PERIYAR UNIVERSITY

PERIYAR PALKALAI NAGAR

SALEM – 636011

DEGREE OF BACHELOR OF SCIENCE

CHOICE BASED CREDIT SYSTEM

Syllabus for

B.SC. ZOOLOGY

(SEMESTER PATTERN)

(For Candidates admitted in the Colleges affiliated toPeriyar University from 2021-2022 onwards)

DEFINITION

PROGRAMME:

"Programme" means core degrees offered in various disciplines.

COURSE:

"Course" refers to the courses offered under the degree programme spread over thecompleteProgramme of study as under.

Part I	-	means "Tamil/other languages" offered under the programme.
Part II	-	means "English" language offered under the programme.
Part III	-	means "the core subjects" related to the programme Concerned including Practicals.
Part III Allied	-	means "Allied subjects" offered as allied, which is Interdisciplinary in nature but related to the programme.
Part III Electives	-	means "Elective subjects" related to the core subjects of the programme concerned.
Part IV (i)	-	"Tamil" means basic orientation in Tamil language for those studentswho have not studied Tamil upto 12th standard.
(ii)	-	"Advanced Tamil" means, the subject is meant for students who have studied Tamil language upto 12th standard and chosen other languages in college but would like to advance their Tamil language skills.
(iii)	-	"Non-Major Electives" means option is being given to students who do not come under the above two categories (i & ii).
(iv)	-	Skill based subject means the courses offered under the programme related to Advanced Skill acquisition for industrial application for which a separate Diploma will be awarded along with the Degree.
(iv)	-	"Foundation Course" means courses offered as 1) Environmental Studies (1st year) 2) Value Education - Human Rights /Women's Rights (2nd year)
Part V	-	"Extension Activities" means all those activities whichform part of NSS/NCC/Sports/YRC and other co and extracurricular activities.

A detailed explanation of the above with relevant credits are given under "Scheme of Examination along with Distribution of Marks and Credits"

Duration:

Means the stipulated years of study to complete a programme as prescribed by the University time to time. Currently for the undergraduate programme the duration of studyis THREE years. These regulations apply to the regular course of study in approved institutions of the University.

Credits:

Means the weightage given to each course of study (subjects) attributed by the experts ofthe Board of Studies concerned.

Credit System:

Means, the course of study under this pattern, where weightage of credits are spread over to different semesters during the period of study and the Cumulative Grade Point Average will be awarded based on the credits earned by the students. The following are the total credit points:

For Undergraduate Programme (Three years) : 148

AIM AND SCOPE OF THE COURSE:

1. To acquire knowledge in different areas of animal science.
2. The topics included in different units of different papers would enable the students to develop technical skills in Zoological and applied branches.
3. Skill based subjects like Poultry Science, Diary Science, Human health and hygiene, Sericulture, Apiculture, Aquaculture, Biotechnology and Clinical Nutrition have been included in order to provide opportunities in employment and research in Government and Private Organizations.
4. There is also scope for self employment for the students.
5. Practicals included in the syllabus will improve the skills of the students in Microscopy, Observations, Drawingand Laboratorytechniques.

ELIGIBILITY FOR ADMISSION:

Candidate for admission to the first year of the degree of Bachelor of Science Course shall berequired to have passed the Higher secondary examination (Academic or Vocational Stream) conducted by the Government of Tamil Nadu or an Examination accepted by the Syndicate, Subject to such conditions may be prescribed therefore shall be permitted to appear and qualify for B.Sc degree examination in Zoology.

DURATION OF THE COURSE:

The course for the degree of Bachelor of Science shall consist of three academic yearsdivided in to six semesters. Each semester consists of 90 working days.

PASSING MINIMUM:

The candidate shall be declared to have passed the examinations if he /she secure not lessthan 40marks.

DISTRIBUTION OF MARKS:

THEORY

University examination = 75 marks
Internal assessment = 25 marks

INTERNAL ASSESSMENT STRUCTURE:

Test = 15 marks

Assignments = 05 marks

Attendance = 05 marks

Passing minimum for Internal Assessment = 10 marks

Passing minimum of University examinations = 30 marks

PRACTICALS

University Examinations = 60marks Internal Assessment = 40marks

INTERNAL ASSESSMENT STRUCTURE:

Test = 15 marks

Observation record = 10 marks

Regularity in Practical =15 marks

Passing minimum for internal assessment = 10 marks

Passing minimum for University examinations = 30 marks

CLASSIFICATION OF SUCCESSFUL CANDIDATES:

- Candidates who secure not less than 60 % of the aggregate marks in the whole examinations shall be declared to have passed the examinations in first class.
- Candidates who secure above 50 % and below 60 % shall be declared to have passed the examinations insecond class.
- Other successful candidates who secure below 50% shall be declared to have passed the examination in third class.

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

Course Structure (CBCS)

From Academic year 2021-2022 onwards

Part	Course Code	Title of the Course	Hrs. / Week	Credits	Exam. Hrs.	Marks		
						CIA	ESE	Total
SEMESTER I								
I	Language I	Tamil	6	3	3	25	75	100
II	Language II	English	6	3	3	25	75	100
		Professional English	2	4	3	25	75	100
III	Core I	Invertebrates	5	5	3	25	75	100
III	Practical-I	Invertebrates & Chordata	3	-	-	-	-	-
III	Allied - I	Chemistry / Botany	4	4	3	25	75	100
III	Allied Practical	Chemistry / Botany	3	-	-	-	-	-
IV	Value Education	Yoga	1	2	3	25	75	100
Total			30	21		150	450	600
SEMESTER II								
I	Language II	Tamil II	6	3	3	25	75	100
II	Language II	English II	4	3	3	25	75	100
II	Naan Muthalvan Course	Language Proficiency for Employability (Effective English)	2	2	3	25	75	100
IV		Professional English	2	4	3	25	75	100
III	Core - II	Chordata	5	5	3	25	75	100
III	Practical-I	Invertebrates & Chordata	3	4	3	40	60	100
III	Allied II	Chemistry / Botany	4	3	3	25	75	100
III	Allied I Practical	Chemistry / Botany	3	3	3	40	60	100
IV	EVS	Environmental Studies	1	2	3	25	75	100
Total			30	29		255	645	900
SEMESTER III								
I	Language III	Tamil III	6	3	3	25	75	100
II	Language III	English III	6	3	3	25	75	100
III	Core III	Cell biology	5	6	3	25	75	100
III	Practical-II	Cell Biology, Genetics, Vermiculture & Vermicomposting & Aquaculture	3	-	-	-	-	-
III	Allied III	Chemistry / Botany	4	4	3	25	75	100
III	Allied Practical	Chemistry / Botany	3	-	-	-	-	-
IV	NMSDC	Digital Skills for Employability – Microsoft Office Essentials	2	2	3	25	75	100
IV	NMEC I	Human health & Hygiene (offered to other Dept. Students)	1	3	3	25	75	100
Total			30	21		150	450	600

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

SEMESTER IV								
I	Language IV	Tamil IV	6	3	3	25	75	100
II	Language IV	English IV	6	3	3	25	75	100
III	Core IV	Genetics	4	5	3	25	75	100
III	Practical-II	Cell Biology, Genetics, Vermiculture & Vermicomposting & Aquaculture	3	4	3	40	60	100
III	Allied IV	Botany/Chemistry	4	4	3	25	75	100
III	Allied IV Practical	Botany/Chemistry	3	3	3	40	60	100
IV	Naan Muthalvan Course	Employability Skills-Microsoft	2	2	3	25	75	100
IV	NMEC II	Wildlife Management (offered to Other Dept. Students)	2	2	3	25	75	100
IV	Internship Programme	Dairy farm, Fish farm / Breedingcentre, Poultry farm, Medical Lab,Natural Ecosystem, Natural HistoryMuseum, Sericulture farmhouse, Apiculture farms, Vermifarm.						
	Core IV	Genetics	4	5	3	25	75	100
Total			30	26		255	645	800
SEMESTER V								
III	Core V	Animal Physiology	5	5	3	25	75	100
III	Core VI	Developmental Biology	5	5	3	25	75	100
III	Core VII	Immunology & Microbiology	5	5	3	25	75	100
III	Elective I	Medical Laboratory Techniques (MLT)	5	5	3	25	75	100
IV	SBEC III	Poultry Science	2	2	3	25	75	100
IV	NMSDC	Advanced Technology for Employability in Life Science – Zoology - International Regulatory Requirement in Clinical Trial and Data Management	2	2	3	25	75	100
IV	Practical	Practical – III & IV	6	-	-	-	-	-
Total			30	24		150	450	600
SEMESTER VI								
III	Core VIII	Environmental Biology	5	4	3	25	75	100
III	Core IX	Evolutionary Biology	4	4	3	25	75	100
III	Core X	Bioinformatics, Biostatistics and Computer Applications	5	5	3	25	75	100
III	Elective II	Sericulture	4	4	3	25	75	100
	Naan Muthalvan Course	Medical coding for Employability-Medical Coding	2	2	-	25	75	100
IV	SBEC IV	Dairy Science	2	2	3	25	75	100
IV	Practical - III	Animal Physiology, Developmental Biology, Immunology & Microbiology, Poultry Science, & MLT.	3	3	3	40	60	100

III	Practical - IV	Environmental Biology, Evolutionary Biology, Bioinformatics, Biostatistics and Computer Applications, Sericulture & Apiculture.	3	3	3	40	60	100
III		Extension Activities		1				
V	Core VIII	Environmental Biology	5	5	3	25	75	100
Total			33	33		230	570	800
Total Credits: 148						Total Marks: 4200		

B.Sc., ZOOLOGY

SEMESTER - I

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

SEMESTER - I
CORE COURSE - I
INVERTEBRATE

Objectives:

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

- Describe the distinguishing characteristics of the major taxonomy
- Explain the basic aspects of classification details of invertebrates
- Understand biodiversity, habitat, adaptation organization and taxonomic status of invertebrates
- Recall certain morphological attributes and physiological processes that are distinct and significant to each Phyla
- Understand the systemic and functional morphology of various groups of invertebrates
- Explain the basic aspects of structural and functional details of Invertebrates

Unit I

Animal kingdom – Systems of classification and nomenclature - levels of organization.
Invertebrate: Introduction, General characters and classifications up to classes with examples.

Phylum: Protozoa - General characters. **Type Study:** *Paramecium caudatum* – External features, Nutrition, Locomotion - effective stroke, recovery stroke, Metachronal rhythm, Reproduction – Asexual - Binary fission, Sexual reproduction – Conjugation, Autogamy, Endomixis, Hemimixis and Cytogamy. **General Topic:** Protozoan human diseases.

Unit II

Phylum: Porifera - General characters. **Type Study**: *Leucosolenia botryoides* - External features, Body wall, Spicules, Canal System, Nutrition, and Reproduction. **General Topic**: Canal System in sponges.

Phylum: Coelenterata - General characters. **Type Study:** *Obelia geniculata* - External features, Histology of the colony, Cnidoblast and its functions, Life History of Obelia, Metagenesis. **General Topic:** Polymorphism in Coelentrates

Unit III

Phylum: Helminthes - General characters. **Type Study:** *Taenia solium*- External features, Body wall, Feeding, Respiratory system, Excretory system-flame cells, Nervous system, Reproductive system, Life cycle. **General Topic:** Parasitic adaptation in Helminthes**.**

Phylum: Annelida - General characters. **Type Study:** *Megascolex mauritii* - External features, Body wall, Coelom, Locomotion, Digestive system, Nervous system, Excretory system, Reproductive system. **General Topic:** Metamerism in annelids.

Unit IV

Phylum: Arthropoda - General characters. **Type Study:** Peripatus - External features, Body wall, Digestive system, Respiratorysystem, Nervous System, Sense organs, Excretory system, Reproductive system. **General Topic:** Affinities of living fossil.

Type study: *Periplaneta americana* - External features, Body wall, Mouthparts, Digestive system, Respiratorysystem, Nervous system,Sense organs, Excretory system, Reproductive system.
General Topic: Beneficial Insects.

Unit V

Phylum: Mollusca - General characters. **Type Study**:*Pilaglobosa* - External features, Shell, Digestive system, Respiratory system, Circulatory system, Nervous system,Sense organs- Eyes, Osphradium, Statocyst, Tentacles, Excretory system**. General Topic**: Torsion in Mollusca**.**

Phylum: Echinodermata - General characters. **Type Study:** *Asterias rubens*- External features, Pedicellaria-Structure and Function, Digestive system, Water vascular system, Circulatory system-Perihaemal and Haemal system, Nervous system, Sense organs, Excretory system, Reproductive system. **General Topic**: Larval forms of Echinoderms**.**

Course Outcomes:

- To compare and understand the general and specific characteristics within each Phyla
- Interpret the affinities, evolutionary relationships and adaptation of the major taxa and to explain their economic importance with respect to Non-Chordates

Reference Books

- Jordan.E.L and Verma.P.S, Invertebrate Zoology Revised Edn., S.Chand and Co. Ltd. Ram Nagar, New Delhi, 2014.
- N. C. Nair, N. Soundara Pandian, S. Leelavathy, T. Murugan, A Text Book of Invertebrates, Saras Publications ,2013.
- Dhami P.S. and Dhami J.K, Invertebrate Zoology 5 th edition S. Chand & Co., New Delhi, 2012. EkambaranathaAyyar,M.&Ananthakrishnan,T.N Manual of Zoology Vol-I (Invertebrata) Part I & II Vishwanathan (p) Ltd.Chennai, 2010
- Kotpal R.L., Agarwal S.K and Ketarpal R.P.R, Modern Text Book of Zoology – Invertebrates, Rastogi Publications, 2011.

B.Sc. ZOOLOGY

SEMESTER – II

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

SESTER - II
CORE COURSE - II
CHORDATA

Objectives:

- ➢ To understand what the chordates are.
- ➢ To understand the taxonomic position of chordates.
- ➢ To understand different categories of chordates.
- ➢ To understand the general characters of chordates.
- ➢ To understands the level of organization in chordate subphylum.
- ➢ To understand the origin and evolutionary relationship in different subphylum of chordates.

Unit I

Chordata: Introduction, General characters and Classification of Chordata. **Prochordata**: General characters and classification up to orders with the name of the examples. **Type study**: Amphioxus - External features-Digestive and Excretory system Agnatha: Petromyzon - External morphology; Ammocoetes Larva. **General Topic**: Affinities of Amphioxus.

Unit II

Pisces: General characters Pisces**. Type study:** Scoliodon (Shark) - External characters - Placoid scales- Digestive system Respiratory system - Receptor Organs - Urinogenital system. **General Topic**: Migration of fishes

Unit III

Amphibia: General characters. **Type study**: Frog - Structure and organization (Excluding skeletal system) **General Topic**: Parental care in amphibia. **Reptilia:** General characters. **Type study** - Calotes - Structure and Organization (Excluding skeletal system). **General Topics**: Identification of poisonous and non - poisonous snakes of South India

Unit IV

Aves: General characters. **Type study:** Pigeon - External characters-Flight muscles-Digestive system, Respiratory system, Urinogenital system. **General Topics**: 1. Migration of Birds
2. Flight adaptations in Birds.

Unit V

Mammalia: General characters. **Type study**: Rabbit – External morphology – Digestive system – Respiratory system - Structure of Heart and Brain- Reproductive system. **General Topics**: 1. Adaptations of aquatic mammals. 2. Dentition in mammals

Course outcomes:

- ➢ This course will be helpful to student to have overall understanding of various chordates.
- ➢ Describe unique characters of urochordates, cephalochordates and fishes.
- ➢ Recognize life functions of urochordates to fishes.
- ➢ Understand the ecological role of different groups of chordates.
- ➢ The knowledge gained from this subject will be helpful for students to realize the significance of AnimalSciences.

References:

- EkambaranathaAyyar,M. and T.N.Ananthakrishnan. A Manual of Zoology Vol.II (chordate). S.Viswanathan (Printers and Publishers) Pvt.Ltd.,Chennai. Alexander, R.M. The Chordates Cambridge University Press.
- Jordan E.L. and P.S. Verma. Chordata Zoology (11th Edition). S.Chand and Company Limited, 7361 Ram Nager, Qutab Road, New Delhi-110 055.
- Kotpal.R.L.Modem Text Book of Zoology-vertebrates. Rastogi Publications, Gangotri, ShivajiRoad, Meerut-250 002.
- Nigam, H.C.,1983. Zoology of Chordates,Vishal Publications, jalandhar - 144 008, 942.
- Newman H.H.1981 The Phylum Chordata, Satish Book Enterprise, Agra -282 003,477 pp.
- Parker and Haswell, 1964. Text Book of Zoology, Vol II (Chordata), A.Z.T,B.S. Publishers and Distributors,New Delhi - 110 051, 952 pp
- Waterman, Allyn J. et al., 1971. Chordate Structure and Function, Mac Millan & Co., New York, 587 pp.

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

PRACTICAL - I INVERTEBRATE & CHORDATA

Course objectives

- The student will demonstrate an understanding of, and be able
- To identify in detail, the anatomical characteristics of members of Invertebrates and phylum Chordata.
- To classify of the ontogenic and phylogenic relationships of Invertebrates and phylum Chordata.

DISSECTION

1. Cockroach - Digestive system
2. Prawn - Nervous system
3. Fish – Digestive System

MOUNTING

1. Mouth parts of House fly, Honey bee, Mosquito
2. Body setae of Earth worm
3. Fish - Ctenoid scales.

SPOTTERS

A. Classify giving reasons up to order:

Paramecium, Aurelia, Fasciola, Ascaris, Lamellidens, Asterias, *Balanoglossus, Branchiostoma (Amphioxus), Petromyzon, Rana hexadactyla, Calotes versicolor, Columba livia.*

B. Draw labelled sketches:

Obelia medusa, Ephyra larva, Redia larva, Cercaria larva, Mysis larva, Bipinnaria larva

C. Comment on Biological significance:

Plasmodium, Obelia colony, Physalia, Fasciola – Miracidium, Taenia – Mature proglottid, Chaetopterus, Peripatus, Hirudinaria, Limulus, Chiton, Sepia, Octopus, *Anabas scandens, Clarias batrachus, Hippocampus, Echeneis, Ichthyophis, Axolotlelarva, Chamaeleon, Viper arusselli (Russel'sviper), Dracovolans, Bat.*

D. Comment on Structure / Skeleton / Palate / Dentition:

Sponge – Spicules, Sponge – Gemmule, Taenia – Scolex, Neris – Parapodium, Penaeus – Petasma, Starfish – Pedicellaria, *Rana*– Pectoral girdle, *Rana*- Pelvic girdle, Rabbit–Dentition.

Course Outcomes.

- Training experience in anatomy through simple dissection and mounting.
- Familiarization with conventional organ system in different animals.
- Identify and study preserved specimens of various economically important animals.

Suggested manuals:

1. Practical Zoology- Invertebrates S.S. Lal
2. Practical Zoology - Invertebrates P.S. Verma
3. Practical Zoology - Invertebrates K.P. Kur

Suggested References:

- Barnes, R.D. (1982). Invertebrate Zoology, V Edition. Holt Saunders International Edition.
- Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). The Invertebrates: A NewSynthesis, III Edition, Blackwell Science
- Barrington, E.J.W. (1979). Invertebrate Structure and Functions. II Edition, E.L.B.S. and Nelson
- Boradale, L.A. and Potts, E.A. (1961). Invertebrates: A Manual for the use of Students. Asia PublishingHome
- Kardong, K.V. (2005) Vertebrates‟ Comparative Anatomy, Function and Evolution. IV Edition. McGraw-Hill Higher Education.
- Kent, G.C. and Carr R.K. (2000). Comparative Anatomy of the Vertebrates. IX Edition. The McGraw-HillCompanies.
- Hilderbrand, M and Gaslow G.E. Analysis of Vertebrate Structure, John Wiley and Sons. 4 Walter, H.E. andSayles, L.P; Biology of Vertebrates, Khosla Publishing House.
- Cleveland P. Hickman et.al. (2008). Animal Diversity, McGraw-Hill Higher Education
- Kotpal (2015). Modern Textbook of Zoology Vertebrates, Rastogi publishers, New Delhi
- Saxena, R.K. and Saxena, S. (2015). Comparative Anatomy of Vertebrates, Viva Books, Delhi
- Jordan E.L. and Verma P.S. (2010). Chordate Zoology, S. Chand & Co, New Delhi.

B.Sc. ZOOLOGY

SEMESTER – III

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

SEMESTER III
CORE COURSE III
CELL BIOLOGY

Course Objectives:

- To understand the structures and purposes of basic components of prokaryotic and eukaryotic cells,especially macromolecules, membranes, and organelles
- To understand how these cellular components are used to generate and utilize energy in cells
- To understand the cellular components underlying mitotic cell division.
- To understand responses to environmental or physiological changes, or alterations of cell functionbrought about by mutation.
- To understand the process of cell division in both somatic and germ cell.

Unit I

The Cell: Ultra structure of Animal cell - Cytoplasm - Structure and Composition, Function - Extra Cytoplasmic Structure – Cilia, Flagella - Cytoplasmic Inclusions. Human Blood Cells – RBC and WBC.

Unit II

Cell components: Plasma Membrane Ultra Structure - Different Models - Functions - Structure and Functions - Endoplasmic reticulum, Ribosomes, Golgi Complex, Lysosomes, Centrioles, and Mitochondria.

Unit III

Nucleus: Ultra structure, Composition and Functions - Nuclear Membrane - Nucleoplasm - Chromosomes - Heterochromatin and Euchromatin - Nucleolus - DNA and RNAs - Protein Synthesis.

Unit IV

Cell Divisions: Types - Amitosis, Mitosis and Meiosis and their Significance - Cancer, Ageing of Cells and Stem cell studies.

Unit V

Tools and Techniques: Cell Fractionation, Homogenization Centrifugation and Isolation of sub-cellular Components.Biochemical Techniques - Cell Culture Techniques. Histological Techniques - Staining - Vital Stains - Cytoplasmic and Nuclear Stains. Microscopes - Types – Light and Electron microscope.

Course Outcomes:

- Able to describe the function and the composition of the plasma membrane.
- Able to explain the principles of the cell theory.
- Able to differentiate between prokaryotes and eukaryotes.
- Able to understand the importance of the nucleus and its components.
- Able to understand how the endoplasmic reticulum and Golgi apparatus interact with one another andknow with which other organelles they are associated.
- Able to identify the three primary components of the cell‟s cytoskeleton and how they affect cell shape, function and movement.

REFERENCE BOOKS

- Ajay Paul., 2011. Cell and Molecular Biology. Books and Allied Pvt, Kolkata.
- Powar, C.B., 2002. Cell Biology. Himalaya Publishing House.
- Cohn, N.S., 1979, Elements of Cytology, Freeman Book Co., New Delhi.
- VeerBala Rastogi, Introductory cytology. Kedar Nath Ram Nath. Meerut 250 001.
- Bhaskaran, K.K. & Biju Kumar, A.: Cell Biology, Genetics & Molecular Biology.
- Vijayakumaran Nair, K. & Jayaprakash, M.: Cell Biology, Genetics, Molecular Biology. Academica, TVM.
- Verma & Agarwal (2006) Cell Biology, Genetics, Molecular Biology, Evolution & Ecology, S. Chandpublishers

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

SBEC-I
VERMICULTURE AND VERMICOMPOSTING

Course Objectives:

- To recall and recognize earthworm diversity.
- To get knowledge on organic farming and waste management using vermitechnology.
- To understand the vermiculture techniques.
- To apply knowledge on vermicompost preparation.
- To aware the significance of sustainable agriculture and organic farming.
- To inoculate basic knowledge on recycling of biodegradable waste of different kinds.
- To understand the value of Vermitechnology and its significance.

Unit I

Vermiculture: Vermiculture process – Site selection - Selection and collection of species mono and poly culture - Essential parameters for vermi–bedding. Methods of harvesting - general manual methods, self-harvesting method, mechanical method.

Unit II

Vermi-technology: Scope of vermiculture and vermicomposting – difference between vermiculture and vermicomposting.Vermi-tech practices in India.

Unit III

Earthworm diversity: Ecological groups of earthworms, biology of composting earthworms – *Eoisena foeitida, Eudriluslugeniae.*

Unit IV

Soil and Organic waste sources: Soil – Physical, chemical and biological features, Organic waste sources – problems in traditionalcomposting, Types, small and large scale pit method, heap method.

Unit V

Vermicompost: Nutritive value of vermicompost, storing and packing of compost - Applications of vermicompost in agricultural and horticultural practices - Economic importance of vermiculture, Nationalized bank support (NABARD) for vermiculture.

Course Outcomes:

- Get knowledge about the characteristics and role of earthworm in sustainable agriculture.
- Get knowledge on the significance of earthworms.
- Understand the importance of waste degradation by eco-friendly method.
- Apply the significance of Vermicomposting methods.
- Apply knowledge on commercialization of Vermiproducts.
- Expertise in Vermiculture Techniques
- Creating Opportunities for self employment

Reference Books:

- Earthworm ecology by LEE
- Biology of earthworm by Steven son
- Vermicomposting tech – soil health to human health by Ranganathan L.S.
- Tripathi G, Vermisource Technology, Discovery Publishing House, 2003
- Ranganathan, L.S., Vermicomposting Technology – From Soil Health to Human Health, 2006.

- Bhatnagar, R.K. and Palta, R.K., (1996). Vermiculture and Vermicomposting. Kalyani Publishers, NewDelhi.
- Arun K. Sharma. (2002). A hand book of Organic Farming, Agrobios, Jodhpur, India
- The Earthworm book, S.A. Ismail. Other India press, Goa - 403 507, India (2005).
- Gupta P.K. (2008). Vermicomposting for Sustainable Agriculture. Agrobios. India.
- Edwards, C.A. and J.R. Lofty (1977) "Biology of Earthworms" Chapman and Hall Ltd., London.
- Lee, K.E. (1985) "Earthworms: Their ecology and Relationship with Soils and Land Use",AcademicPress, Sydney.
- Satchel, J.E. (1983). "Earthworm Ecology", Chapman Hall, London

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

NMEC – I
HUMAN HEALTH AND HYGIENE

Course Objectives:

On the completion of the course the learner will be able to,

- understand the classification of nutrients
- gain knowledge on the intake of balanced diet and the significance of food
- list the common deficiency disorders, their causes, symptoms and recommended food sources
- evaluate the importance of a balanced diet
- understand the types of abuses and associated behavioural changes.
- know the causes for drug, tobacco and alcohol addiction and its effects on health.
- analyse the possible ways of de-addiction.
- know about the diseases and disorders associated with lifestyle modification.
- explain the underlying cause and symptoms for diabetes, obesity, cancer and AIDS.

Unit I: Physical Health

Health & Hygiene: Meaning, Definitions, Significance. **Nutrition:** Classification and functions of food, sources and requirement of Carbohydrates, Proteins, Fats, Vitamins and Minerals, Malnutrition, Balanced diet.

Unit II: Water, Air, Light and Noise.

Water: Criteria for water quality standards, household purification. **Air**: Health effects of air pollution, prevention and control. **Ventilation** – Standards of ventilation, **Light** – The requirements of good lighting, **Noise**: Effects of noise exposure.

Unit III: Pathogens

Dimensions and Determinants of health, Indicators of health – Characteristics of indicators, Types of indicators, Disease agents – Classification of disease agents- water, air, vector borne.

Unit IV: Mental Health

Conflicts and Frustration, Depression, Mental illness – Major and minor illnesses - Social pathological causes. Defense Mechanisms, Guidance and Counselling.

Unit V: Personal Hygiene

Dental Care, Eye care, Ear care and Skin care. Diabetes, Obesity and Cancer. Awareness on Alcoholism, Smoking, Tobacco chewing, Drug Abuse and Addiction, STD - AIDS.

Course Outcomes:

After the completion of the course the student will be to,

- Get an opportunity to work in the field of health department, NGOs.
- Do higher learning in the area of Paramedical courses.
- Confirm the quality and standards of water, air, light, sound.
- Suggest remedial measures for prevention and control of these diseases and disorders.
- Create awareness among the individuals in the society to lead healthy life.

Text Books:

1. Park, J.E. and Park. 2000. Text book of preventive and social medicine, 17th Edition, BanarasidasPublishers, Jabalpur.
2. Murugesh, N. 2002. Health education and community pharmacy, 3rd Edition, Sathya Publishers, Madurai.
3. Edward P Sarafino and Timothy W. Smith. 2012, Health Psychology, International Student Versio7th Edition, Wiley India (P) Ltd, New Delhi.
4. Srilakshmi, B. Dietetics, 2014, 7th Multi-color Edition, New Age International Publishers, New Delhi.
5. Sathyanarayana U. Biochemistry – Revised Edition, Books and (P) Ltd, Kolkata.

References:

1. Swaminathan M (1995): "Food & Nutrition", The Bangalore Printing & publishing co ltd., Vol I, SecondEdition, Bangalore.
2. Srilakshmi (1997): "Food Science", New Age International (P) Ltd, Publishers, Pune.
3. Mudambi .R. Sumathi &Rajagpal M.V (1983), "Foods & Nutrition", Willey Eastern Ltd, Second Edition,New Delhi.
4. Thangam.E.Philip(1965): Modern Cookery, Orient Longman, II edition. Vol II, Bombay.
5. Shubhangini A. Joshi,(1992)" "Nutrition and Dietetics"Tata Mc Grow- Hill publishing Company Ltd, NewDelhi.
6. Srilakshmi. B – "Nutrition Science", V Edn, New Age International (P) Ltd, Publishers, Chennai.
7. Tortora.J and Funk.R., (2008), Microbiology an Introduction, 9th edition, Pearson Education in South Asia.
8. Winwood R.S. and Smith J. L., Sear"s Anatomy and Physiology for Nurses, 6th Edition, Edward Arnold andJaypee Brothers.

B.Sc. ZOOLOGY

SEMESTER – IV

SEMESTER – IV
CORE COURSE – IV
GENETICS

Course Objectives:

- ➢ To know how the behavior of chromosomes during meiosis can explain by Mendel‟s law.
- ➢ To understand how inheritance patterns are affected by position on chromosomes.
- ➢ To make out the similarities and differences between how genetic information is passed on inprokaryotes and eukaryotes.
- ➢ To understand gene interactions.
- ➢ To understand the chemical nature of heredity.

UNIT I:

Introduction to Genetics, Mendel's experiment, Alleles, Backcross, Test cross, Laws of heredity. Monohybrid and Dihybrid. Interaction of genes – complementary, epistasis, lethal genes in man, Multiple alleles – Human Blood grouping system - Rh factor, Erythroblastosis foetalis.

UNIT II

Linkage – complete, incomplete. Crossing over - Chromosomes map - Sex determination in man and Drosophila. Sex linked Inheritance in man – Haemophilia, Colour Blindness, Animal breeding: – Inbreeding and out breeding, heterosis.

UNIT III

Mutation - Types of mutation- gene mutation - mutagens – Chromosomal abnormalities – autosome and sex chromosomes – klinefelters syndrome, Turner‟s syndrome and Down‟s syndrome.

UNIT IV

Karyotyping, idiogram, Simple Mendelian traits in man– twins. Inborn errors of metabolism – phenylketonuria, Alkaptonuria, Albinism, Sickle – Cell anaemia. Pedigree Analysis.

UNIT V

Vectors: Plasmids and Viral vectors - Recombinant DNA technology - Human Genome project – Gene structure and functions – Genetic engineering – Genetic application of bacteria, structure and life history of *T*4 phage.

Course outcomes:

- ➢ Comprehensive and detailed understanding of the chemical basis of heredity.
- ➢ Understanding about the role of genetics in evolution.
- ➢ The ability to evaluate conclusions that are based on genetic data.
- ➢ The ability to understand results of genetic experimentation in animals.

Reference Books:

1. Strickberger : Genetics (MacMillan).
2. Farnsworth : Genetics (harper and Row).
3. P.K.Gupta: Genetics (Rastogi Publications)
4. P.S. Verma and Agarwal: Genetics (S.Chand & Co.Ltd.)
5. Altonburg,E: Genetics (Oxford & IBH publishing company)
6. Burns G.W.: The Science of Genetics (MacMillan)
7. A.C.Pai: Foundations of Genetics (Mc Gaw –Hill)
8. J.A.Serra: Modern Genetics (3 volumes)
9. Sinnot, Dunn and Dobzhansky: Principles of Genetics (McGrawHill)
10. Gardener: Principles of Genetics.

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

SBEC II

AQUACULTURE

Course objectives:

- To know the basic principles of aquaculture farming.
- To acquire the knowledge about the water quality parameters.
- To understand the function of individual nutritive components.
- To know the cultivable fish production for sustainable aquaculture farming.
- To study the microbial infective defence mechanism and their disease management.

Unit I: Introduction to Aquaculture

Aquaculture - Scope and Definition, History of aquaculture, origin and growth. Types of aquaculture – Intensive, Semi-intensive, Extensive, Monoculture, Polyculture, Integrated fish farming (Composite fish culture, Paddy - fish culture, Duck - fish culture, Pig – fish culture), Pen and Cage Culture.

Unit II: Farm Management

Selection of sites - water quality management (temperature, dissolved oxygen, pH, alkalinity, hardness, ammonia, and nitrites) - water supply and drainage - Construction of different ponds (Nursery, Rearing and Stocking ponds) - pond structure (size, shape, depth etc.).

Unit III: Feed Technology

Live feeds - Rotifer and brine shrimp Artemia. Artificial feeds – formulation, types, and nutritive importance. Nutritional requirements of cultivable Fish. Feed additives and preservatives.

Unit IV: Economic Importance of Fish

Cultivable species-criteria for selection, Brooders, Spawning and fry production and grow out, Culture of fresh water fishes – Catla, Rohu and Mrigal. Mariculture – culture of shrimp (*Penaeus monodon*), edible oyster and pearl oyster. Induced breeding - Hypophysation. Preservation of fish – Smoking, Canning, and Drying.

Unit V: Diseases Management of fish and Government Agencies

Infectious diseases: Bacterial, viral and Fungi. Hemorrhagic Septicemia (VHS). Prevention and treatment of diseases. Role of Government Agencies – CMFRI, MPEDA, CIBA, CIFA and NFDB. Funding agency – NABARD.

Course outcomes:

- Familiarize the importance of aquaculture practices.
- Acquired the technology enabled sustainable aquaculture farm management.
- Gained knowledge of nutritive importance in feed formulation
- Obtained knowledge in the economical aspects of the aquaculture.
- Relate the strategies learned for the development of Aquafarm management and sustainable production

References:

1. Jhingram, V. G., (1982), Fish and Fisheries in India, Hindustan Publishing Cooperation, New Delhi.
2. James E. Lannen, R. Onealsmitherman, George tchobanologous, (1983), principles and practices of Pond Aquaculture: A state of the art review, Pond Dynamics/ Aquaculture CRSP, program Management Office,Oregon state University, Marine Science Center,Newport, Oregon, USA.
3. Lucas, J.S., Southgate, P.C. and Tucker, C.S. eds. (2019) Aquaculture: farming aquatic animals and plants,John Wiley & Sons.
4. Austin, B., Austin, D. A, (2012), Bacterial fish pathogens, 2012.,Vol. 481, p. 482. Dordrecht, The Netherlands: Springer.
5. Lim C.E., Sessa D.J, (1995), Nutrition and Utilization Technology in Aquaculture. AOCS Press, Illinois, USA.
6. Roberst R. J, (2012), Fish Pathology. Wiley – Blackwell.
7. Pillay, T.V.R. & M.A. Dill, (1979), Advances in Aquaculture. Fishing News (Books) Ltd., England.

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

NMEC – II

WILDLIFE MANAGEMENT

Course Objectives:

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

- Know the basic concept and principles of Wildlife Management
- Understand the Evaluation of Wild life habitat
- Know population estimation
- Analyse Human – animal conflicts
- Realise Zoo‟s Zoological Parks, Wildlife sanctuaries, National Parks and Tiger reserves

Unit I: Wildlife Management:

Basic concepts and principles - Wildlife management before and after implementation of Wild Life (Protection) Act, 1972 – IUCN – CITES – NBA – IBA – Project Tiger – Project Elephant – Project Crocodile

Unit II: Evaluation of Wildlife habitat:

Habitat – Definition, Types of Forest habitat - basic survey techniques of habitats – Vegetative analyses – Point centered quadrat, Quadrat, strip transect – Habitat manipulation.

Unit III: Population Estimation:

Basic concepts and applications - Direct count (block count, transect methods, Point counts, visual encounter survey). Indirect count (Call count, track and signs, pellet count, pugmark, camera trap, DNA finger printing and aerial photography).

Unit IV: Human-Animal Conflicts:

Basic concepts, reason for conflicts, Identification of damages caused by wild animals and control measures. Case studies – Elephant, gaur, wild boar, monkey, tiger and leopard.

Unit V: Wildlife Sanctuaries, National Parks & Tiger Reserves:

Definition – in-situ and ex-situ conservation. Sanctuaries and national parks in India - Mudumalai and Periyar Tiger Reserves - Nilgiri Biosphere Reserve.

Course outcomes:

- Understand the various concepts of Wild life Management
- Write Competitive Examinations

References:

1. Saharia, V.B. 1982 Wildlife in India, Nataraj Publishers, Dehra Dun
2. Seshadri, B.1986 India‟s Wildlife reserves, Sterling Pub‟rs Pvt. Ltd., New Delhi
3. Giles, R.H. Jr. (Ed) 1984.Wildlife Management Techniques 3rd edition. The wildlife Society, Washington. D.C. NatarajPublishers,Dehradun. India
4. Dasmann, Rf. 1964, Wildlife Biology. John and Wiley and sons Newyork. Pp231.
5. Robinson, Wl. and Eric, G. Bolen, 1984. Wildlife Ecology and Management Mac Millan

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

PRACTICAL - II

CELL BIOLOGY, GENETICS, VERMICULTURE &

VERMICOMPOSTINGN & AQUACULTURE

Course Objectives:

Students will be able,

- Count blood cells by using hemocytometer.
- Identification of drosophila mutants.
- Study about Normal Karyotyping
- To compost in a limited space and describe the decomposing process.
- They will also turn towards organic farming,
- To give the students the necessary basic information about fishery and aquaculture.
- To discuss aquatic food primary production systems, fishery and aquaculture.
- To discuss important factors for performing a sustainable fishery and a sustainable aquaculture.

Major Practical:

1. Counting of RBC using Hemocytometer
2. Counting of WBC using Hemocytometer.
3. Mitosis in Onion root tip squash

Minor Practical:

Human blood grouping

Common Drosophila mutant – Eye Colour and Wing.

Mounting of Buccal epithelial cells.

Spotters:

1. Microscope
2. Columnar epithelium, Ciliated epithelium, Glandular epithelium
3. Cardiac muscle
4. Catla, Rohu, Mrigal, and Tilapia
5. Vermiwash, Earthworm Cocoon
6. Human Karyotyping, Down syndrome

Extension Activity:

Field trip & Report submission:

1.Visit Vermiculture Unit

2.Visit Aquaculture Farm

Course Outcomes:

- Basic knowledge on applications to different cell studies.
- Understands the fundamental genetic studies.
- Understands concepts of fisheries, fishing tools and site selection
- Knowledge on Aquaculture systems, induced breeding techniques, post harvesting techniques
- Provides knowledge of ornamental fish breeding which is highly professional and attractive avenue

foryouth

References:

1. Celis JE (ed) (1998) Cell Biology: A Laboratory Handbook, 2nd edn. San Diego: Academic Press.
2. Paddock SW (ed) (1999) Methods in Molecular Biology, vol 122: Confocal Microscopy Methods andProtocols. Totowa, NJ: Humana Press.
3. Human Genetics and Genomics: A Practical Guide - Bahar Taneri, Esra Asilmaz, Türem Delikurt, PembeSavas, Seniye Targen, Yagmur Esemen
4. Bhatt J.V. & S.R. Khambata (1959) "Role of Earthworms in Agriculture" Indian Council of AgriculturalResearch, New Delhi
5. Dash, M.C., B.K.Senapati, P.C. Mishra (1980) " Verms and Vermicomposting" Proceedings of the NationalSeminar on Organic Waste Utilization and Vermicomposting Dec. 5-8, 1984, (Part B), School of Life Sciences, Sambalpur University, Jyoti Vihar, Orissa.
6. Kevin, A and K.E.Lee (1989) " Earthworm for Gardeners and Fisherman" (CSIRO, Australia, Division of Soils)
7. Wallwork, J.A. (1983) "Earthworm Biology" Edward Arnold (Publishers) Ltd. London.
8. ICAR, 2013. Hand book of Animal Husbandry, 4th Ed.ICAR Publication, Pusa, New Delhi.
9. Banerjee, G.C., 2006. Text book of Animal Husbandry 8th Ed.Oxford and IBH Publishing Company Ltd.,New Delhi.
10. Jagadish Prasad, 2002. Principles and practices of Dairy Farm Management, 3rd Ed. Kalyani Publishers,Ludhiana.
11. Sastry, N.S.R., C.K.Thomas and R.A.Singh, 2015. Livestock Production Management, 4th Ed.KalyaniPublishers, New Delhi.
12. Hafez, E. S. E. (1962). Reproduction in Farm Animals. Lea & Fabiger Publisher
13. Dunham R.A. (2004). Aquaculture and Fisheries Biotechnology Genetic Approaches. CABI publications,U.K.

B.Sc. ZOOLOGY

SEMESTER – V

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

SEMESTER - V

CORE COURSE - V

ANIMAL PHYSIOLOGY

Course Objectives:

- To understand the structure of the different organ systems in man/mammals.
- To understand the mechanisms involved in the functioning of the different systems.
- To study certain disorders that arise as a consequence of physiological malfunction.
- To understand the metabolic activities in mammalian body.
- To understand the gaseous transport and the structure involved in gaseous transport in mammalian body.
- To understand the various biomolecules in body.
- To understand the types mechanism of working of nerve cells.
- To understand the nature of endocrine glands and their secretion.

UNIT – I

Nutrition: Proteins, Carbohydrates, lipids, Vitamins, minerals and water. – Food requirements – Balanced Diet. Digestive system of Man, Digestive enzymes and Absorption.

UNIT – II

Respiratory system of Man, Mechanism of respiration in Man, Respiratory pigments. Circulatory system - Circulation of Blood – Composition, Properties and Functions. Human Cardiac Cycle, Cardiac Rhythm – Origin and Regulation of Heart Beat.

UNIT – III

Nervous System – Neuron – Structure, types of neurons, Nerve impulse. Synapse – Synaptic transmission, Neurotransmitters. Receptors – Photoreceptor – Mammalian Eye – Physiology of vision. Phonoreceptors – Mammalian Ear

UNIT – IV

Muscular System: Structure and types of muscle, Physiology of muscle contraction.

Excretion – Kidney – Structure and Function, Mechanism of Urine formation, Osmoregulation in mammals.

UNIT – V

Endocrine glands – Structure, secretions and functions of all Endocrine glands of Vertebrates. Antagonism and Synergism.

Course Outcomes

- Students are able to understand the physiology at cellular and system levels.
- Students are able to describe the role and functions of different systems.
- Able to describe the physiology of respiratory, renal, endocrine systems to define normal and abnormalfunctions.

Reference Books

1. Verma, Tyagi and Agarwal. 1986. Animal Physiology. Chand & Co., New Delhi.
2. William. S. Hoar. 1976. General and Comparative Physiology, Prentice Hall of India Pvt. Ltd., NewDelhi-110 001.
3. Wood. D. W. 1983. Principles of Animal Physiology. 3 rd edition.
4. Prosser and Brown. 1985. Comparative Animal Physiology. Satish Book Enterprise, Agra-282 003.
5. Tortora, G.J. and Derrickson, B.H. (2009). Principles of Anatomy and Physiology, XII Edition, JohnWiley & Sons, Inc.
6. Widmaier, E.P., Raff, H. and Strang, K.T. (2008) Vander‟s Human Physiology, XI Edition., McGrawHill
7. Guyton, A.C. and Hall, J.E. (2011). Textbook of Medical Physiology, XII Edition, Harcourt Asia Pvt.Ltd/ W.B. Saunders Company
8. Berg, J. M., Tymoczko, J. L. and Stryer, L. (2006). Biochemistry. VI Edition. W.H Freeman and Co.
9. Nelson, D. L., Cox, M. M. and Lehninger, A.L. (2009). Principles of Biochemistry. IV Edition. W.H.Freeman and Co.
10. Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2009). Harper‟s Illustrated Biochemistry. XXVIII Edition. Lange Medical Books / Mc Graw3Hill.
11. Singh. H.R, & Neeraj Kumar (2017) Animal Physiology and Biochemistry, Vishal Publishing Co
12. Nagabhushanam, (2008), Textbook of Animal Physiology, Oxford & IBH
13. Rastogi, S.C. (2007). Essentials of Animal Physiology, New Age International Publishers

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

CORE COURSE VI
DEVELOPMENTAL BIOLOGY

Course Objectives

On completion of the course, students should be able to

- Remember the basic concepts and definitions of modern developmental biology
- Understand steps and advancements in the developmental biology
- Comprehend embryonic formation and developmental stages with suitable examples
- Apply functional knowledge on developmental biology into frontier sciences
- Analyze animal embryonic development and possibilities of birth control

Unit I: Gametogenesis

Spermatogenesis – Definition – Process and significance - Structure of mammalian sperm. Oogenesis – Definition – Process and Significance – Types of Eggs and Egg membranes.

Unit II: Fertilization and Parthenogenesis

Fertilization – Definition – Process and Significance. Entry of sperm – egg activation, Post fertilization changes – Theories of fertilization - Parthenogenesis: Definition and Significance – types of Parthenogenesis.

Unit III: Cleavage and Gastrulation

Planes and patterns of cleavage – Factors affecting cleavage – Cleavage in frog and Chick. Morula and Blastulation - Morphogenetic movements - Fate maps –Gastrulation in frog and chick.

Unit IV: Organogenesis and Embryogenesis

Origin and development of organs – Development of brain, eye and heart. Development of foetal membranes in chick. Placenta in Mammal – Definition – Significance and types.

Unit V: Metamorphosis and Experimental Embryology

Metamorphosis – definition and significance. Regressive and Progressive Metamorphosis – hormonal control of metamorphosis in Amphibians– Regeneration –nuclear transplantation – induced ovulation – Artificial insemination – IVF – Embryo transfer.

Course Outcomes:

After the completion of the course, students should be able to

- Develop critical understanding how a single-celled fertilized egg becomes an embryo and then a fully formed adult by going through three important processes of cell division, cell differentiation andmorphogenesis.
- Understand how developmental processes and gene functions within a particular tissue or organism can provide insight into functions of other tissues and organisms.
- Realize that very similar mechanisms are used in very diverse organisms; and development is controlled through molecular changes resulting in variation in the expression and function of gene networks.
- Understand the relevance of developmental biology in medicine or its role in development of diseases.

REFERENCE BOOKS

1. Balinsky, B.T. (1981) An introduction to Embryology, 5th Edition. W.B.Saunders Co.London.
2. Pattern (1971.) Fundamentals of Embryology — McGraw Hill Book Co. NewYork.
3. Carlson, Bruce M (1996). Patten‟s Foundations of Embryology, McGraw Hill, Inc.
4. Verma.P.S.&.Agarwal V.K. Chordate Embryology. S.Chand& Company Ltd. Ram Nagar, New Delhi110055

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

CORE COURSE VII
IMMUNOLOGY AND MICROBIOLOGY

Course Objectives:

- To understand the concept of immunity and its constituent types.
- To study the lymphoid organs, the cells of the immune system and the effector molecules namely, antigens and antibodies.
- To study the clinical manifestations of immunological disorders.
- To appreciate the diversity of microbes and significance of certain microbes that are associated with man.

UNIT - I: **Immunity**

Innate immunity – Physical, Mechanical and Biochemical factors – Cellular factors –Geneticfactor. Acquired immunity – Natural – Artificial –Active – Passive immunity Cell mediated immunity

UNIT – II Lymphoid organs

Primary Lymphoid organs – Thymus – Bursa of Fabricius –Bone marrow, Secondary Lymphoidorgans – Lymph node – spleen – MALT – Payer‟s patches Tonsils. Cell of the immune system – Lymphoid lineage –Myeloid lineage.

UNIT- III: **Antigens -Antibody**

Antigen and Antibody – Definition and structure of Immunoglobulin – Types of Immunoglobulin – Biological propertiesof Immunoglobulin. Antigen antibody reaction – Vaccines – Types of Vaccines - Common Vaccines - Auto immune disorders – Rheumatoid arthritis.

UNIT – IV: Classification & Diseases of Microorganisms.

Structure and Reproduction of Bacteria, Bacterial disease in Man –Typhoid, Cholera, Tuberculosis, Structure and Reproduction of T4 Phage, Viral disease in Man – AIDS, Polio, Rabies.

UNIT –V: Applied Microbiology

Structure and economic importance of yeast, Sterilization, Culture media and culture techniques, Food Beverages, Microbiology of food poisoning.

Course Outcomes

- Imparts in depth knowledge of tissues, cells and molecules involved in host defense mechanisms
- Understanding of types of immunity
- Interactions of antigens, antibodies, complements and other immune components
- Understanding of immune mechanisms in disease control, vaccination, process of immune interactions
- Classification of microorganisms.
- Understanding of pathology of diseases caused by various microorganisms such as bacteria, virus, parasites and fungus

REFERENCE BOOKS

1. Ananthanarayanan, K. & Jayaram Panicker, C.K. 1988. Text book of Microbiology, 3rd Edition.
2. Dasgupta. A. 1982. Morden Immunology, 2nd Edition, Jaypee Brothers, Medical Publications, NewDelhi.
3. Pelczar, M.J. et al. 1993. Microbiology, McGraw Hill, New York.
4. Stewart, F.S. 1968. Bacteriology and Immunology for students of Medicine. 9th edition. ELBS.
5. Freeman Burrows. Text Book of Microbiology. 22nd Edition, Igaku-Shoin-Saunders International Edition.
6. Khan, F.H. (2009). The elements of Immunology. Pearson Education India
7. Abbas, A.K., Andrew H. H. Lichtman, and Shiv Pillai (2017). Cellular and Molecular immunology. Elsevier
8. Peter J. Delves, Seamus J. Marti, Dennis R. Burton, Ivan M. Roitt. (2017). Roitt′s Essential Immunology.Wiley-Blackwell
9. Thomas J. Kindt, Barbara A. Osborne, and Richard Goldsby (2006). Kuby Immunology. W. H. Freeman
10. Ramesh (2016). Immunology. McGraw Hill Education India Private Limited

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

ELECTIVE PAPER – I
MEDICAL LABORATORY TECHNIQUES (MLT)

Course Objectives:

- To make the knowledge about medical laboratory instruments and its uses.
- To teach the method and collection of samples and its importance.
- To make aware the students during the emergency situation.
- To learn the blood sample collection and its cells counting.
- To learn the techniques used in the Clinical laboratory for sample analysis.
- To create knowledge on Self-Employment Opportunity.

Unit I: Laboratory Instruments:

General and personal care in the laboratory. Maintenance of Laboratory records. General principle, use and maintenance of Laboratory instruments: Autoclave, Hot air oven, Incubator, Water bath, Centrifuge, Refrigerator, Colorimeter, pH meter, Hemocytometer, Hemoglobinometer and Sphygmomanometer.

Unit II: Preparation of Laboratory Equipments and Chemicals:

Cleaning, maintenance of Glassware - Definition and methods of Sterilization. Heat, Radiation, Chemical methods. Preparation and uses of Reagents – Normal Saline - Turkey's fluid, Hayem's fluid, Leishamn's stain, Wright stain, Carnoy's fluid and Bovin's fluid.

Unit III: Clinical Hematology:

Blood and its Constituents, Collection of blood (Venous and Capillary) Anticoagulants, RBC, WBC, Total count and Erythrocyte Sedimentation rate (ESR), Platelet count, Clotting time, Bleeding time. Blood grouping and Cross matching, Blood transfusion.

Unit IV: Clinical Microscopic Examination:

Examination of Sputum – Examination of Urine and Faeces - Examination of throat Swab - Examination of Cerebrospinal fluid - Semen analysis - Sperm motility - Sperm count.

Unit V: Pathological Examination:

Malarial parasites, Plasmodium sp., Endameba histolytica, Ascaris lumbricoids, Taenia solium. Pathology of Vibrio cholera, diphtheriae, Mycobacterium tuberculosis, Salmonella typhi and clostridium tetani.

Course outcome

- Understand fundamental analytical principles and processes used in clinical laboratory testing for various specimens.
- Understand the concepts and safety measures of clinical laboratory instruments.
- Acquired technical skills will help the students for collecting and processing biological specimens foranalysis.
- Application of medical laboratory procedures will enable the students to distinguish normal and abnormal microscopic pathogens.
- Students enable their critical and analytical thinking in the detection of diseases.
- Interpretation will empower students to compare and contrast clinical laboratory procedures, interpretdata and predict diagnosis.

References:

1. Kanai L. Mukherjee, Medical Laboratory Technology vol I, II, III –, Tata McGraw Hill Publishing Ltd., NewDelhi.
2. RamanikSood, Medical Laboratory Technology – Jaypee Brother's Medical Publishers (P) Ltd., New Delhi.
3. MadhavanKutty,K Text Book of Medical Laboratory Technology, MedcenPoonthanam.
4. Mary Ellen Wedding, Sally A Toenjas Medical Laboratory Procedures Jaypee Brothers Medical Publishers.
5. Samuel,K.M Notes on Clinical Lab Techniques Published by M.K.Gopalan, Chrompet.
6. SathishGupte Short Textbook of Medical Laboratory for Technicians Jaypee Brothers, Medical Publishers.
7. Baker F.J. And Silverton R.E Introduction to Medical Laboratory Technology Hodder Education Publishers.

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

SBEC III - POULTRY SCIENCE

Course Objectives:

- To explore the cultivation of poultry
- To understand the methodology of construction of poultry house
- To create the aware the students for about the poultry disease and its treatment
- To make the learner well aware of various methods in Poultry Science and its management.
- To train the students to undertake Poultry farming as income source.

UNIT: I

Introduction to poultry keeping –Poultry industry in India – Poultry breeds and classes of fowls –Poultry housing – general principles of building poultry house.

UNIT: II

Rearing of fowls – growers. Layers and broilers – growth management – summer and winter management.

UNIT: III

Poultry nutrition –Composition of poultry feed – nutrient requirements for fowls – nutritional deficiencysymptoms.

UNIT: IV

Poultry diseases: Ranikhet disease, New castle disease, Fowl pox, Birds flu. Vaccination schedules.

UNIT: V

Poultry egg production – composition and nutritive value of egg - use of feathers and poultry manure.Economics of poultry. Field visit.

Course Outcomes:

- Students in Poultry Science study the nutrition, marketing, management and business skills needed inpoultry production.
- Poultry Science students receive a foundation in basic sciences and mathematics, as well as un understanding of the poultry industry.

References:

a. Prakash Malhotra (2008) Economic Zoology, Adhyayna Publishers & Distributors, New Delhi.
b. GnanamaniA.R.Modern aspects of commercial Poultry keeping. Giri Publication, Madurai.
c. Banerjee G.C. A text book of Animal Husbandry –Oxford & IBH publishing Co Pvt. Ltd., New Delhi.
d. Jawaid, A. and Sinha, S. P. (2008) A Handbook of Economic Zoology. S. Chand & Company, NewDelhi.
e. Upadhya, V.B. (2006) Economic Zoology. Rastogi Publications, Meerut, India.
f. Biester, H.E. and Schwarte, L.H. (1969) Diseases of Poultry, 5th Edn. Oxford and IBH Publishing Co,NewDelhi.

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

SBEC - IV

CLINICAL NUTRITION

Course Objectives:

- To understand Nutrition for our health.
- To understand the disorders of nutrition.
- To understand the diseases due to insufficient nutrition

.

UNIT I

Introduction, Definition of nutrition, Principles of Healthy Nutrition, Therapeutic diet – types and qualities. Food as source of nutrients, functions of food, nutrients & energy, Adequate, optimum & good nutrition, malnutrition.

UNIT II

Interrelationship between Nutrition and Health - Visible symptoms of goods health. Weight Management and Eating Disorders - Obesity and Underweight, causes and dietary management. Nutrition and Anaemia.

UNIT III

Routine hospital diets - Regular diet, light diet, full liquid and tube feeding. Diabetes - Types, Symptoms, Causes and dietary management. Hypertension and Cardiovascular Diseases, Symptoms and Dietary management.

UNIT IV

Diseases of gastro Intestinal tract- Gastric and duodenal Ulcer, Diarrhea, Constipation and dietary management. Typhoid, Jaundice, Malaria, dengue, *Chikungunya* – symptoms and dietary management

UNIT V

Feeding infants and children - problems in feeding children in hospitals. Nutrition and diet clinics - Patients checkup and dietary counseling, educating the patient and followup .

Course outcomes:

- Developing diet planning skills for healthy and diseased individuals in society for better health management and prevention of diseases.
- Sensitization and awareness about the hazards of poor hygiene and sanitation and its management.

REFERENCES:

1. Paul. S. Text book of Bio nutrition curing diseases through diet. CBS Publications.
2. Textbook of Nutrition-Ravinder Chadha & Pulkit Mathur, Orient Blackswan Pvt. Ltd. Telangana.
3. Srilakshmi B .Nutrition Science. New Delhi: New Age International.
4. Clinical Nutrition & Dietetics- F. P. Antia and Philip Abraham, Oxford University Press.
5. Swaminathan S.: Advanced text book on Foods Nutrition Vol. I.

B.Sc. ZOOLOGY

SEMESTER – VI

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

SEMESTER – VI
CORE COURSE – VIII
ENVIRONMENTAL BIOLOGY

Course Objectives:

- To understand the basic ecological concepts.
- To learn the importance of environment and its related components.
- To attain the knowledge about the ecosystem and its characteristics.
- To develop an awareness of pollution and importance of environmental resources.
- To obtain the knowledge about the conservation of biodiversity

Unit I – Introduction of ecology

Concepts and definition – ecology, habitat, biosphere and biome; Biotic factors – animals, plants, bacteria and fungi; Abiotic factors – water, air, soil and sunlight.

Unit II – Population and community

Population characteristics – natality, mortality, density, growth curve and age distribution; Community - species richness, dominance, diversity, abundance; Species interaction - Mutualism, commensalism, parasitism.

Unit III – Ecosystem

Structure and function of ecosystem - Food chains, food web, ecological pyramids and energy flow; Ecological niche; Ecosystem types – forest and grassland; Aquatic ecosystem – Lakes, rivers and estuaries; Biogeochemical cycle – carbon, nitrogen and phosphorous.

Unit IV – Pollution

Environmental Pollutions - air, water, soil and noise pollution - Sources and prevention; Solid waste – types, sources and control measures; Hazardous waste – types and treatment methods.

Unit V – Biodiversity and Conservation

Biodiversity and hotspots of India; Wildlife conservation - National parks and Sanctuaries of India. Conservation of biodiversity - In-situ and Ex-situ conservation. Natural resources- renewable and non- renewable.

Course Outcomes:

- ✓ Acquire the ecological knowledge and its biological significance.
- ✓ Understand the differences in the structure and function of ecosystems.
- ✓ Learn the ways of interactions of living and non-living organisms with the environment.
- ✓ Identify the problems of environment and analyzing its impact on biodiversity.
- ✓ The importance of hotspots, sanctuaries and their role in protecting biodiversity.

REFERENCES:

1. Odum, E.P. (1971). Fundamentals of Ecology. W.B. Saunders Company, Phil. London.
2. Kotpal,R.L. and Bali,N.P. (1986), Concepts of Ecology, Vishal Publication, New Delhi.
3. Sharma, B.K. and Kaur, (1997). An Introduction to Environmental Pollution. Goel Publishing House,Meerut.
4. Agarwal, K.C. (2001). Environmental Biology, Nidi Publication Ltd. Bikaner.
5. https://pib.gov.in/newsite/mbErel.aspx?relid=105134
6. N. Arumugam, Concepts of Ecology, Saras Publication Pvt.Ltd, Nagercoil, Tamil Nadu, India.

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

CORE COURSE - IX
EVOLUTIONARY BIOLOGY

Course Objectives:

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

- Identify the Origin of life.
- Relate the existing evidences of evolution with the process of evolution.
- Analyze critically the Evolutionary theories with examples.
- Understand the Patterns of Evolution.
- Summarize the concept of species, mechanisms of speciation.
- Appreciate the evolution of man.
- Defend Animal distribution.

Unit 1: Origin of life

History of Life: Abiogenesis, Biogenesis. Biochemical Evolution: Concepts and Experiments. Geological time scale.

Unit 2: Evidences of Evolution

Homologous organs, Analogous organs and vestigial organs. Mass extinction - Causes, Major extinctions. Fossils, Types of fossils, and Fossilization, Indian fossils, Dating of fossils.Origin and evolution of horse and man - Culture evolution – Future Evolution.

Unit 3: Evolutionary theories

Contributions of Lamarck, Darwin and De Vries. Present status of Lamarkism and Darwinism. Modern Synthetic Theory, Hardy Weinberg Law.

Unit 4: Mechanism of Evolution &Speciation

Organic variations; Isolating Mechanisms; Natural selection, Types of natural selection, Artificial selection. Polymorphism and mimicry in evolution. Evolutionary & Biological species concept, Modes of speciation (Allopatric, Sympatric)

Unit 5: Patterns of Evolution &Animal distribution

Micro and Macro evolutionary Principles. Zoogeographical distribution - Continental and island fauna - Continental drift - Discontinuous distribution, adaptive radiation.

Course Outcomes:

After the completion of the course the student will be to

- Students are able to describe various biological interactions.
- Able to describe evolutionary history of man.
- Able to describe origin of species on earth.
- Write competitive examinations like GATE / UPSC / TNPSC.
- Get an opportunity to work in the field of forensic science, Museum, Archeology.
- Do higher learning in the area of anthropology.

Textbooks:

1. Mohan P. Arora, Organic Evolution, Himalaya Publishing House, Mumbai.
2. Rostogi, V.B. Organic Evolution, Kedernath, Ramnath publishers, Meerut.
3. Verma P.S. &Agarval, V.L. Concepts of Evolution S. Chand & Company.

References:

1. Eli C. Minkoff, 1984, Addison –Wesley Publishing Company, Canada.
2. Peter E. Rosenbaum ,2010. Volpe‟s understanding evolution, McGraw-Hill, New York.
3. Theodosius Dobzhansky, Francisco J. Ayala, G. Ledyard Stebbins, James W.Valentine, 1977 Evolution, W. H. Freeman & company, San Francisco.
4. G. Ledyard Stebbins,1966. The process of organic evolution, Prentice – Hall, New Jersey.
5. Edward O. Dodson,1960. Evolution: Process and Product , Reinhold Publishing Corporation, Newyork .

Web links:

1. http://www.nhs.uk http://www.eniscuola.net/en/2012/11/29/ exobiology/2
2. .https://en.wikipedia.org/wiki/Astrobiology

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

CORE COURSE -X

BIO-INFORMATICS, BIOSTATISTICS AND COMPUTER APPLICATIONS

Course Objectives

- To introduce the basics of bioinformatics- biological databases, retrieval tools and applications.
- To understand data collection, data handling and data analysis.
- To understand computer components, certain MS Office applications, internet search engines and computer viruses.

Bio-Informatics:

UNIT - I

Definition, history, biological databases, protein sequence, Proteomics, Protein structure, entry of a SWISSPROT account, Genomics – Divisions, entry of Gen Bank account.

UNIT - II

Data retrieval tools- Entrez, BLAST, Bioinformatics in drug design, Phylogeny analysis inbioinformatics, Human genome project.

Bostatistics:

UNIT - III

Data - types of data, collection of data, methods of collecting primary data, sources of secondary data. Classification and tabulation of data. Measures of central tendency - Arithmetic mean. Measures of dispersion – Standard deviation and Standard error. Student‟s „t‟ test and Chi-square test

UNIT - IV

Diagrammatic representation of data- line diagram, bar diagram (simple, component and percentage), pie diagram and pictogram. Graphic representation of data – histogram, frequency polygon, frequency curve and Ogive.

Computer Applications:

UNIT - V

Fundamentals of Computer: Classification, Computer organization, Input devices, output devices, Storage devices, Software, Computer and its application to biology-, MS Word, Excel, Power point, Internet, WWW, E-Mail – Search engines (Google, Yahoo), Applications, Computer virus.

Course Outcomes:

- Basics of bioinformatics- biological databases, retrieval tools and applications.
- Collection, Handling, Analysis of biological data.
- Students gains knowledge about statistical methods like measures of central tendencies.
- Computer applications in biological data / statistical methods.

Reference Books

1. Gupta, S.P. 1976. Statistical methods. Sultan Chand and Sons. New Delhi.
2. Palanichamy, S. Manohar, Statistics for Biologists, Paramount Publications, Palani.
3. Ignachimuthu S. Basic Bioinformatics –. NarosaPublising House, New Delhi, 2005.
4. Mani, S. Bioinformatics Vol I, II, III. Centre for Cultural Studies Pub, Coimbatore.
5. Rastogi S.C., Mendiratta, N .Bioinformatics – Methods and Applications., Rastogi Prentice New Delhi, 2005.
6. Rajaraman. V. Fundamentals of computers.

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

ELECTIVE COURSE – II
SERICULTURE

Course Objectives:

- To know the history and socio-economic aspects of sericulture.
- To understand the classification and morphology of silkworm+.
- To obtain the knowledge about the description of Mulberry cultivation and pest management.
- To attain the knowledge about the disease management in sericulture.
- To understand the methodology followed for the reeling and rearing of sericulture

UNIT I: Sericulture History & economics

Origin and History of sericulture-environmental impacts - Advantages and characteristics - current status of sericulture in India - income and employment generation – National Sericulture Project (NSP) - Future scope of sericulture.

UNIT II: Biology of Mulberry and Planting

Biology of Mulberry- Description and Eco-Mulberry cultivation in India - Selection of land and cultivation of mulberry –Mulberry varieties- Different methods of planting –Organic and in organic manure application-Mulberry pest Management- (Mealy bug – Maconellicoccushirsutus), (hairy caterpillar- Spilosomaobliqua) – (Stem griddler-Stheniasgrisator) : Preventive and control Measures.

UNIT III: Silk worm Taxonomy and Classification

Silkworm taxonomy, Classification of silk worms based on number of larval Moults, Moultinism and Voltinism – Tasar, Muga, and Eri. Morphology and life cycle of silk worm (Bombyx mori) and organization of larvae, Pupae and Moth- Structure of the silk gland and importance.

UNIT IV: Farming and Disease Management:

Silkworm rearing house models-Disinfection of rearing houses and appliances- Egg transportation and incubation –Egg handling – Hatching –Brushing. Silk worm Pests- Uzi fly, Ants and Demisted Beetles- diseases- Bacterial (Flecherie)-fungal (Muscardine) and viral (Grasserie) diseases of silk worm and its preventive measures.

UNIT V: Reeling and Rearing Technologies:

Reeling methods – Reeling and Re-reeling –Silk examination, cleaning, lacing, book making and grading of silk. Rearing of silkworm-Chawki rearing or young age worm rearing- Harvesting of cocoon (stifling, storage and sorting) and quality assessment.

Course Outcome:

- Describe the economic impacts and income generation by sericulture.
- Educate the students about the basic biology of Mulberry culture.
- Expertise in the taxonomy, morphology and life cycle of the silkworm.
- Relate the strategies involved in the sericulture management system.
- Acquired the knowledge about the technologies in sericulture.

REFERENCES:

1. G.Ganga and Sulochanachetty (2018-19,Reprint)An Introduction to sericulture (IInd edition),Oxford &IBH Publishing Co.Pvt.Ltd, New Delhi, India.
2. Charsley, S.R. (1982). Culture And Sericulture. Academic Press Inc., NewYork, U.S.A
3. Rangaswamy .G. (1987) .Manual on sericulture FAO, Vol –IV, Agriculture service bulletin ,CSB ,Bangalore , India .
4. Dandan.S.B. (2004),Hand book of new sericulture technologies ,Central Silk Board Bangalore,pp 287.
5. Mahadeveppa, D., Halliyal, V.G., Shankar, A.G. and Bhandiwad, R. (2000), Mulberry Silk ReelingTechnology, Oxford and IBH Publishing Co. PVT. Ltd. New Delhi.
6. http://www.csrtimys.res.in/sites/default/files/ebooks/2019-1.pdf

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

SBEC – V – APICULTURE

Course Objectives:

The learner will…

- Understand the basic life cycle of the honeybee.
- Learn about beekeeping tools and equipment.
- Learn to manage beehives for honey production and pollination.
- Learn about bee diseases and pests.

UNIT - I: **Introduction**

Scope of Apiculture. Types of Honey Bees- Life Cycle. Honey bee's *species: Apisdorsata F., Apis indica F., Apis florae F., Apis mellifera F.*

UNIT –II: **Social Organization**

Social Organization of Honey Bee - drones, queens, and workers. Bee Language and Communication. Dancing and Swarming.

UNIT - III: **Bee Keeping and Bee Keeping Equipment**

Beehive, Tools for Bees Keeping: Comb foundation, Bee gloves, Bee veil, Smoker, Hive tool, Honeyextractor.

UNIT - IV: Products of Apiculture

Honey-Chemical composition-Nutritional value and medicinal value.Testing Methods to find adulteration in honey Production of Bee wax and Uses. Bee venom and Uses.

UNIT - V: Bee enemies and Diseases

Bee enemies: Insects, Reptiles, birds, Mammals.

Bee Diseases: Nosima, Acarine, Septecamiea, Brood Foul, Isle of Wight, Amoeba disease.

Course Outcomes:

- Encourage Students‟ participation in scientific beekeeping.
- Maintain ecological balance in nature by way of domestication of honey bee species.
- Maintain small apiaries for demonstration, pollination, extraction and popularization of honey and otherby-product of beekeeping.
- Motivation of students to adopt beekeeping as source of their livelihood.

References:

1. Kumar, A. and Nigam, P. M., Economic and Applied Entomology.
2. Backyard Beekeeping- Kim Flottum, ed. of Bee Culture magazine
3. First Lessons in Beekeeping- Keith Delaplane
4. Hooray for Beekeeping! – Bobbie Kalman
5. How to Keep Bees and Sell Honey – Kelleys
6. The Hive & the Honeybee - Dadant

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

SBEC – VI – DIARY SCIENCE

Course Objectives:

- To explore the Farming of Dairy Breeds
- To understand the methodology of construction of Dairy Farming
- To get employment in the Cooperative Milk Producers Union Limited and in private dairy productfactories
- To provide knowledge to give them an opportunity and its socio-economic aspects
- To train and impart practical knowledge in clean milk production, processing of milk and preparation ofmilk products
- To Study of various diseases and disorders in Dairy breeds and First Aid Measures
- To create the aware the students about the Cattle disease and its treatment

Unit I: Dairy Farming:

Dairy Farming - Definition and Scope. Dairy breeds of India and its classification. Exotic cow breed - Jersey and Red Sindhi, Indian breed – Ongole and Kangayam, Buffalo - Murrah and Surti.

Unit II: Cattle feed and it's Nutrition:

Common cattle feed and nutritive values. Rations - its computational and qualities - Balanced ration for cattle. Importance of grassland and fodder in dairy farming.

Unit III: Milk and Milk products:

Milk and its Composition – Nutritive value; milk collection; factors affecting the quality of milk; Dairy processing: Pasteurization; grading and packaging; transportation and distribution. Milk products – Butter, Ghee, Cheese.

Unit IV – Diseases of Cattle:

Viral diseases - Cow pox-Foot and mouth disease - Rinder pest. Bacterial diseases –Anthrax-Mastitis – Tuberculosis - Haemorrhagic septicemia. Non-contagious diseases-Milk fever, Parasites of dairy breeds

Unit V: Marketing of Milk:

Milk marketing - Dairy Cooperatives: Role of Cooperative societies in milk production and marketing. Dairy development in India, NDDB, NDRI; Merits and demerits of Dairy Business. Progressive plans to promote Dairy technology as a Self-employment Venture.

Course Outcomes

- On the successful completion of the course, students will be able to impart technical knowledge and skills required concerning the selection and breeding of dairy cattle, management of animals anddifferent physiological status, nutrition, health, housing and feeding.
- Principles and practices essential in the production of clean milk. Able to classify feeds according to their nutritive values. Students will know the different types of microbes, and diseases.
- Completion of the programme may seek employment in private dairy farm, milk processing plants and dairy product factories.

Reference Books:

1. Principles of Dairy Science - G. H.Schmidt, L. D. Vivek and N. N. Pathak.
2. Milk and milk products - Harbonsing and Moore
3. Handbook of Dairy science - K. C. Mahanta
4. Milk Production and processing – C.IbraheemKutty and SheebaKhamer.
5. Farm animals and their management – J.A.S.Watson and W.J.Mills.
6. A text book of Animal Husbandry – G.C.Banerjee.
7. Animal Husbandry and dairy science - Jagdish Prasad

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

SEMESTER - VI

PRACTICAL – III

ANIMAL PHYSIOLOGY, DEVELOPMENTAL BIOLOGY, IMMUNOLOGY & MICROBIOLOGY, BIOINFORMATICS, BIOSTATISTICS AND COMPUTER APPLICATIONS, POULTRY SCIENCE & MLT

Course Objectives:

- To empower our students with practical skills to comprehend the Physiology and other functions of each and every vital systems.
- Identify experimental approaches in developmental biology.
- Recognise sources of error in experimental approaches in developmental biology.
- Analyse, compare, assess and evaluate experimental data in the field of developmental biology.
- To familiarize the student with principles of clinical microbiology, immunology, routine methods of identification of bacteria &study of common parasites of man
- To give the students a sound knowledge of pathogenic microbes, laboratory diagnosis, basic understanding of virology, mycology,& advanced serological techniques.
- Apply the knowledge to collect various Biological data and using statistical applications.
- Familiar with various Applications of Bioinformatics
- Understand practical knowledge on poultry science.
- Computer applications on biological data.

Major Practical:

1. Study of activity of salivary amylase activity based on Temperature.
2. Estimation of Oxygen consumption in a fish with reference to body weight.
3. Detection of nitrogenous waste products in fish tank water, frog tank water, bird excreta.

Minor Practical:

1. Separation of serum from the blood sample.
2. Estimation of Urine sugar.
3. Representation of data – Histogram, Frequency polygon..
4. Study of Yeast cells in Curd, mycelium in Bread mould.
5. Entry page of SWISS PROT and BLAST.
6. Study of various breeds of layers and broilers (photographs)

Spotters:

1. Slides of different stages of chick embryo: 24 Hours, 48 Hours, 72 hours and 96 Hours.
2. Slides of cleavage stages - Blastula and Gastrula of frog.
3. Placenta of Sheep and Pig.
4. Slides of Primary and Secondary Lymphoid organs – Thymus, Bone marrow, Spleen and Lymph node.
5. Computer Hardware - Storage Device, CPU, Mouse, Key Board, Monitor.
6. Feeders and Waterers.

Extension Activity:

1. Visit to poultry farm and Submission of visit report.

2. Visit to a Medical Lab and Submission of visit report

Course Outcomes:

- Students are able to do experiment on the role and functions of different systems.
- Able to describe the physiology of respiratory, renal, endocrine and reproductive systems to definenormal and abnormal functions.
- Students are able to understand how physiological parameters are measured in mammals.
- Be able to list the types of characteristics that make an organism ideal for the study of developmentalbiology.
- Be familiar with the events that led up to fertilization.
- Be able to observe the first four rounds of cell division in different groups.
- Be able to identify the stages and cellular mechanisms for gastrulation.
- Demonstrate various types of Eggs
- Learn about various types of Placenta
- Develop skill in observing sperm motility
- Apply the computer knowledge to collect various Biological data
- Familiar with various Applications of Bioinformatics
- Get awareness about nature of the emerging digital knowledge society
- Students will gain skill to execute the roles of a biology teacher or medical lab technicians with trainingas they have basic fundamentals
- To impart awareness on Clinical Lab Technology
- To create knowledge on Self-Employment Opportunity by area of poultry science and MLT.

References:

1. Agarwal, R.A., A.K. Srivastava and Kaushal Kumar. Animal Physiology and Biochemistry (3rd Edition). S. Chand &Company Limited, 7361 Ram Nagar, New Delhi-110 055.
2. Arora, M.P. Embryology. Himalaya Publishing House,Ramdoot, Dr. Bhalerao Marg, Girgaon, Mumbai.
3. Lakshmanan,M : Laboratory manual in Microbiology.
4. Moat & Foster : Microbial Physiology.
5. C.S.V. Murthy Bioinformatics- Himalaya Publishing House.
6. Gurumani. N, An Introduction to Biostatistics (computer Application included) 2nd Edition M.J.P. Publishers,Tamilnadu Book House, 47 Nallathambi street, Triplicane- 600 005.
7. Beauchamp, T.I. and Childress, J.F. (2008). Principles of Biomedical Ethics. VI Edition, OxfordUniversity Press.
8. Samuel, K.M. 1992: Notes on Clinical Lab Techniques. M.K.G. Iyyer & Sons Publ. Co., Chennai – India
9. Mukherjee, 2006 : Medical Laboratory Technology Vol. I, II & III – Tata McGraw Hill Publ. Co. Noida, India.
10. Textbook of Microbiology – R.Anantharayan and CKJ. Paniker
11. A hand book of Medical laboratory technology – V.H. Talib
12. Medical Laboratory technology – (vol-I & vol-II) – Kanai.L. Mukherjee
13. Medical Zoology-Sobti 5. Medical Laboratory Technology-Ramnik Sood

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

SEMESTER VI - PRACTICAL IV

ENVIRONMENTAL BIOLOGY, CLINICAL NUTRITION, EVOLUTIONARY BIOLOGY, SERICULTURE, APICULTURE AND DAIRY SCIENCE

Course Outcomes:

- To inculcate the practical knowledge on moriculture and sericulture
- To know the importance of silkworm rearing, pests and diseases of silkworms and their control measures
- To analyze the quality of silk through experiments
- To identify the honey bee species, races and castes
- To understand the behavior and physiology of honey bees
- To know the importance of honey bees and hive products
- To develop knowledge about value added products in honey

Major Practical:

1. Estimation of Dissolved Oxygen in different watersamples.
2. Estimation of Salinity in different watersamples.
3. Plankton study – Freshwater and marine planktons

Minor Practical:

1. Preparation and calculation of following diets: a) Normal diet. b) Liquid diet c) Soft diet.
2. Value added honey product preparation
3. Estimation of milk quality by MBRT (Methylene Blue Reduction Test)

Spotters:

1. Use of Rain Gauge, Maximum & Minimum Thermometer, Hygrometer, Anemometer and Barometer.
2. Study of fossil evidences
3. Silk worm Rearing equipments
4. Mutant Hive
5. Honey Extractor and Smoker

Extension Activity:

1. Visit to sericulture farmhouse and submission of report
2. Visit to Dairy farm and submission of Report.

Course Outcomes:

- Ability to Estimate of dissolved oxygen, Salinity, pH, free CO_2, Carbonates and Bicarbonates, Calciumin water samples.
- Familiar with ecological adaptations
- Measure pH of different water samples using pH meter, pH paper and indicator solution.
- Demonstrate Alarm pheromones in ants.
- Identify the contributions of various evolutionists.
- Identify different zoogeographical realms with fauna.
- Apply knowledge on moriculture and sericulture

- Observe the biology, rearing, pests and diseases of silkworm and their control measures
- Evaluate the quality of silk
- Supply knowledge in identifying honey bee species, races and castes
- Field visit to study the apiary management techniques and honey harvesting methods
- Demonstrate the students for value added products in honey
- Students will get the self-employment with the help of Dairy Science
- They can generate employments by Dairy Science.

References:

1. Ananthakrishnan : Bioresources Ecology 3rd Edition
2. Goldman – Limnology, 2nd Edition
3. Odum and Barrett – Fundamentals of Ecology, 5th Edition
4. David McFarland, Animal Behaviour, Pitman Publishing Limited, London, UK.
5. Manning, A. and Dawkins, M. S, An Introduction to Animal Behaviour, Cambridge, University Press,UK.
6. John Alcock, Animal Behaviour, Sinauer Associate Inc., USA.
7. Vinod Kumar (2002) Biological Rhythms: Narosa Publishing House, Delhi/ Springer-Verlag, Germany
8. Agarwal V.K., Animal Behaviour (2013). S. Chand Publishing,
9. Ridley, M. (2004). Evolution. III Edition. Blackwell Publishing
10. Barton, N. H., Briggs, D. E. G., Eisen, J. A., Goldstein, D. B. and Patel, N. H. (2007). Evolution. ColdSpring, Harbour Laboratory Press.
11. Hall, B. K. and Hallgrimsson, B. (2008). Evolution. IV Edition. Jones and Bartlett Publishers
12. Verma & Agarwal (2006) Cell Biology, Genetics, Molecular Biology, Evolution & Ecology, S. Chand publishers
13. Carl T. Bergstrom& Lee Alan Dugatkin (2012). Evolution, W. W. Norton & Company; Internationalstudent edition edition
14. Madan Mohan Rao. M. (2008) A text book of sericulture B.S publications, Hyderabad.
15. Ganga & Sulochanachetty.G. (2006) An introduction to sericulture. Oxford & IBH Publishing Co. Pvt.Ltd. New Delhi.
16. Ullal.S.R and M.N Narasimhanna (1977) Hand book of Practical Sericulture Published by Shri .A.R S.Gopalachar Secretary ,Central silk board ,.Meghdoot, Bombay.
17. Rangaswami.G and S. Manjeet. Jolly. (1988) Sericulture Manual –I, Mulberry Cultivation Published byMohan Primlani for Oxford & IBH publishing CO. Pvt. Ltd. New Delhi
18. David Cramp (2012). The Complete Step-by-step Book of Beekeeping: A Practical Guide to Beekeeping, from Setting Up a Colony to Hive Management and Harvesting the Honey. Lorenz Books. London, p160.

B.Sc.

ALLIED ZOOLOGY

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

B.Sc. ALLIED ZOOLOGY - ODD SEMESTER
PAPER – I: NON–CHORDATA AND CHORDATA

Objectives:

- To appreciate the diversity of the animal kingdom.
- To understand characteristics of the non-chordate phyla and the chordate classes.
- To study the organization and life cycle of certain economically significant organisms.

UNIT – I

General characters of the Phylum Protozoa - General organization and life cycle of Plasmodium - General characters of the Phylum Porifera -General characters of the Phylum Coelenterata.

UNIT – II

General characters of the Phylum Platyhelminthes., General organization and life history of Fasciola hepatica., General characters of the Phylum Nemathelminthes -Nematode parasites of man., General characters of the Phylum Annelida. General organization and reproduction in Earthworm.

UNIT – III

General characters of the phylum Arthropoda - General organization and reproduction in Periplanata americana - General characters of the Phylum Mollusca- General characters of the Phylum Echinodermata - General organization and reproduction in Asterias.

UNIT – IV

General characters of the Phylum chordate and outline classification up to class level - General characters of the class: Pisces - General organization of all systems except endoskeletal systemof Shark - General characters of the class: Amphibia.

UNIT – V

General characters of the class: Reptilia - General characters of the class: Aves - General characters ofthe class: Mammalia - General organization of all systems of Rabbit except endoskeleton.

Course Outcomes:

- Get awareness on animal diversity
- Understand the affinities among the animals.
- Apply on zoology knowledge on further higher learning of other subjects.

REFERENCE BOOKS

1. M. EkambaranathaAyyar& T. N. Ananthakrishnan. Outlines of Zoology.
2. M. EkambaranathaAyyar& T. N. Ananthakrishnan. Manual of Zoology, Vol I & II.
3. R. L. Kotpal. Modern textbook of Zoology: Invertebrates.
4. R. L. Kotpal. Modern textbook of Zoology: Vertebrates.

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

B.SC. ALLIED ZOOLOGY - EVEN SEMESTER

PAPER – II: GENERAL PRINCIPLES OF ZOOLOGY

Course Objective

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

- Understand the structure of the cell and its functions
- Study the development of animals
- Analyse the physiology and functions of different organs
- Know environmental problems
- Deploy the concepts of evolution

Unit I - Cell Biology:

Structure of Animal Cell, Structure and functions of Plasma Membrane, Golgi Body & Mitochondria Genetics**:** Mendelian laws - Sex linked inheritance - Turner‟s, Klinefelter‟s and Down syndrome - Phenylketonuria and Sickle cell anemia.

Unit II - Developmental Biology:

Types of Eggs - Fertilization - Cleavage and Gastrulation in Frog –fetal membranes in chick - Placentation in mammals.

Unit III - Physiology:

Osmotic and ionic regulation in fishes – Digestion and Excretion in Man - Respiration - Types ofRespiratory organs – Respiratory pigment - Hb - Transport of respiratory gases.

Unit IV- Ecology:

Environmental factors – Temperature and Light - Pond Ecosystem – Water Pollution – Air Pollution –Animal Associations

Unit V - Evolution:

Evidences **–** Morphological, Anatomical, Biochemical and Paleontological **-** Lamarckism – Neo Lamarckism, Darwinism – Neo-Darwinism.

Course Outcomes:

After the completion of the course, students should be able to

- Realise the various cell structure, organelles,
- Gain Knowledge regarding genetic disorders, developmental process, physiological functions,Environmental aspects and evolutionary process.
- Applied knowledge for higher learning and occupational needs.

REFERENCE BOOKS

1. Verma.P.S.&.Agarwal V.K (2006) Cell Biology, Genetics, Molecular Biology, Evolution and Ecology–S.Chand& Company LTD. Ram Nagar, New Delhi -110055
2. Verma.P.S.&.Agarwal V.K. Chordate Embryology. S.Chand& Company Ltd. Ram Nagar, New Delhi -110055
3. Verma P.S. & Tyagi B.S. Animal Physiology. VI Edition, S. Shand & Company Ltd, Ram Nagar, NewDelhi -110055

PERIYAR UNIVERSITY, SALEM – 636011

B.Sc., ZOOLOGY

B.SC. ALLIED ZOOLOGY PRACTICALS

ODD & EVEN SEMESTER

NON – CHORDATA, CHORDATA AND GENERAL PRINCIPLES OF ZOOLOGY

Course Objectives:

- To get anatomical knowledge and adaptations in animal group.
- To identify model animals as specimen / slides.
- To provide skill of drawing and labelling.
- To appreciate economic zoology for its importance.

DISSECTIONS

1. Cockroach/Prawn – Digestive system.
2. Prawn appendages.

MOUNTINGS

1. Cockroach – Mouth parts.
2. Honey bee - Mouth parts.

SPOTTERS – IDENTIFICATION

Identify, draw and write notes:

1. Paramecium: Entire.
2. Ascon: Entire.
3. Obelia: Colony, Medusa.
4. Fasciola hepatica: Entire.
5. Ascaris: Entire.
6. Penaeus: Entire.
7. Pila: Entire.
8. Starfish: Entire – Oral and Aboral view.
9. Shark: Entire.
10. Frog: Entire.
11. Calotes: Entire.
12. Pigeon: Entire.
13. Rat: Entire.

EMBRYOLOGY

1. 24 hours of Chick embryo
2. Blastula of Frog.
3. Gastrula of Frog.

ECONOMIC ZOOLOGY

1. Honey bee – Different castes.
2. Silkworm – Adult, Caterpillar, Pupa and Cocoon.
3. Pisciculture – Edible fishes.

Course Outcomes:

- Getting fundamental knowledge on animal groups.
- Acquired skill of dissection, drawing and labelling.
- Awareness on economic value in animals.

REFERENCE BOOKS

1. M. Ekambaranatha Ayyar & T. N. Ananthakrishnan. Outlines of Zoology.
2. M. Ekambaranatha Ayyar & T. N. Ananthakrishnan. Manual of Zoology, Vol I & II.
3. R. L. Kotpal. Modern textbook of Zoology: Invertebrates.
4. R. L. Kotpal. Modern textbook of Zoology: Vertebrates.
5. Verma. P.S. &. Agarwal V.K (2006) Cell Biology, Genetics, Molecular Biology, Evolution and Ecology–S. Chand & Company LTD. Ram Nagar, New Delhi -110055
6. Verma. P.S. &. Agarwal V.K. Chordate Embryology. S. Chand & Company Ltd. Ram Nagar, NewDelhi -110055
7. Verma P.S. & Tyagi B.S. Animal Physiology. VI Edition, S. Shand & Company Ltd, Ram Nagar, NewDelhi -110055

****