PRACTICAL – III

DEVELOPMENTAL BIOLOGY, BIOTECHNOLOGY, ANIMAL PHYSIOLOGY AND GENERAL AND APPLIED ENTOMOLOGY

(OPTIONAL SUBJECT-I

- To Determine the Salt loss and Salt gain in Fish / Crab.
- To determine the Respiratory Quotient in aquatic animal in relation to Light (Fish /crab). Blastoderm
- To mount the Chick embryo. Problems related to Mean, Standard Deviation, Chi-square test.

Learning objective

- To gain knowledge on determination of Salt loss and Salt gain in Fish / Crab.
- Know Respiratory Quotient in aquatic animal in relation to Light (Fish /crab). Blastoderm
- Knowledge on mount the Chick embryo. Problems related to Mean, Standard Deviation, Chi-square test.

ELECTIVE – III
ENDOCRINOLOGY

Learning objective

- To explain the roles of the endocrine system in maintaining homeostasis, integrating growth and development, responding to environmental insults and promoting successful reproduction.
- To discuss the definition of a hormone in terms of its general properties.
- To differentiate among endocrine, paracrine and autocrine systems.
- To describe the different classes and chemical structures of hormones.
- To identify the glands, organs, tissues and cells that synthesize and secrete hormones, hormone precursors and associated compounds.
- To describe the synthesis and modes of secretion of hormones.
- To explain how the secretion of hormones is regulated, including the principles of negative and positive feedback mechanisms.
- To explain the importance of patterns of hormone secretion such as pulsatile, diurnal and cyclic.

Learning outcome

- Know the properties of polypeptide structure hormones.
- Know the properties of steroid structure hormones.
- Gain knowledge on basic principles of homeostatic regulation of biological systems;
- know the structures and biosynthetic pathways of major families of chemical messengers; recognize the diversity of hormone receptor systems and transduction pathways;
- Acquire a systems-based working knowledge of important hormonally regulated physiological processes;
- Appreciate current scholarly and popular issues in endocrinology; and
- Able to find and access primary literature resources, and to synthesize current knowledge in reporting on a topic of endocrinological interest.

CORE – XII

Evolution

Learning objective

The course will give the student knowledge about evolutionary processes and skills• in evolutionary analysis

- To study molecular evolution and the history of life
- To emphasize the historical nature of evolutionary biology and the evolutionary concepts.

Learning outcome

- CO1: Students learn how evolution is the central theoretical explanation for all of life, for all its diversity of form and function.
- Students learn that evolution is a significant part of understanding who we are as humans.
- Students learn practical skills like constructing phylogenetic trees.
- Describe the molecular methods to study genetic variation within and between species.

CORE – XIV: OPTIONAL SUBJECT – II
SERICULTURE

Learning objective

- To study the external morphology, anatomy, physiology and behaviour of insects and their position in animal kingdom by studying their taxonomic characters up to order.
- To explain the potentialities of sericulture as a source of rural employment and as an export earning enterprise;
- To differentiate different silkworms and their host plants; ”
- To determine various support systems available to strengthen sericulture; and ” identify the organizations involved in sericulture training and skill upgradation.
- To know about the economic entomology and special adaptation of insects•

Learning outcome

- Classify the insects up to order level. CO2: Explain the morphology and system of insects.
- Understand the various internal systems of the insects.
- Students can acquire knowledge about Sericulture, Apiculture and Lac culture techniques.
- Briefly gain knowledge on pest and its management methods.

CORE – PRACTICAL – IV
EVOLUTION, MEDICAL LABORATORY TECHNIQUES, SERICULTURE
(OPTIONAL SUBJECT - II) AND MICROTECHNIQUE

Learning objective

- To Study of Fossils (Ammonoids, Nautiloids & Echinoderm fossils)
- To Estimation of Haemoglobin (Hb) and Erythrocyte Sedimentation Rate (ESR).
- To Identification of common mulberry varieties and their features.
- To Identification of important pest and diseases of silkworm *Bombyx mori*

Learning outcome

- Gain knowledge on Fossils (Ammonoids, Nautiloids & Echinoderm fossils).
- Knowledge on Blood – clotting time, bleeding time – Preparation of Haematin crystals.
- Know Staining procedure for prepared slides.
- Gain knowledge on Various stages of larva and their identification in *Bombyx mori*.

ELECTIVE – IV
ECONOMIC ZOOLOGY

Learning objective

- To know the Morphology and Biology of honey bees
- To know the Medicinal value of honey
- To know Importance of bee colonies in crop pollination.

Learning outcome

- Aware students about knowledge and skill in the fundamentals and systematics of animal kingdom.
- Gain knowledge of anatomical structure and various metabolic functions of organisms.
- Understand various physiological processes at molecular level of animals from different phyla.
- Information and skill of advanced biological techniques for experimental purpose.
- Awareness about environment and its conservation processes,• pollution control and its importance and.
- Gain knowledge of protection of vulnerable and endangered species