



PERIYAR UNIVERSITY

PERIYARPALKALAINAGAR

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
to Periyar 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 programmes spread over the complete Programme of studies 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 students who 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.
“Foundation Course” means courses offered as
- (iv)** - 1) Environmental Studies (1st year)
2) Value Education-Human Rights/Women's Rights (2nd year)
- Part V** - “Extension Activities” means all those activities which form part of NSS/NCC/Sports/YRC and other co and extra curricular activities.

A detailed explanation of the above with relevant credits are given under “Scheme of Examinational on 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 study is 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 of the 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, Dairy 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, Drawing and Laboratory techniques.

ELIGIBILITY FOR ADMISSION:

Candidate for admission to the first year of the degree of Bachelor of Science Course shall be required 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 Sciences shall consist of three academic years divided into six semesters. Each semester consists of 90 working days.

PASSING MINIMUM:

The candidates shall be declared to have passed the examinations if he/she secure not less than 40 marks

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 = 60 marks
Internal Assessment = 40 marks

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 whose 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 whose secure above 50% and below 60% shall be declared to have passed the examinations in second class.
- Other successful candidates whose secure below 50% shall be declared to have passed the examination in third class.

PERIYARUNIVERSITY,SALEM-636011

B.Sc.,ZOOLOGY

CourseStructure(CBCS)

FromAcademyear2021-2022onwards

Part	CourseCode	TitleoftheCourse	Hrs. /Wee k	Credits	Exam. Hrs.	Marks		
						CIA	ESE	Total
SEMESTERI								
I	Language I	Tamil	6	3	3	25	75	100
II	Language II	English	6	3	3	25	75	100
		ProfessionalEnglish	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	AlliedPractical	Chemistry/Botany	3	-	-	-	-	-
IV	ValueEducation	Yoga	1	2	3	25	75	100
Total			30	21		150	450	600
SEMESTERII								
I	Language II	TamilII	6	3	3	25	75	100
II	Language II	English II	4	3	3	25	75	100
II	Naan MuthalvanCourse	LanguageProficiencyforEmployability(Eff ectiveEnglish)	2	2	3	25	75	100
IV		ProfessionalEnglish	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	AlliedII	Chemistry/Botany	4	3	3	25	75	100
III	AlliedIPractical	Chemistry/Botany	3	3	3	40	60	100
IV	EVS	EnvironmentalStudies	1	2	3	25	75	100
Total			30	29		255	645	900
SEMESTERIII								
I	LanguageIII	TamilIII	6	3	3	25	75	100
II	LanguageIII	EnglishIII	6	3	3	25	75	100
III	CoreIII	Cellbiology	5	6	3	25	75	100
III	Practical-II	Cell Biology,Genetics,Vermiculture&Ver micomposting&Aquaculture	3	-	-	-	-	-
III	Allied III	Chemistry/Botany	4	4	3	25	75	100
III	AlliedPractical	Chemistry/Botany	3	-	-	-	-	-
IV	NMSDC	Digital Skills for Employability – Microsoft Office Essentials	2	2	3	25	75	100
IV	NMECI	Human health & Hygiene(offeredtootherDept.Stu dents)	1	3	3	25	75	100
Total			30	21		150	450	600

PERIYARUNIVERSITY,SALEM-636011

B.Sc.,ZOOLOGY

SEMESTERIV								
I	LanguageIV	TamilIV	6	3	3	25	75	100
II	LanguageIV	EnglishIV	6	3	3	25	75	100
III	CoreIV	Genetics	4	5	3	25	75	100
III	Practical-II	CellBiology,Genetics,Vermiculture & Vermicomposting&Aquaculture	3	4	3	40	60	100
III	AlliedIV	Botany/Chemistry	4	4	3	25	75	100
III	AlliedIVPractical	Botany/Chemistry	3	3	3	40	60	100
IV	NaanMuthalvan Course	Employability Skills-Microsoft	2	2	3	25	75	100
IV	NMECII	Wildlife Management (offered to OtherDept.Students)	2	2	3	25	75	100
IV	Internship Programme	Dairyfarm,Fishfarm/Breedingcentre,Poultryfarm,MedicalLab,NaturalEcosystem,NaturalHistoryMuseum, Sericulturefarmhouse,Apiculturefarms, Vermifarm.						
	CoreIV	Genetics	4	5	3	25	75	100
Total			30	26		255	645	800
SEMESTERV								
III	CoreV	AnimalPhysiology	5	5	3	25	75	100
III	CoreVI	Developmental Biology	5	5	3	25	75	100
III	CoreVII	Immunology&Microbiology	5	5	3	25	75	100
III	Elective I	MedicalLaboratoryTechniques(MLT)	5	5	3	25	75	100
IV	SBEC III	PoultryScience	2	2	3	25	75	100
IV	NMSDC	Advanced Technology for Employability in Life Science – Medical Coding	2	2	3	25	75	100
IV	Practical	Practical-III& IV	6	-	-	-	-	-
Total			30	24		150	450	600
SEMESTERVI								
III	CoreVIII	Environmental Biology	5	4	3	25	75	100
III	CoreIX	EvolutionaryBiology	4	4	3	25	75	100
III	CoreX	Bioinformatics, Biostatistics andComputerApplications	5	5	3	25	75	100
III	Elective II	Sericulture	4	4	3	25	75	100
	Naan MuthalvanCourse	Medical coding for Employability-Medical Coding	2	2	-	25	75	100
IV	SBECIV	DairyScience	2	2	3	25	75	100
IV	Practical-III	AnimalPhysiology,Developmental Biology, Immunology & Microbiology,PoultryScience,&MLT.	3	3	3	40	60	100

PERIYARUNIVERSITY,SALEM-636011**B.Sc.,ZOOLOGY**

III	Practical-IV	Environmental Biology, EvolutionaryBiology, Bioinformatics, BiostatisticsandComputerApplication s, Sericulture&Apiculture.	3	3	3	40	60	100
III		ExtensionActivities		1				
V	CoreVIII	Environmental Biology	5	5	3	25	75	100
Total			33	33		230	570	800
TotalCredits:148						Total Marks:42 00		

PERIYARUNIVERSITY,SALEM-636011

B.Sc.,ZOOLOGY

B.Sc.,ZOOLOGY

SEMESTER-I

**SEMESTER -
ICORE COURSE -
IINVERTEBRATE**

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 and 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 – level 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 Coelenterates

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, Lifecycle. **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, Respiratory system, 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, Respiratory system, Nervous system, Sense organs, Excretory system, Reproductive system. **General Topic:** Beneficial Insects.

UnitV

Phylum:Mollusca-Generalcharacters.**TypeStudy:***Pilaglobosa*-

Externalfeatures,Shell,Digestivesystem,Respiratorysystem,Circulatorysystem,Nervoussystem,,Senseorgans-Eyes,Osphradium,Statocyst, Tentacles, Excretorysystem. **GeneralTopic:** Torsionin Mollusca.

Phylum:Echinodermata-Generalcharacters.**TypeStudy:***Asteriasrubens*-Externalfeatures,Pedicellaria-Structure and Function, Digestive system, Water vascular system, Circulatory system-PerihaemalandHaemalsystem,Nervoussystem,Senseorgans,Excretorysystem,Reproductivesystem.**GeneralTopic:**Larvalforms ofEchinoderms.

CourseOutcomes:

- Tocompareandunderstandthegeneralandspecificcharacteristics withineachPhyla
- Interprettheaffinities,evolutionaryrelationshipsandadaptationofthemajortaxaandtoexplaintheireconomicimportancewith respect to Non-Chordates

ReferenceBooks

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

B.Sc.ZOOLOGY

SEMESTER-II

SESTER -
IICORE COURSE-
II

Objectives:

CHORDATA

- 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 understand the level of organization in chordates 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 amphibians. **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 and 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 Animal Sciences.

References:

- EkambaranathaAyyar,M.andT.N.Ananthakrishnan.AManualofZoologyVol.II(chordate). S.Viswanathan (Printers and Publishers) Pvt.Ltd.,Chennai. Alexander, R.M. TheChordatesCambridgeUniversityPress.
- JordanE.L.andP.S.Verma.ChordataZoology(11thEdition).S.ChandandCompanyLimited,7361 RamNager, Qutab Road,New Delhi-110 055.
- Kotpal.R.L.ModemTextBookofZoology-vertebrates.RastogiPublications,Gangotri,ShivajiRoad,Meerut-250002.
- Nigam,H.C.,1983.ZoologyofChordates,VishalPublications,jalandhar - 144008,942.
- NewmanH.H.1981ThePhylum Chordata,SatishBookEnterprise,Agra-282003,477pp.
- Parker and Haswell, 1964. Text Book of Zoology, Vol II (Chordata), A.Z.T,B.S. PublishersandDistributors,New Delhi-110 051, 952 pp
- Waterman, Allyn J. et al., 1971. Chordate Structure and Function, Mac Millan & Co., NewYork,587 pp.

PRACTICAL-ININVERTEBRATE&CHORDATA

Courseobjectives

- 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 ontogenetic and phylogenetic relationships of Invertebrates and phylum Chordata.

DISSECTION

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

MOUNTING

1. Mouth parts of Housefly, Honeybee, Mosquito
2. Body setae of Earth worm
3. Fish-Ctenoid scales.

SPOTTERS

A. Classifying reasons upto order:

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

B. Draw labelled sketches:

Obelamedusa, Ephyralarva, Redialarva, Cercarialarva, Mysis larva, Bipinnarialarva

C. Comment on Biological significance:

Plasmodium, Obeliacolony, Physalia, Fasciola-Miracidium, Taenia-Mature proglottid, Chaetopterus, Peripatus, Hirudinaria, Limulus, Chiton, Sepia, Octopus, *Anabasscandens*, *Clarias batrachus*, *Hippocampus*, *Echeneis*, *Ichthyophis*, *Axolotle larva*, *Chamaeleon*, *Viperarusselli* (*Russe l' 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

SuggestedReferences:

- Barnes,R.D.(1982).InvertebrateZoology,VEdition.HoltSaundersInternationalEdition.
- Barnes,R.S.K.,Calow,P.,Olive,P.J.W.,Golding,D.W.andSpicer,J.I.(2002).TheInvertebrates:A New Synthesis,IIIEdition, Blackwell Science
- Barrington,E.J.W.(1979).InvertebrateStructureandFunctions. IIEdition,E.L.B.S.andNelson
- Boradale,L.A.andPotts,E.A.(1961).Invertebrates:AManualfortheuseofStudents.AsiaPublishingHome
- Kardong,K.V.(2005)Vertebrates“ComparativeAnatomy,FunctionandEvolution.IVEdition.McGraw-HillHigher Education.
- Kent,G.C. andCarrR.K.(2000).ComparativeAnatomyoftheVertebrates.IXEdition.TheMcGraw-HillCompanies.
- Hilderbrand,MandGaslowG.E.AnalysisofVertebrateStructure,JohnWileyandSons.4Walter, H.E.andSayles,L.P;BiologyofVertebrates,Khosla PublishingHouse.
- ClevelandP.Hickmanet.al.(2008).AnimalDiversity,McGraw-Hill HigherEducation
- Kotpal(2015).ModernTextbookofZoologyVertebrates,Rastogi publishers,NewDelhi
- Saxena,R.K.andSaxena,S.(2015).Comparative AnatomyofVertebrates,VivaBooks,Delhi
- JordanE.L.andVermaP.S.(2010).ChordateZoology,S.Chand&Co,NewDelhi.

B.Sc.ZOOLOGY

SEMESTER-III

**SEMESTER
IIICORE COURSE
IIICELLBIOLOGY**

CourseObjectives:

- 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 function brought about by mutation.
- To understand the process of cell division in both somatic and germ cell.

UnitI

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

UnitII

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

UnitIII

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

UnitIV

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

UnitV

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.

CourseOutcomes:

- 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 and know with which other organelles they are associated.
- Able to identify the three primary components of the cell – cytoskeleton and how they affect cell shape, function and movement.

REFERENCEBOOKS

- AjayPaul.,2011. CellandMolecularBiology.BooksandAlliedPvt, Kolkata.
- Powar,C.B.,2002.Cell Biology.HimalayaPublishingHouse.
- Cohn,N.S.,1979,ElementsofCytology,FreemanBookCo.,NewDelhi.
- VeerBalaRastogi, Introductorycytology.KedarNathRamNath.Meerut250001.
- Bhaskaran,K.K.&Biju Kumar,A.:CellBiology, Genetics&MolecularBiology.
- VijayakumaranNair,K.&Jayaprakash,M.:CellBiology,Genetics,MolecularBiology.Academica,TVM.
- Verma&Agarwal(2006)CellBiology,Genetics,MolecularBiology,Evolution&Ecology,S.Chandpublishers

SBEC-I

VERMICULTUREANDVERMICOMPOSTING

CourseObjectives:

- Torecallandrecognizeearthwormdiversity.
- Togetknowledgeonorganicfarmingandwastemanagementusingvermitechnology.
- Tounderstandthevermiculturetechniques.
- Toapplyknowledgeonvermicompost preparation.
- Toawarethesignificanceofsustainableagricultureandorganicfarming.
- Toinoculatebasic knowledgeonrecyclingofbiodegradablewasteofdifferent kinds.
- TounderstandthevalueofVermitechnologyanditssignificance.

UnitI

Vermiculture: Vermiculture process – Site selection - Selection and collection of species mono andpolyculture-Essentialparametersforvermi-bedding.Methodsofharvesting-generalmanualmethods,self-harvestingmethod, mechanical method.

UnitII

Vermi-technology: Scope of vermiculture and vermicomposting – difference between vermicultureandvermicomposting.Vermi-tech practices inIndia.

UnitIII

Earthwormdiversity:Ecologicalgroupsofearthworms,biologyofcompostingearthworms–*Eoisenafoeitida*,*Eudriluslugeniae*.

UnitIV

Soil and Organic waste sources: Soil – Physical, chemical and biological features, Organic wastesources–problemsintraditionalcomposting, Types,small andlargescale pitmethod,heapmethod.

UnitV

Vermicompost: Nutritive value of vermicompost, storing and packing of compost - Applications ofvermicompostinagriculturalandhorticulturalpractices-Economicimportanceofvermiculture,Nationalizedbank support (NABARD)forvermiculture.

CourseOutcomes:

- Getknowledgeaboutthe characteristicsandroleofearthworminsustainableagriculture.
- Getknowledgeonthesignificanceofearthworms.
- Understand the importanceof wastedegradationbyeco-friendlymethod.
- Applythe significanceofVermicompostingmethods.
- Applyknowledgeon commercializationofVermiproducts.
- ExpertiseinVermicultureTechniques
- CreatingOpportunitiesforselfemployment

ReferenceBooks:

- EarthwormecologybyLEE
- BiologyofearthwormbySteven son
- Vermicompostingtech–soilhealth tohumanhealthbyRanganathanL.S.
- TripathiG,Vermisource Technology,DiscoveryPublishingHouse,2003
- Ranganathan,L.S.,VermicompostingTechnology–FromSoilHealthtoHumanHealth,2006.

B.Sc.,ZOOLOGY

- Bhatnagar,R.K.andPalta,R.K.,(1996).VermicultureandVermicomposting.KalyaniPublishers,NewDe
lhi.
- ArunK.Sharma.(2002).AhandbookofOrganic Farming,Agrobios,Jodhpur,India
- TheEarthwormbook,S.A. Ismail. OtherIndiapress,Goa-403507,India(2005).
- GuptaP.K.(2008).VermicompostingforSustainableAgriculture.Agrobios.India.
- Edwards,C.A.andJ.R. Lofty(1977)“BiologyofEarthworms”Chapmanand HallLtd.,London.
- Lee, K.E. (1985) “Earthworms: Their ecology and Relationship with Soils and
LandUse”,AcademicPress,Sydney.
- Satchel,J.E.(1983).“EarthwormEcology”,ChapmanHall,London

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, Eyecare, Earcare and Skincare. Diabetes, Obesity and Cancer. Awareness on Alcoholism, Smoking, Tobacco chewing, Drug Abuse and Addiction, STD- AIDS.

CourseOutcomes:

Afterthecompletion of thecoursethestudentwillbeto,

- Getanopportunitytowork inthefieldofhealthdepartment,NGOs.
- DohigherlearningintheareaofParamedicalcourses.
- Confirm thequalityand standards ofwater,air,light,sound.
- Suggestremedial measuresforpreventionandcontrolofthesediseasesanddisorders.
- Create awarenessamongtheindividuals inthe societytolead healthylife.

TextBooks:

1. Park,J.E.andPark.2000.Textbookofpreventiveandsocialmedicine,17thEdition,Banarasidas Publishers,Jabalpur.
2. Muruges,N.2002.Healtheducationandcommunitypharmacy,3rdEdition,SathyaPublishers,Madurai.
3. EdwardPSarafinoandTimothyW.Smith.2012,HealthPsychology,InternationalStudentVersion7thEdition, WileyIndia(P)Ltd, New Delhi.
4. Srilakshmi,B.Dietetics,2014,7thMulti-colorEdition,NewAgeInternationalPublishers,NewDelhi.
5. SathyanarayanaU. Biochemistry–RevisedEdition,Booksand(P)Ltd,Kolkata.

References:

1. SwaminathanM(1995):“Food&Nutrition”,TheBangalorePrinting&publishingcoltd.,VolII,Second Edition, Bangalore.
2. Srilakshmi(1997):“FoodScience”,NewAgeInternational(P)Ltd,Publishers,Pune.
3. Mudambi.R.Sumathi&RajagpalM.V(1983),“Foods&Nutrition”,WilleyEasternLtd,Second Edition,New Delhi.
4. Thangam.E.Philip(1965):ModernCookery,OrientLongman,IIdition.VolII,Bombay.
5. ShubhanginiA.Joshi,(1992)““NutritionandDietetics””TataMcGrow-HillpublishingCompanyLtd,NewDelhi.
6. Srilakshmi.B–“NutritionScience”,VEDn,New AgeInternational(P) Ltd,Publishers,Chennai.
7. Tortora.JandFunk.R.,(2008),MicrobiologyanIntroduction,9thedition,PearsonEducationinSouth Asia.
8. WinwoodR.S.and SmithJ.L.,Sear“sAnatomyand PhysiologyforNurses,6thEdition,EdwardArnoldandJaypeeBrothers.

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 in prokaryotes 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 – autosomes and sex chromosomes – Klinefelter's 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 T4 phage.

Courseoutcomes:

- Comprehensiveanddetailedunderstandingofthechemicalbasisofheredity.
- Understandingabouttheroleof geneticsinevolution.
- Theabilitytoevaluateconclusionsthat arebasedon genetic data.
- Theabilityto understandresults ofgeneticexperimentationinanimals.

ReferenceBooks:

1. Strickberger:Genetics(MacMillan).
2. Farnsworth:Genetics(harperandRow).
3. P.K.Gupta:Genetics(RastogiPublications)
4. P.S.VermaandAgarwal:Genetics(S.Chand&Co.Ltd.)
5. Altonburg,E:Genetics(Oxford&IBHpublishingcompany)
6. BurnsG.W.:TheScienceofGenetics(MacMillan)
7. A.C.Pai:Foundations ofGenetics(McGaw-Hill)
8. J.A.Serra:ModernGenetics(3volumes)
9. Sinnott,DunnandDobzhansky:PrinciplesofGenetics(McGrawHill)10.
- Gardener:Principles of Genetics.

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.

Courseoutcomes:

- Familiarizetheimportanceofaquaculturepractices.
- Acquiredthetechnologyenablesustainableaquaculturefarmmanagement.
- Gainedknowledgeofnutritiveimportanceinfeedformulation
- Obtainedknowledgein theeconomicalaspectsoftheaquaculture.
- RelatethestrategieslearnedforthedevelopmentofAquafarmmanagementandsustainableproduction

References:

1. Jhingram,V.G.,(1982),FishandFisheriesin India,HindustanPublishingCooperation,NewDelhi.
2. James E. Lannen, R. Onealsmitherman, George tchobanologous, (1983), principles and practices ofPondAquaculture:Astateoftheartreview,PondDynamics/AquacultureCRSP,programManagementOffice,Oregonstate University,MarineScienceCenter,Newport,Oregon,USA.
3. Lucas, J.S., Southgate, P.C. and Tucker, C.S. eds. (2019) Aquaculture: farming aquatic animals andplants,JohnWiley&Sons.
4. Austin, B., Austin, D. A, (2012), Bacterial fish pathogens, 2012.,Vol. 481, p. 482. Dordrecht, TheNetherlands:Springer.
5. Lim C.E., Sessa D.J, (1995), Nutrition and Utilization Technology in Aquaculture. AOCS Press,Illinois,USA.
6. RoberstR.J,(2012),FishPathology.Wiley–Blackwell.
7. Pillay,T.V.R.&M.A.Dill,(1979),AdvancesinAquaculture.FishingNews(Books)Ltd.,England.

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 Wildlife 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 fingerprinting 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.

Courseoutcomes:

- UnderstandthevariousconceptsofWildlifeManagement
- WriteCompetitiveExaminations

References:

1. Saharia, V.B.1982WildlifeinIndia,NatarajPublishers,DehraDun
2. Seshadri,B.1986India'sWildlifereserves,SterlingPub'sPvt.Ltd.,NewDelhi
3. Giles,R.H.Jr.(Ed)1984.WildlifeManagementTechniques3rdedition.
ThewildlifeSociety,Washington.D.C. NatarajPublishers,Dehradun.India
4. Dasmann,Rf.1964,WildlifeBiology.John and Wileyandsons Newyork.Pp231.
5. Robinson,Wl.and Eric,G. Bolen,1984. WildlifeEcologyandManagementMacMillan

**CELLBIOLOGY,GENETICS,VERMICULTURE&V
ERMICOMPOSTINGN&AQUACULTURE**

CourseObjectives:

Studentswillbeable,

- Countblood cellsbyusinghemocytometer.
- Identificationofdrosophilamutants.
- StudyaboutNormalKaryotyping
- Tocompostinalimitedspace anddescribethedecomposingprocess.
- Theywill alsoturntowardsorganicfarming,
- Togivestudents thenecessarybasicinformationaboutfisheryandaquaculture.
- Todiscuss aquaticfoodprimaryproductionsystems, fisheryandaquaculture.
- Todiscussimportantfactorsforperformingasustainablefisheryandasustainableaquaculture.

MajorPractical:

1. CountingofRBCusingHemocytometer
2. CountingofWBCusingHemocytometer.
3. Mitosisin Onionroot tipsquash

MinorPractical:

Humanbloodgrouping

CommonDrosophilamutant-

EyeColourandWing.MountingofBuccal epithelial
cells.

Spotters:

1. Microscope
2. Columnarepithelium,Ciliatedepithelium,Glandularepithelium
3. Cardiacmuscle
4. Catla,Rohu,Mrigal,andTilapia
5. Vermiwash,EarthwormCocoon
6. HumanKaryotyping, Downsyndrome

ExtensionActivity:

Fieldtrip&Reportssubmission:

1.Visit Vermiculture

Unit2.VisitAquacultureF

arm

CourseOutcomes:

- Basicknowledgeonapplicationstodifferentcellstudies.
- Understandsthefundamentalgeneticstudies.
- Understandsconceptsoffisheries,fishingtoolsandsiteselection

- Knowledge on Aquaculture systems, induced breeding techniques, postharvesting techniques
- Provides knowledge of ornamental fish breeding which is highly professional and attractive avenue

foryouth

References:

1. CelisJE(ed)(1998)CellBiology:ALaboratoryHandbook,2ndedn.SanDiego:AcademicPress.
2. PaddockSW (ed)(1999) Methods inMolecularBiology,vol122:
ConfocalMicroscopyMethodsandProtocols.Totowa, NJ: HumanaPress.
3. Human Genetics and Genomics: A Practical Guide - Bahar Taneri, Esra Asilmaz, Türem Delikurt,PembeSavas,SeniyeTargen,YagmurEsemen
4. BhattJ.V.&S.R.Khambata(1959)“RoleofEarthwormsinAgriculture”IndianCouncilofAgricultura
lResearch,New Delhi
5. Dash, M.C., B.K.Senapati, P.C. Mishra (1980) “ Vermis and Vermicomposting” Proceedings of
theNationalSeminar on Organic Waste Utilization and Vermicomposting Dec. 5-8, 1984, (Part B),
Schoolof LifeSciences, Sambalpur University,Jyoti Vihar, Orissa.
6. Kevin, A and K.E.Lee (1989) “ Earthworm for Gardeners and Fisherman” (CSIRO, Australia,
DivisionofSoils)
7. Wallwork,J.A.(1983)“EarthwormBiology”EdwardArnold(Publishers) Ltd.London.
8. ICAR,2013.HandbookofAnimalHusbandry,4thEd.ICARPublication, Pusa,NewDelhi.
9. Banerjee,G.C.,2006.TextbookofAnimalHusbandry8thEd.OxfordandIBHPublishingCompanyLtd.,New
Delhi.
- 10.JagadishPrasad,2002.PrinciplesandpracticesofDairyFarmManagement,3rdEd.KalyaniPublishers
,Ludhiana.
- 11.Sastry,N.S.R.,C.K.ThomasandR.A.Singh,2015.LivestockProductionManagement,4thEd.Kalyan
iPublishers, New Delhi.
- 12.Hafez, E.S. E.(1962).ReproductioninFarmAnimals.Lea&
FabigerPublisher13.DunhamR.A.(2004).AquacultureandFisheriesBiotechnologyGeneticAppro
aches.CABI
publications,U.K.

B.Sc.ZOOLOGY

SEMESTER – V

**SEMESTER -
VCORECOURSE-**

V

CourseObjectives:

ANIMALPHYSIOLOGY

- Tounderstandthestructureofthedifferent organ systemsinman/mammals.
- Tounderstandthemechanismsinvolvedinthefunctioningofthedifferent systems.
- Tostudycertain disordersthatariseasaconsequenceof physiologicalmalfunction.
- Tounderstandthemetabolicactivitiesinmammalianbody.
- Tounderstandthegaseoustransportandthestructureinvolvedingaseoustransportinmammalianbody.
- Tounderstandthevariousbiomoleculesinbody.
- Tounderstandthetypesmechanism ofworkingofnervecells.
- Tounderstandthenatureofendocrine glandsandtheirsecretion.

UNIT-I

Nutrition:Proteins,Carbohydrates,lipids,Vitamins,mineralsandwater.–Foodrequirements–BalancedDiet.
DigestivesystemofMan,Digestiveenzymesand Absorption.

UNIT-II

Respiratory system of Man, Mechanism of respiration in Man, Respiratory pigments.Circulatorysystem-CirculationofBlood–
Composition,PropertiesandFunctions.HumanCardiacCycle,CardiacRhythm–Originand RegulationofHeart Beat.

UNIT-III

NervousSystem–Neuron–Structure,typesofneurons,Nerveimpulse.Synapse–Synaptictransmission,
Neurotransmitters. Receptors – Photoreceptor – Mammalian Eye – Physiology of vision.Phonoreceptors– Mammalian Ear

UNIT-IV

MuscularSystem:Structureandtypesofmuscle,Physiologyofmusclecontraction.
Excretion – Kidney – Structure and Function, Mechanism of Urine formation, Osmoregulation inmammals.

UNIT-V

Endocrineglands–Structure,secretionsandfunctionsofallEndocrineglandsofVertebrates.Antagonismand Synergism.

CourseOutcomes

- Studentsareabletounderstandthephysiologyatcellularand system levels.
- Studentsareabletodescribetherolesand functionsofdifferentsystems.
- Abletodescribethephysiologyofrespiratory,renal,endocrinesystemstodefinenormalandabnormalfunctions.

ReferenceBooks

1. Verma,Tyagi andAgarwal.1986.AnimalPhysiology.Chand&Co.,NewDelhi.
2. William.S.Hoar.1976.GeneralandComparativePhysiology,PrenticeHallofIndiaPvt.Ltd.,NewDelhi-110001.
3. Wood.D.W.1983.PrinciplesofAnimalPhysiology.3rd edition.
4. ProsserandBrown.1985.ComparativeAnimalPhysiology.SatishBookEnterprise,Agra-282003.
5. Tortora,G.J.andDerrickson,B.H.(2009).PrinciplesofAnatomyandPhysiology,XIIEdition,JohnWiley&Sons,Inc.
6. Widmaier,E.P.,Raff,H. andStrang,K.T.
(2008)Vander'sHumanPhysiology,XIIEdition.,McGrawHill
7. Guyton,A.C.andHall,J.E.(2011).TextbookofMedicalPhysiology,XIIEdition,HarcourtAsiaPvt.Ltd/W.B. SaundersCompany
8. Berg,J.M.,Tymoczko,J.L.andStryer,L.(2006).Biochemistry.VIEdition.W.HFreemanandCo.
9. Nelson,D.L.,Cox,M.M.andLehninger,A.L.(2009).PrinciplesofBiochemistry.IVEdition.W.H.Freemanand Co.
- 10.Murray,R.K.,Granner,D.K.,Mayes,P.A.andRodwell,V.W.(2009).Harper'sIllustratedBiochemistry.XXVIIIEdition.LangeMedicalBooks/McGraw3Hill.
- 11.Singh.H.R,&Neeraj Kumar(2017)AnimalPhysiologyandBiochemistry,VishalPublishingCo
- 12.Nagabhushanam,(2008),Textbook ofAnimalPhysiology,Oxford&IBH
- 13.Rastogi,S.C.(2007).EssentialsofAnimalPhysiology,NewAgeInternationalPublishers

**CORE COURSE
VIDEVELOPMENTALBIOLOGY**

CourseObjectives

Oncompletion of thecourse,studentsshouldbeableto

- Rememberthebasic concepts anddefinitions ofmodern developmental biology
- Understandstepsand advancementsinthedevelopmentalbiology
- Comprehendembryonic formationanddevelopmentalstageswithsuitable examples
- Applyfunctionalknowledgeondevelopmentalbiologyintofrontiersciences
- Analyzeanimalembryonicdevelopmentandpossibilitiesofbirth control

UnitI:Gametogenesis

Spermatogenesis–Definition–Processandsignificance-Structureofmammaliansperm.Oogenesis–
Definition–ProcessandSignificance–Typesof EggsandEggmembranes.

UnitII:FertilizationandParthenogenesis

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

UnitIII:CleavageandGastrulation

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

UnitIV:OrganogenesisandEmbryogenesis

Origin and development of organs – Development of brain, eye and heart.Development of
foetalmembranesinchick.PlacentainMammal–Definition–Significance andtypes.

UnitV:MetamorphosisandExperimentalEmbryology

Metamorphosis–definitionandsignificance.RegressiveandProgressiveMetamorphosis–
hormonalcontrolofmetamorphosisinAmphibians–Regeneration–nucleartransplantation–
inducedovulation
–Artificialinsemination–IVF–Embryotransfer.

CourseOutcomes:

Afterthecompletionofthecourse,students should beableto

- 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 and morphogenesis.
- 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.

REFERENCEBOOKS

1. Balinsky, B.T. (1981) An introduction to Embryology, 5th Edition. W.B.SaundersCo.London.
2. Pattern(1971.)Fundamentals ofEmbryology—McGrawHillBookCo.NewYork.
3. Carlson,BruceM(1996).Patten'sFoundationsofEmbryology,McGrawHill,Inc.
4. Verma.P.S.&.AgarwalV.K.ChordateEmbryology.S.Chand&CompanyLtd.RamNagar,NewDelhi 110 055

CORE COURSE
VIII 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 – Genetic factor. Acquired immunity – Natural – Artificial – Active – Passive immunity Cell mediated immunity

UNIT-II: Lymphoid organs

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

UNIT-III: Antigens - Antibody

Antigen and Antibody – Definition and structure of Immunoglobulin – Types of Immunoglobulin – Biological properties of Immunoglobulin. Antigen antibody reaction – Vaccines – Types of Vaccines - Common Vaccines - Autoimmune 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.

CourseOutcomes

- Impartsindepthknowledgeoftissues,cellsandmoleculesinvolvedinhostdefensemechanisms
- Understandingoftypesofimmunity
- Interactionsofantigens,antibodies, complementsandotherimmunecomponents
- Understandingofimmunemechanismsindiseasecontrol,vaccination, processofimmuneinteractions
- Classificationofmicroorganisms.
- Understandingof pathologyofdiseasescausedbyvarious microorganismssuchas bacteria,virus,parasitesandfungus

REFERENCEBOOKS

1. Ananthanarayanan,K. &JayaramPanicker,C.K.1988.TextbookofMicrobiology,3rdEdition.
2. Dasgupta.A.1982.MordenImmunology,2ndEdition,JaypeeBrothers,MedicalPublications,NewDelhi.
3. Pelczar,M.J.etal.1993.Microbiology,McGrawHill,NewYork.
4. Stewart,F.S.1968.BacteriologyandImmunologyforstudentsofMedicine.9thedition.ELBS.
5. FreemanBurrows.TextBookofMicrobiology.22ndEdition,Igaku-Shoin-SaundersInternationalEdition.
6. Khan,F.H.(2009).TheelementsofImmunology. PearsonEducationIndia
7. Abbas,A.K.,AndrewH.H.Lichtman,andShivPillai(2017).CellularandMolecularimmunology.Elsevier
8. PeterJ.Delves,SeamusJ.Marti,DennisR.Burton, IvanM.Roitt.(2017).Roitt'sEssentialImmunology.Wiley-Blackwell
9. ThomasJ.Kindt,BarbaraA.Osborne, andRichard Goldsby(2006).KubyImmunology. W. H.Freeman
- 10.Ramesh(2016).Immunology.McGrawHillEducationIndiaPrivateLimited

ELECTIVEPAPER-I
MEDICALLABORATORYTECHNIQUES (MLT)

CourseObjectives:

- Tomakethetheknowledgeaboutmedicallaboratoryinstruments anditsuses.
- Toteachthemethodandcollectionofsamplesanditsimportance.
- Tomakeawarethestudents duringtheemergencysituation.
- Tolearnthebloodsamplecollectionanditscellscounting.
- TolearnthetechniquesusedintheClinicallaboratoryforsampleanalysis.
- Tocreteknowledgeon Self-EmploymentOpportunity.

UnitI:LaboratoryInstruments:

General and personal care in the laboratory.Maintenance of Laboratory records. General principle, useandmaintenanceofLaboratoryinstruments:Autoclave,Hotairoven,Incubator,Waterbath,Centrifuge,Refrigerator,Colorimeter,pHmeter,Hemocytometer,HemoglobinometerandSphygmomanometer.

UnitII:PreparationofLaboratoryEquipmentsandChemicals:

Cleaning,maintenanceofGlassware-DefinitionandmethodsofSterilization.Heat,Radiation,Chemical methods. Preparation and uses of Reagents – Normal Saline - Turkey's fluid, Hayem's fluid,Leishamn'sstain, Wrightstain, Carnoy'sfluid andBovin's fluid.

UnitIII:ClinicalHematology:

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.Bloodgroupingand Cross matching,Blood transfusion.

UnitIV:ClinicalMicroscopicExamination:

ExaminationofSputum-ExaminationofUrineandFaeces-ExaminationofthroatSwab-Examination ofCerebrospinalfluid-Semen analysis-Sperm motility-Sperm count.

UnitV:PathologicalExamination:

Malarialparasites,Plasmodiumsp.,Endamebahistolytica,Ascarislumbricoids,Taeniasolium.Pathologyof Vibriocholera,diphtheriae,Mycobacteriumtuberculosis,Salmonellatyphiandclostridium tetani.

Courseoutcome

- Understandfundamentalanalyticalprinciplesandprocessesusedinclinicallaboratorytestingforvarious specimens.
- Understand the conceptsand safetymeasuresofclinical laboratoryinstruments.
- Acquiredtechnicalskillswillhelpthestudentsforcollectingandprocessingbiologicalspecimensforanalysis.
- Applicationofmedicallaboratoryprocedureswillenablethestudentstodistinguishnormalandabnormalmicroscopic pathogens.
- Studentsenabletheircriticalandanalyticalthinkinginthedetection ofdiseases.
- Interpretation willempower studentsto compareand contrastclinical laboratory procedures,interpretdataand predictdiagnosis.

References:

1. KanaiL. Mukherjee,MedicalLaboratoryTechnologyvolI,II,III-,TataMcGrawHill PublishingLtd.,NewDelhi.
2. RamanikSood,MedicalLaboratoryTechnology- JaypeeBrother'sMedicalPublishers(P)Ltd.,NewDelhi.
3. MadhavanKutty,KTextBookofMedicalLaboratoryTechnology,MedcenPoonthanam.
4. MaryEllenWedding,SallyAToenjasMedicalLaboratoryProcedures JaypeeBrothers MedicalPublishers.
5. Samuel,K.MNotes onClinicalLab TechniquesPublishedbyM.K.Gopalan,Chrompet.
6. SathishGupteShortTextbookofMedicalLaboratoryforTechniciansJaypeeBrothers,MedicalPublishers.
7. BakerF.J.AndSilvertonR.EIntroductiontoMedicalLaboratoryTechnologyHodderEducationPublishers.

CourseObjectives:

- Toexplorethe cultivation of poultry
- Tounderstand the methodologyofconstruction ofpoultryhouse
- Tocreate theawarethe studentsforabout thepoultrydiseaseand its treatment
- Tomakethelearner wellawareofvarious methods inPoultryScienceand its management.
- Totrainthestudents toundertakePoultryfarming as incomesource.

UNIT:I

Introductiontopoultrykeeping–PoultryindustryinIndia–Poultrybreedsandclassesoffowls–Poultryhousing–general principles of buildingpoultryhouse.

UNIT:II

Rearingoffowls–growers.Layersandbroilers–growthmanagement–summerandwintermanagement.

UNIT:III

Poultrynutrition–Compositionofpoultryfeed–nutrientrequirementsforfowls–nutritionaldeficiencysymptoms.

UNIT:IV

Poultrydiseases:Ranikhetdisease, Newcastleldisease,Fowl pox, Birdsflu.Vaccinationschedules.

UNIT:V

Poultryeggproduction–compositionandnutritivevalueofegg-useoffeathersandpoultrymanure.Economicsofpoultry.Field visit.

CourseOutcomes:

- StudentsinPoultrySciencestudythenutrition,marketing,managementandbusinessskillsneededin poultryproduction.
- PoultrySciencestudentsreceiveafoundationinbasicsciencesandmathematics,aswellasununderstanding ofthe poultryindustry.

References:

- a. PrakashMalhotra(2008) EconomicZoology,AdhyaynaPublishers &Distributors,NewDelhi.
- b. GnanamaniA.R.Modern aspectsofcommercial Poultrykeeping.GiriPublication,Madurai.
- c. BanerjeeG.C.AtextbookofAnimalHusbandry–Oxford&IBHpublishingCoPvt.Ltd.,NewDelhi.
- d. Jawaid,A.andSinha,S.P.(2008)AHandbookofEconomicZoology.S.Chand&Company,NewDelhi.
- e. Upadhya,V.B.(2006)EconomicZoology.Rastogi Publications,Meerut,India.
- f. Biester,H.E.andSchwarte,L.H.(1969)DiseasesofPoultry,5thEdn.OxfordandIBHPublishingCo,NewDelhi.

CourseObjectives:

- TounderstandNutritionforourhealth.
- Tounderstand thedisordersofnutrition.
- Tounderstandthediseasesduetoinsufficientnutrition

UNITI

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

UNITII

Interrelationship between Nutrition and Health - Visible symptoms of goods health.Weight ManagementandEatingDisorders-Obesityand Underweight, causes and dietary management.Nutritionand Anaemia.

UNITIII

Routine hospital diets - Regular diet, light diet, full liquid and tube feeding. Diabetes - Types, Symptoms,Causesanddietarymanagement.HypertensionandCardiovascularDiseases,SymptomsandDietarymanagement.

UNITIV

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

UNITV

Feeding infants and children - problems in feeding children in hospitals.Nutritionanddietclinics -Patientscheckupanddietarycounseling,educatingthepatient andfollowup.

Courseoutcomes:

- Developingdietplanningskillsforhealthyanddiseasedindividualsinsocietyforbetterhealthmanagemnt andprevention of diseases.
- Sensitizationandawareness aboutthe hazards ofpoorhygieneandsanitationanditsmanagement.

REFERENCES:

1. Paul.S.Text bookofBionutritioncuringdiseasesthroughdiet.CBSPublications.
2. TextbookofNutrition-RavinderChadha&PulkitMathur,OrientBlackswanPvt.Ltd.Telangana.
3. SrilakshmiB.NutritionScience.NewDelhi:NewAgeInternational.
4. ClinicalNutrition&Dietetics-F.P.AntiaandPhilipAbraham,OxfordUniversityPress.
5. SwaminathanS.:AdvancedtextbookonFoodsNutritionVol.I.

B.Sc.ZOOLOGY

SEMESTER-VI

**SEMESTER –
VICORECOURSE–
VIII**

CourseObjectives: ENVIRONMENTALBIOLOGY

- 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

UnitI–Introduction ofecology

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

UnitII–Populationandcommunity

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

UnitIII–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 phosphorus.

UnitIV–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.

UnitV–Biodiversity andConservation

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.

CourseOutcomes:

- ✓ Acquiretheecologicalknowledgeanditsbiologicalsignificance.
- ✓ Understandthedifferences inthestructureandfunctionofecosystems.
- ✓ Learnthewaysofinteractionsoflivingandnon-livingorganismswiththeenvironment.
- ✓ Identifytheproblemsofenvironmentand analyzingitsimpactonbiodiversity.
- ✓ Theimportanceofhotspots, sanctuariesandtheir roleinprotectingbiodiversity.

REFERENCES:

1. Odum,E.P.(1971).Fundamentals ofEcology.W.B.SaundersCompany,Phil.London.
2. Kotpal,R.L.andBali,N.P.(1986),ConceptsofEcology,VishalPublication,NewDelhi.
3. Sharma,B.K.andKaur,(1997).AnIntroductiontoEnvironmentalPollution.GoelPublishingHouse,M
eerut.
4. Agarwal,K.C.(2001).EnvironmentalBiology,NidiPublicationLtd.Bikaner.
5. <https://pib.gov.in/newsite/mbErel.aspx?relid=105134>
6. N.Arumugam,ConceptsofEcology,SarasPublicationPvt.Ltd,Nagercoil,TamilNadu, India.

**CORE COURSE -
IXEVOLUTIONARYBIOLO
GY**

CourseObjectives:

Onthecompletion ofthecoursethestudentwillbeableto

- Identifythe Originoflife.
- Relatetheexistingevidencesofevolutionwiththeprocessofevolution.
- AnalyzecriticallytheEvolutionarytheories withexamples.
- UnderstandthePatternsofEvolution.
- Summarizetheconceptofspecies,mechanisms ofspeciation.
- Appreciatetheevolutionofman.
- Defend Animaldistribution.

Unit1:Originoflife

HistoryofLife:Abiogenesis,Biogenesis.BiochemicalEvolution:ConceptsandExperiments.Geologicaltimescale.

Unit2:EvidencesofEvolution

Homologous organs, Analogous organs and vestigial organs.Mass extinction- Causes, Majorextinctions. Fossils, Types of fossils, and Fossilization, Indian fossils, Dating of fossils.Origin andevolutionofhorseand man -Cultureevolution-FutureEvolution.

Unit3:Evolutionary theories

ContributionsofLamarck,DarwinandDeVries. Presentstatusof LamarckismandDarwinism.ModernSyntheticTheory,HardyWeinberg Law.

Unit4:Mechanismof Evolution&Speciation

Organic variations; Isolating Mechanisms; Natural selection, Types of naturalselection, Artificialselection.Polymorphismandmimicryinevolution.Evolutionary&Biologicalspeci esconcept, Modesofspeciation(Allopatric,Sympatric)

Unit5:PatternsofEvolution&Animaldistribution

MicroandMacroevolutionaryPrinciples.Zoogeographicaldistribution-Continentalandislandfauna-Continental drift-Discontinuousdistribution,adaptiveradiation.

CourseOutcomes:

Afterthecompletion ofthecoursethestudentwillbeto

- Studentsareabletodescribevariousbiologicalinteractions.
- Abletodescribeevolutionaryhistoryofman.
- Abletodescribeoriginof speciesonearth.
- WritecompetitiveexaminationslikeGATE/UPSC/TNPSC.

PERIYARUNIVERSITY,SALEM-636011

B.Sc.,ZOOLOGY

- Getanopportunityto work in thefieldofforensic science, Museum,Archeology.
- Dohigherlearningin theareaofanthropology.

Textbooks:

1. MohanP.Arora,OrganicEvolution,HimalayaPublishingHouse,Mumbai.
2. Rostogi,V.B.OrganicEvolution,Kedernath,Ramnathpublishers,Meerut.
3. VermaP.S.&Agarval,V.L.ConceptsofEvolutionS.Chand&Company.

References:

1. EliC.Minkoff,1984,Addison–WesleyPublishingCompany,Canada.
2. PeterE.Rosenbaum,2010.Volpe“sunderstandingevolution,McGraw-Hill,NewYork.
3. TheodosiusDobzhansky,FranciscoJ.Ayala,G.LedyardStebbins,JamesW.Valentine,1977Evolution,W. H. Freeman &company, SanFrancisco.
4. G.LedyardStebbins,1966.Theprocessoforganicevolution,Prentice–Hall,NewJersey.
5. EdwardO.Dodson,1960.Evolution:ProcessandProduct,ReinholdPublishingCorporation,New york.

Weblinks:

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

BIO-INFORMATICS,BIOSTATISTICSANDCOMPUTERAPPLICATIONS

CourseObjectives

- 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 GenBank account.

UNIT-II

Data retrieval tools- Entrez, BLAST, Bioinformatics in drug design, Phylogeny analysis in bioinformatics, 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.

CourseOutcomes:

- Basicsofbioinformatics-biologicaldatabases,retrievaltoolsandapplications.
- Collection,Handling,Analysisofbiologicaldata.
- Studentsgainknowledgeaboutstatisticalmethodslikemeasuresofcentraltendencies.
- Computerapplicationsinbiologicaldata/statisticalmethods.

ReferenceBooks

1. Gupta,S.P.1976.Statisticalmethods.SultanChandandSons.NewDelhi.
2. Palanichamy,S.Manohar,StatisticsforBiologists,ParamountPublications,Palani.
3. IgnachimuthuS.BasicBioinformatics-.NarosaPublisingHouse,NewDelhi,2005.
4. Mani,S.BioinformaticsVol I,II,III. CentreforCulturalStudiesPub,Coimbatore.
5. RastogiS.C.,Mendiratta,N.Bioinformatics-MethodsandApplications.,RastogiPrenticeNewDelhi,2005.
6. Rajaraman.V.Fundamentalsofcomputers.

**ELECTIVE COURSE –
II SERICULTURE**

Course Objectives:

- To know the history and socio-economic aspects of sericulture.
- To understand the classification and morphology of silk worm.
- 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 inorganic manure application - Mulberry pest Management - (Mealy bug – *Maconellicoccus hirsutus*), (hair caterpillar - *Spilosoma obliqua*) – (Stem girdler - *Sthenias grisor*): Preventive and control Measures.

UNIT III: Silk worm Taxonomy and Classification

Silk worm taxonomy, Classification of silk worms based on number of larval moults, Moulting 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 its importance.

UNIT IV: Farming and Disease Management:

Silk worm rearing house models - Disinfection of rearing houses and appliances - Egg transportation and incubation – Egg handling – Hatching – Brushing. Silk worm Pests - Uzi fly, Ants and Dermestid 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 silk worm - Chawki rearing or young age worm rearing - Harvesting of cocoon (stifling, storage and sorting) and quality assessment.

CourseOutcome:

- 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.
- Acquire 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., New York, U.S.A
3. Rangaswamy. G. (1987). Manual on sericulture FAO, Vol-IV, Agriculture service bulletin , CSB, Bangalore, India.
4. Dandan. S.B. (2004), Handbook 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 Reeling Technology, Oxford and IBH Publishing Co. PVT. Ltd. New Delhi.
6. <http://www.csrtimys.res.in/sites/default/files/ebooks/2019-1.pdf>

SBEC-V-APICULTURE

CourseObjectives:

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.

Honeybee's species: *Apis dorsata* F., *Apis indica* F., *Apis florea* 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, Honey extractor.

UNIT-IV:Productsof Apiculture

Honey - Chemical composition -

Nutritional value and medicinal value. Testing Methods to find adulteration in honey Production of Beewax and Uses. Bee venom and Uses.

UNIT-V:BeeenemiesandDiseases

Bee enemies: Insects, Reptiles, birds, Mammals.

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

CourseOutcomes:

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

References:

1. Kumar,A.andNigam, P.M.,EconomicandAppliedEntomology.
2. BackyardBeekeeping-KimFlottum,ed.ofBeeCulturemagazine
3. FirstLessonsinBeekeeping-KeithDelaplane
4. HoorayforBeekeeping!- BobbieKalman
5. HowtoKeepBeesand Sell Honey-Kelleys
6. TheHive&the Honeybee-Dadant

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 product factories
- 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 of milk products
- To study of various diseases and disorders in Dairy breeds and First Aid Measures
- To create the awareness of 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 its 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 Cooperatives 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.

CourseOutcomes

- 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 and different 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.

ReferenceBooks:

1. Principles of Dairy Science - G.H.Schmidt, L.D.Vivek and N.N.Pathak.
2. Milk and milk products - Harbansing and Moore
3. Handbook of Dairy science - K.C. Mahanta
4. Milk Production and processing - C.Ibraheem Kutty and Sheeba Khamer.
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

**ANIMAL PHYSIOLOGY, DEVELOPMENTAL BIOLOGY, IMMUNOLOGY &
MICROBIOLOGY,BIOINFORMATICS,BIOSTATISTICS ANDCOMPUTERAPPLICATIONS,
POULTRY SCIENCE &MLT**

CourseObjectives:

- To empower our students with practical skills to comprehend the Physiology and other functions of each and every vital system.
- 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

CourseOutcomes:

- 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 define normal 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 developmental biology.
- Be familiar with the events that lead 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 training as 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-110055.
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 Nallathambistreet, Triplicane-600005.
7. Beauchamp, T.I. and Childress, J.F. (2008). Principles of Biomedical Ethics. VI Edition, Oxford University Press.
8. Samuel, K.M. 1992: Notes on Clinical Lab Techniques. M.K.G. Iyer & 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

**ENVIRONMENTALBIOLOGY,CLINICALNUTRITION,EVOLUTIONARYBIOLOGY,SE
RICULTURE, APICULTURE AND DAIRYSCIENCE**

CourseOutcomes:

- Toinculcatethepracticalknowledgeonmoricultureandsericulture
- Toknowtheimportanceofsilkwormrearing,pestsanddiseasesofsilkwormsandtheircontrolmeasures
- Toanalyzethe qualityofsilkthroughexperiments
- Toidentifythehoneybeespecies, racesandcastes
- Tounderstand the behaviorand physiologyofhoneybees
- Toknow the importanceofhoneybeesand hive products
- Todevelopknowledgeaboutvalueadded products inhoney

MajorPractical:

1. Estimationof DissolvedOxygenindifferentwatersamples.
2. EstimationofSalinityindifferentwatersamples.
3. Plankton study–Freshwaterandmarine planktons

MinorPractical:

1. Preparationandcalculationoffollowingdiets:a)Normaldiet.b)Liquiddietc)Soft diet.
2. Valueadded honeyproduct preparation
3. EstimationofmilkqualitybyMBRT(MethyleneBlueReductionTest)

Spotters:

1. UseofRainGauge, Maximum&Minimum Thermometer,Hygrometer,AnemometerandBarometer.
2. Studyoffossilevidences
3. SilkwormRearingequipments
4. MutantHive
5. HoneyExtractor and Smoker

ExtensionActivity:

1. Visitto sericulturefarmhouseandsubmissionofreport
2. VisittoDairyfarmandsubmissionofReport.

CourseOutcomes:

- AbilitytoEstimateofdissolvedoxygen,Salinity,pH,freeCO₂,CarbonatesandBicarbonates,Calcium inwatersamples.
- Familiarwithecologicaladaptations
- MeasurepH ofdifferentwatersamplesusingpHmeter, pHpaper andindicator solution.
- DemonstrateAlarmpheromonesinants.
- Identifythe contributionsof various evolutionists.
- Identifydifferent zoogeographicalrealmswithfauna.
- Applyknowledgeon moricultureand sericulture

- Observethebiology, rearing,pestsanddiseasesofsilkwormandtheircontrolmeasures
- Evaluatethequalityofsilk
- Supplyknowledge inidentifyinghoneybeespecies, racesandcastes
- Field visit to studytheapiarymanagementtechniques and honeyharvesting methods
- Demonstratethestudentsforvalueadded productsinhoney
- Students willget theself-employment with thehelp ofDairyScience
- TheycangenerateemploymentsbyDairyScience.

References:

1. Ananthakrishnan :BioresourcesEcology3rdEdition
2. Goldman–Limnology,2nd Edition
3. OdumandBarrett –Fundamentals ofEcology,5thEdition
4. DavidMcFarland,AnimalBehaviour,PitmanPublishingLimited,London,UK.
5. Manning,A.andDawkins,M.S,AnIntroductiontoAnimalBehaviour,Cambridge,UniversityPress,UK.
6. JohnAlcock,AnimalBehaviour,SinauerAssociate Inc., USA.
7. VinodKumar(2002)BiologicalRhythms:NarosaPublishingHouse,Delhi/Springer-Verlag,Germany
8. AgarwalV.K.,AnimalBehaviour(2013).S.ChandPublishing,
9. Ridley,M.(2004).Evolution.IIIEdition.BlackwellPublishing
- 10.Barton,N.H.,Briggs,D.E.G.,Eisen,J.A.,Goldstein,D.B.andPatel,N.H.(2007). Evolution.ColdSpring,HarbourLaboratoryPress.
- 11.Hall, B. K. and Hallgrimsson, B. (2008). Evolution. IV Edition. Jones and Bartlett Publishers
- 12.Verma&Agarwal(2006)CellBiology,Genetics,MolecularBiology,Evolution&Ecology, S.Chandpublishers
13. CarlT.Bergstrom&LeeAlanDugatkin(2012).Evolution,W.W.Norton&Company;Internationalstudentedition edition
14. Madan Mohan Rao. M. (2008) A text book of sericulture B.S publications, Hyderabad.
- 15.Ganga&Sulochanachetty.G.(2006)Anintroductiontosericulture.Oxford&IBHPublishing Co.Pvt.Ltd.NewDelhi.
16. Ullal.S.RandM.NNarasimhanna(1977)HandbookofPracticalSericulturePublishedbyShri .A.RS.GopalacharSecretary,Central silkboard,.,Meghdoot,Bombay.
- 17.Rangaswami.GandS.Manjeet.Jolly.(1988)SericultureManual– I,MulberryCultivationPublishedbyMohanPrimlani forOxford&IBH publishingCO. Pvt.Ltd.NewDelhi
- 18.David Cramp (2012). The Complete Step-by-step Book of Beekeeping: A Practical Guide toBeekeeping, fromSetting Up a Colony to Hive ManagementandHarvestingtheHoney.LorenzBooks.London,p160.

B.Sc.
ALLIEDZOOLOGY

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 Nematelminthes - 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 system of Shark - General characters of the class: Amphibia.

UNIT-V

General characters of the class: Reptilia - General characters of the class: Aves - General characters of the 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. 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 text book of Zoology: Invertebrates.
4. R. L. Kotpal. Modern text book of Zoology: Vertebrates.

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 of Respiratory 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.

REFERENCEBOOKS

1. Verma.P.S.&.AgarwalV.K(2006)CellBiology,Genetics,MolecularBiology,EvolutionandEcology-S.Chand&CompanyLTD. RamNagar,NewDelhi-110055
2. Verma.P.S.&.AgarwalV.K.ChordateEmbryology.S.Chand&CompanyLtd.RamNagar,NewDelhi-110055
3. VermaP.S.&TyagiB.S.AnimalPhysiology.VIEdition,S.Shand&CompanyLtd,RamNagar,NewDelhi-110055

PERIYARUNIVERSITY,SALEM-636011

B.Sc.,ZOOLOGY

B.SC.ALLIEDZOOLOGYPRACTICALS

ODD&EVEN SEMESTER

NON-CHORDATA,CHORDATAANDGENERALPRINCIPLESOFZOOLOGY

CourseObjectives:

- Togetanatomicalknowledgeandadaptationsinanimalgroup.
- Toidentifymodelanimalsas specimen/slides.
- Toprovideskillofdrawingandlabelling.
- Toappreciateeconomic zoologyforitsimportance.

DISSECTIONS

1. Cockroach/Prawn-Digestivesystem.
2. Prawnappendages.

MOUNTINGS

1. Cockroach-Mouthparts.
2. Honeybee-Mouthparts.

SPOTTERS-IDENTIFICATION

Identify,draw andwritenotes:

1. Paramecium:Entire.
2. Ascon:Entire.
3. Obelia:Colony,Medusa.
4. Fasciolahepatica:Entire.
5. Ascaris:Entire.
6. Penaeus:Entire.
7. Pila:Entire.
8. Starfish:Entire-OralandAboralview.
9. Shark:Entire.
10. Frog:Entire.
11. Calotes:Entire.
12. Pigeon:Entire.
13. Rat:Entire.

EMBRYOLOGY

1. 24hoursofChickembryo
2. BlastulaofFrog.
3. GastrulaofFrog.

ECONOMICZOOLOGY

1. Honeybee-Differentcastes.
2. Silkworm-Adult, Caterpillar,PupaandCocoon.
3. Pisciculture-Ediblefishes.

CourseOutcomes:

- Gettingfundamentalknowledgeon animalgroups.
- Acquiredskillofdissection,drawingandlabelling.
- Awarenessoneconomic valueinanimals.

REFERENCEBOOKS

1. M.EkambaranathaAyyar&T.N.Ananthakrishnan.OutlinesofZoology.
2. M.EkambaranathaAyyar&T.N.Ananthakrishnan.Manualof Zoology, VolI&II.
3. R.L.Kotpal.ModerntextbookofZoology: Invertebrates.
4. R. L.Kotpal.ModerntextbookofZoology:Vertebrates.
5. Verma.P.S.&.AgarwalV.K(2006)CellBiology,Genetics,MolecularBiology,EvolutionandEcology –S.Chand&CompanyLTD.Ram Nagar,New Delhi-110055
6. Verma.P.S.&.AgarwalV.K.ChordateEmbryology.S.Chand&CompanyLtd.RamNagar,NewDelhi-110055
7. VermaP.S.&
TyagiB.S.AnimalPhysiology.VIEdition,S.Shand&CompanyLtd,RamNagar,NewDelhi-110055
