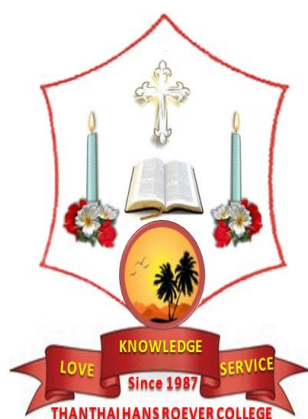


Syllabus for B.Sc., Zoology (2019–2020)



Department of Zoology
THANTHAI HANS ROEVER COLLEGE(Autonomous)
Autonomous and affiliated to Bharathidasan University, Trichy
Nationally accredited by NAAC
Perambalur – 621 220

(Applicable to the candidates admitted from the academic year 2019–2020 onwards)

THANTHAI HANS ROEVER COLLEGE (Autonomous)

Perambalur – 621 220

B.Sc. Zoology – Course Structure under CBCS

(Applicable to the candidates admitted from the academic Year 2018–19 onwards)

SEMESTER	SUBJECT CODE	PART	COURSE	COURSE TITLE	HRS/ WEE K	CREDIT	EXAM HRS	MARKS		TOTAL MARKS
								INT MARK	EXT MARK	
Semester I	18UT1	I	Language Course – I (LC) – Tamil/Other Languages	Tamil/Hindi – I	6	3	3	25	75	100
	18UE1	II	English Language Course – II	English – I	6	3	3	25	75	100
	18UZO1CC1	III	Core Course–I	Invertebrata	6	5	3	25	75	100
	18UZO1CP1		Core Practical–I	Invertebrata and Chordata (P)	3	–	–	–	–	–
	18UBO1AC1		Allied Course–I	Botany –I	4	4	3	25	75	100
	18UBO1AP1		Allied Course Practical–I	Botany–I& II (P)	3	–	–	–	–	–
	18UVE	IV	Value Education	Value Education	2	2	3	25	75	100
Total					30	17	–	–	–	500
Semester II	18UT2	I	Language Course – I (LC) – Tamil/Other Languages	Tamil/Hindi – II	6	3	3	25	75	100
	18UE2	II	English Language Course –II	English – II	6	3	3	25	75	100
	18UZO2CC2	III	Core Course–II	Chordata	6	5	3	25	75	100
	18UZO2CP1		Core Practical– I	Invertebrata and Chordata –I (P)	3	3	3	40	60	100
	18UBO2AC2		Allied Course–II	Botany–II	4	4	3	25	75	100
	18UBO2AP1		Allied Course Practical–I	Botany– I & II (P)	3	3	3	40	60	100
	18UES	IV	Environmental Studies	Environmental Studies 2	2	2	3	25	75	100
Total					30	23	–	–	–	700

Semester III	18UT3	I	Language Course – I(LC) – Tamil/Other Languages	Tamil/Hindi – III	6	3	3	25	75	100
	118UE3	II	English Language Course – II	English – III	6	3	3	25	75	100
	18UZO3CC3	III	Core Course–III	Cell and molecular biology	6	5	3	25	75	100
	18UZO3CP2		Core Practical–III & IV	Cell and molecular biology and Genetics (P)	3	–	–	–	–	–
	18UCH3AC3		Allied Course–III	Chemistry –I	4	4	3	25	75	100
	18UCH3AP2		Allied Course Practical –II	Chemistry I &II (P)	3	–	–	–	–	–
	18UZO3NME 1	IV	Non Major Elective –I [#]	Human Physiology	2	2	3	25	75	100
Total					30	17	–	–	–	500
Semester IV	18UT4	I	Language Course – I (LC) – Tamil/Other Languages	Tamil/Hindi – IV	6	3	3	25	75	100
	18UE4	II	English Language Course –II	English – IV	6	3	3	25	75	100
	18UZO4CC4	III	Core Course–IV	Genetics	5	5	3	25	75	100
	18UZO4CP2		Core Practical – III & IV	Cell and molecular biology, and Genetics (P)	3	3	3	40	60	100
	18UCH4AC4		Allied Course–IV	Chemistry –II	3	3	3	25	75	100
	18UCH4AP2		Allied Course Practical–II	Chemistry I & II (P)	3	3	3	40	60	100
	18UZO4NME 2	IV	Non Major Elective –II [#]	Human diseases	2	2	3	25	75	100
	18UZO4SBE1		Skill Based Elective–I	Ornamental fish farming	2	2	3	25	75	100
Total					30	24	–	–	–	800
Semester V	18UZO5CC5	III	Core Course–V	Animal physiology	5	5	3	25	75	100
	18UZO5CC6		Core Course–VI	Immunology	5	5	3	25	75	100
	18UZO5CC7		Core Course–VII	Ecology	5	5	3	25	75	100
	18UZO5CP3		Core Course Practical–V	Animal Physiology ³ , Immunology & Ecology	4	4	3	40	60	100

				(P)						
	18UZO5MBE 1		Major Based Elective –I	Economic Entomology	5	5	3	25	75	100
	18UZO5SBE2	IV	Skill Based Elective–II	Applied Zoology	2	2	3	25	75	100
	18UZO5SBE3		Skill Based Elective–III	Health education	2	2	3	25	75	100
	18USSD		Soft Skills Development	Soft Skills Development	2	2	3	25	75	100
Total					30	30	–	–	–	800
Semester VI	18UZO6CC8	III	Core Course–VIII	Development al Biology	6	6	3	25	75	100
	18UZO6CC9		Core Course–IX	Evolution	6	6	3	25	75	100
	18UZO6CP4		Core Course– Practical–VI	Development al Biology and Evolution (P)	5	5	3	40	60	100
	18UZO6MBE 2		Major Based Elective – II	Biophysics & Biostatistics	6	5	3	25	75	100
	18UZO6MBE 3		Major Based Elective –III	Human diseases	6	5	3	25	75	100
		V	Extension Activities	Extension Activities	–	1	–	–	–	–
	18UGS		Gender Studies	Gender Studies	1	1	3	25	75	100
Total					30	29	–	–	–	600
Grand Total					180	140	–	–	–	3900

– denotes that Non major elective 1 and 2 for those who studied Tamil under part I [(a) Basic Tamil for other language students, (b) Special Tamil for those who studied Tamil upto +2 but not opt for other languages in degree programme]

COURSE GENERAL STRUCTURE

Language Part I	–	4	
English Part II	–	4	
Core Paper	–	9	
Core Practical	–	4	
Allied Paper	–	4	
Allied Practical	–	2	
Non Major Elective	–	2	
Skill Based Elective	–	3	
Major Based elective	–	3	
Environmental studies	–	1	
Value education	–	1	
Soft Skill Development	–	1	
Gender Studies	–	1	
Extension Activities	–	1	4

Note:

	Internal Marks	External Marks
1. Theory	25	75
2. Practical	40	60

3. Separate passing minimum is prescribed for Internal and External marks

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]

The passing minimum for University Examinations shall be 40% out of 75 marks [i.e. 30 marks] Examination at the end of the semester.

Extension activities shall be outside the instruction hours.

List of Elective Papers

Non Major Elective Course –I	Human physiology
Non Major Elective Course –II	Human diseases
Major Based Elective Course –I	Economic Entomology
Major Based Elective Course– II	Biophysics and Biostatistics
Major Based Elective Course– III	Human Diseases
Skill Based Elective Course–I	Ornamental fish farming
Skill Based Elective Course–II	Applied Zoology
Skill Based Elective Course–III	Health education

Programme: B.Sc., Zoology

Subject Code: 18UZO1CC1

Semester: I

No. of Hours Allotted: 6

Title of the Paper: Invertebrata

No. of Credits: 5

OBJECTIVES:

- To understand the fundamental organization, adaptations and significance of invertebrate animals
- To highlight the importance of invertebrate taxonomy.

UNIT – I

Taxonomy: Definition, Principles of classification – symmetry and coelom – Units of classification – **Binomial nomenclature** – **Outline classification of Animal kingdom up to order level with example, Flowchart only.**

UNIT – II

Protozoa and Porifera: Type Study: Plasmodium: structure, life cycle, pathology, prevention and control measures – Type study: Asconsponge General organization and histology – General topic: Structure, pathology, prevention and control measures of Entamoebahistoltyica – Different types of spicules.

UNIT – III

Coelenterata and Helminthes: Type Study: Obelia: Structure of Obelia colony, Medusa, Nematocyst and Life cycle (Metagenesis) – Type Study: Fasciola hepatica (Liver Fluke): External characters and Life cycle – General topic: General characteristic feature of Helminthes – Polymorphism Coelenterates.

UNIT – IV

Annelida and Arthropoda: Type Study: Earthworm: External morphology, setae and Nephridia – Type Study: Penaeus (Marine Prawn): External morphology, Appendages, Reproductive System and Development – General topic: Metamerism in Annelids – Beneficial insects. – Larval forms of Asteroidea

UNIT – V

Mollusca and Echinodermata: Type Study: Pilaglobosa: External morphology, Digestive System and Respiratory System – General topic: Cephalopods as an advanced Mollusc, Larval forms in Echinodermata – Type Study: Star fish External morphology, Pedicellaria and water vascular system – Larval forms of Asteroidea.

TEXT BOOK

1. Invertebrate Zoology by Arumugam N. *et al.*, Saras Publications, Kottar, Nagercoil –2012
2. Ekambaranatha Iyar and T.N.Ananthakrishnan. 1992. A Manual of Zoology, Vol.I. (Invertebrata).Parts I &II.Viswanathan& Co.

REFERENCES BOOK:

1. Jordon, E.L. and P.S. Verma. 1995 Invertebrate Zoology.12th Edn. Sultan Chand &co
 2. Dhama P.S. and J.K. Dhama (2003) Invertebrate Zoology, R.Chand and company, New Delhi.
 3. Kotpal R.L. (2005) Invertebrate Zoology, Third Edition published by RakeshRastogi for Rastogi Publications, Meerat.
-

Total topics	Local	Regional	National	Global
18	2	2	2	18

Programme: B.Sc., Zoology
Semester: II
Title of the Paper: Chordata

Subject Code: 18UZO2CC2
No. of Hours Allotted: 6
No. of Credits: 5

OBJECTIVES:

To enlighten the students about the diverse forms of Vertebrate animals which belong to 5 major classes present around us.

To help our students to distinguish various vertebrate animals and to know the evolutionary sequence of them.

UNIT-I

General characteristics– Outline classification up to class level with example –Prochordates:Type study: Amphioxus; external morphology - digestive system, excretory system only – Ascidian: tadpole larva - Axolotl larva- retrogressive metamorphosis–AffinitiesBalanoglossus.

UNIT-II

Pisces: Classification of fishes –Type study: Shark: external morphology, Digestive system, Circulatory system only – Migration of fishes –Economic importance of fishes–Amphibians:Frog: external morphology, respiratory system, reproductive system and development only –Parental care Amphibian- limbless Amphibian.

UNIT- III

Reptilia: Type study :Calotes, external morphology,– Digestive system –Urinogenetal system and nervous system –Poisonous and non-poisonousSnakes – identification and biting mechanism – first aid –Decline of Mesozoic reptiles (Dinosaurs).

UNIT-IV

Aves: Type study : Pigeon; external morphology– Digestive system – respiratory system, pectoral and pelvic girdles only. – Flight adaptation –beakmodification in birds – feet modification in birds – Migration of birds – Flightless birds–Fossil bird Archaeopteryx and its evolutionary importance.

UNIT-V

Mammalia : Classification of Mammals with examples –Type study: Rabbit: external morphology,– Digestive system – nervous system reproductive system –Dentitionin mammals – Aquatic mammals.

Total topics	Local	Regional	National	Global
32	7	6	6	31

TEXT BOOKS

1. Chordate Zoology – E.L. Jordon and P.S. Verma (2006) S.Chand& co. New Delhi.
2. Chordate Zoology – P.S. Dhami and J.K. Dhami. (2006) R.Chand& co. New Delhi.
3. Chordate – A Manual of Zoology, M.EkambaranathaIyer and T.N.Ananthkrishnan (2003) Viswanathan Publications, Chennai .

REFERENCES:

4. Vertebrate Zoology – R.L.Kotpal, (2005) Rastogi Publications, Meerat .
5. Text book of Vertebrate – N.Arumugam et al., (2008) SarasPubulications. Nagerkovil.

Programme: B.Sc., Zoology

Subject Code: 18UZO2CP1

Semester: II

No. of Hours Allotted: 3

Title of the Paper: Practical I (Invertebrata and Chordata) No. of Credits: 3

Dissection:

1. Earthworm: Nervous system.
2. Cockroach: Digestive system and Nervous system,
3. Pila: Digestive system
4. Frog: Arterial system
5. Frog: Digestive system
6. Calotes: Venous system

Mounting:

1. Earth worm – Body setae
2. Cockroach – Trachea
3. Honey Bee – Mouth parts and Sting
4. Pila – Radula
5. Shark –Placoid scales
6. Frog – Brain

Spotters:

1. Protozoa– paramecium Entire, paramecium conjugation, euglena
2. Porifera – simple sponge, gemmule, spicules
3. Coelenterata – obelia colony, medusa of obelia, sea anemone,
4. Helminthes– liver fluke, redia larva, cercaria larva, ascaris male and female
5. Annelida – earthworm, nereis, heteronereis, leech
6. Arthropoda – prawn, zoea larva, mysis larva, peripatus, honey bee and silk worm
7. Mollusca – pila, sepia, octopus, pearl oyster
8. Echinodermata – star fish, sea–urchin, sea–cucumber, bipinnaria larva
9. Prochordata – Amphioxus, Balanoglossus, Ascidian
10. AgnathaPertomyzon

Total topics	Local	Regional	National	Global
22	9	- 1	-	13

Programme: B.Sc., Zoology

Subject Code: 18UZO3CC3

Semester III

No. of Hours Allotted: 6

Title of the Paper: Cell and Molecular Biology

No. of Credits: 5

OBJECTIVES:

To understand the cell and cellular details with their significance.

To train the students about the various types of animal cell structures with their characteristic features and detailed functions. It facilitates

To understand the structure and function at molecular level in prokaryote and eukaryote.

UNIT I

Microscopy : Principles and applications of Light, Phase Contrast, Fluorescent Microscope – Electron Microscopes: SEM– TEM –**Micro-technique**; tissue fixation, sectioning and staining –Ultrastructure organization of virus – Different types of bacteria – bacteria and animal cell.

UNIT II

Plasma Membrane: Ultra structure, Unit membrane and fluid mosaic models, Membrane proteins – peripheral and integral proteins–functions of plasma membrane –**Cytoplasm**: structure and composition, physical and biological properties –**Endoplasmic Reticulum**: ultrastructure and functions.

UNIT III

Golgi complex:Morphology, structure, role in secretion – formation of acrosome – other functions – **Lysosome and Centrosome**:Morphology, chemistry and functions –**Mitochondria** : ultrastructure and functions –**Ribosomes** : ultrastructure and functions.

UNIT IV

Nucleus: ultrastructure of interphase nucleus –**Nucleolus and Chromosome**: structure and functions– Giant chromosomes :Polytene– Lampbrushchromosomes–**Cell divisions**: Mitosis and Meiosis –Cell cycles and its significance.

UNIT V

Molecular structure of DNA. DNA: Replication in prokaryotes and eukaryotes –DNA:repair mechanisms – **RNA** : Types and functions –Genetic code–**Protein synthesis** :Transcription, Translation and post-translational modifications –Cancer Biology– Apoptosis– mechanism of programmed cell death – Stem cells– Application of stem cells.

Total topics	Local	Regional	National	Global
32	2	2 ₁	2	32

TEXT BOOK

1. Verma, P.S. and V.K. Agarwal. 2003. Cytology (Cell Biology and Molecular Biology). S.Chand Company Ltd, New Delhi.
2. Powar, C.B. 1997. Cell Biology.Himalaya Publishing House, Bombay.
3. Kumar, H.D. 2003. Molecular Biology. Vikas Publishing House Pvt. Ltd., New Delhi.

REFERENCES:

1. De Robertis, E.D.P. and De Robertis E.M.F. 1995.Cell and Molecular Biology. 8th Edition, B.I. Waverly Pvt., Ltd., New Delhi.
2. Freidfelder, D. 2003. Molecular Biology.Narosa Publishing House, New Delhi.
3. Turner, P.C., McLennan, A.G., Bates, A.D and White, M.R.H. 2001. Molecular Biology. Second Edition. Viva Books Pvt. Ltd., New Delhi.
4. Verma, P.S. and V.K. Agarwal. 1998. Cell Biology. S.Chand Company Ltd., New Delhi.
5. Arumugam, N.2001. Cell Biology.Saras Publications, Nagercoil. 6. David, F. 2003. Molecular Biology.SecondEdition.Narosa Publishing House, New Delhi.

Course Code: 18UZO3NME1

Exam Hours: 3

Instruction Hours: 2

Internal Marks: 25

Credits: 2

External Marks: 75

NON MAJOR ELECTIVE COURSE - I

HUMAN PHYSIOLOGY

Objectives:

1. To provide basic knowledge about human physiology.
2. To study the various systems in the human body and their functions.

UNIT - I Cell

Cell General introduction of human systems – **Cells** under electron microscope - Recent concepts – **Tissues:** Classification, structure and function.

UNIT – II Physiology of digestion and respiratory system

Digestive System - Anatomy of gastro-intestinal tract - Digestion and absorption of carbohydrates, proteins and fats - Anatomy and physiology of respiratory organs - Gaseous exchange in the lungs, mechanism of respiration.

UNIT - III Excretory System , Physiology of Nerve and Muscle

Structure of kidney - formation of urine, acid-base balance, skin temperature regulation, water balance - Conduction of nerve impulses - Physiology of muscle contraction - **Nervous System:** General anatomy of nervous system - functions of the different parts reflexes, autonomic nervous system - **Sense Organs** Physiology of vision, hearing, taste, smell and cutaneous sensations.

UNIT – IV Blood

Composition, constituents, functions, wounds, hemorrhage, reticulo - endothelial system, body defence against diseases - **Heart and Circulation** - Anatomy of the heart - structure of the heart and blood vessels - properties of cardiac muscle - origin and conduction of heart beat -cardiac cycle, cardiac output, heart sounds, blood pressure - definition and factors affecting blood pressure and ECG.

UNIT - V Endocrinology Endocrinology: Pituitary, thyroid, parathyroid, adrenal and pancreas - functions of the hormones and their relationships - Reproductive System Anatomy of male and female reproductive organs - hormonal regulation of female reproductive function - menstruation, fertilization, pregnancy, lactation - hormone influence.

Text Books

1. Gupta, A.P., (2010). Anatomy and physiology. Agra: SumitPrakashan.
2. Moorthy, A.M., (2014). Anatomy Physiology and Health Education. Karaikudi: Madalayam publication.
3. S.C. Rastogi. Essentials of Animal Physiology. New Age International Publishers. 2001.

References

1. Guyton, A.C. Functions of the Human Body, W.B. Saunders Co., Philadelphia.
2. Vander, A.J , Sherman, J.H. and Luciano, D.S. Human Physiology - the Mechanisms of Body Functions, 2nd ed., TMH Publishing Co., Ltd.,
3. Subramaniam, S. and MadhavanKutty, K. 1971. The Text Book of Physiology, 1st ed., Orient Longman Ltd.
4. Best, CH and NB Taylor, The living body, latest edition, Asia publishing house, Bombay.
5. Ham, A.W., Histology, Latest edition. Pitman Medical Publishing Ltd., London,

Total topics	Local	Regional	National	Global
32	2	2	2	32

Programme: B.Sc., Zoology

Subject Code: 18UZO4CC4

Semester IV

No. of Hours Allotted: 5

Title of the Paper: Genetics

No. of Credits: 5

OBJECTIVES:

Giving a basic overview of genes, mutations, sex determination and patterns of inheritance.

An understanding of the chromosomal inheritance and expression of human genetic characters and disorders.

UNIT I

Introduction to Genetics– Basis of Mendelian Inheritance and Mendelian laws – Monohybrid – Dihybrid Cross – Simple Problems Relating to Inheritance – Structure of gene – Interaction of Gene – Commentary factors – Supplementary factors – Inhibitory and lethal Factors – Atavism.

UNIT II

Blood Groups and their Inheritance in Human – Linkage and Crossing Over: *Drosophila* – Morgan's Experiments – Complete and Incomplete Linkage – Linkage Groups – Crossing Over types – Mechanisms : Cytological Evidence for Crossing Over – Mapping of Chromosomes – Interference and Coincidence.

UNIT-III

Sex Linkage in *Drosophila* and Man – Sex influenced in *Bonellia* – Sex influenced and Sex Limited Genes – NonDisjunction, Gynandromorphs, Cytoplasmic Inheritance – Maternal Effect on *Limnaea* (Shell Coiling) – Male Sterility (Rode's Experiment) – CO₂ sensitivity in *Drosophila* – Kappa particles in *Paramecium* – Milk factor Mice.

UNIT-IV

Structure and Function of Genetic Material – Fine Structure of the Gene – Cistron, Recon, Muton – Gene Regulation – Operon Concept – Lac Operon – Positive and Negative Regulation – Mutation: Molecular Basis of Mutation – Types of Mutation, Mutagens – Mutable and Mutator Gene – Chromosomal Aberrations : Numerical and Structural Examples from Human.

UNIT-V

Applied Genetics:Animal Breeding : Heterosis–Inbreeding - Out Breeding, Out Crossing,Hybrid Vigour – Population Genetics, Hardy Weinberg Law – Gene Frequency, Factors Affecting Gene Frequency – Eugenics –Euphenics–Ethenics– Bioethics.

Total topics	Local	Regional	National	Global
50	1	1	1	50

TEXT BOOK

1. Verma, P.S. and V.K. Agarwal, 1995. Genetics, 8th edition, S. Chand & Co., New Delhi – 110 055, 580 pp.
2. Gunther, S. Stent, 1986. Molecular Genetics. Macmillan Publishing Co Inc. 773 pp.
3. Goodenough, V., 1978. Genetics, 2nd ed., New York Holt, Rinchart and Winston, 894 pp.
4. Hart, D.L. and D. Freifelder, 1988. Basic Genetics, John &Barlet Publishers, 505 pp.
5. Garder, 1972. Principles of Genetics, Wiley Eastern Pvt. Ltd. 590 pp.

REFERENCE:

1. Watson, J.D. and W.A. Benjamin, 1976. Molecular Biology of the Gene, 3rd., Benjamin Co. Inc., New York, 739 pp.
2. Winchester, 1967. Genetics, Oxford IBH Publications, 504 pp.
3. Stickberger, 1968. Genetics, Macmillan Publications, New York, 914 pp.

Programme: B.Sc., Zoology

Subject Code: 18UZO4CP2

Semester: IV

No. of Hours Allotted: 3

Title of the Paper: Practical –II

No. of Credits: 3

Cell and Molecular Biology & Genetics

Cell and Molecular Biology

- 1) Blood grouping in man.
- 2) Squash preparation of onion root tip; observe the stages of mitosis.
- 3) Chironomous larva; Giant Chromosomes. (*Drosophila* / Chironomous)
- 4) Blood Smear Preparation
- 5) Human buccal Smear
- 6) **Spotters:**Compound microscope,pH meter, Centrifuge, Colorimeter, Spectrophotometer

Genetics

1. *Drosophila*; male and female identification, Mutant forms (from pictures),Genetic importance.
2. Observation of simple Mendelian traits in man.
3. Human Karyotypes: Normal, Down's, Klinefelters, Turner, and Edwardis syndrome.
4. Recording of Mendelian traits in humans.

Total topics	Local	Regional	National	Global
10	8	-	-	3

Course Code: 18UZO4NME2

Exam Hours: 3

Instruction Hours: 2

Internal Marks: 25

Credits: 2

External Marks: 75

NON MAJOR ELECTIVE COURSE - II

HUMAN DISEASES

Objective

1. To impart the knowledge of important human diseases with respect to their causative agent, clinical symptoms, pathogenesis, mode of transmission, prevention and treatment.

UNIT - I

Communicable Diseases: Symptoms - Prevention and Control of Communicable Diseases - Community Diagnosis: Tuberculosis

UNIT - II

Non-communicable Diseases: Symptoms, Prevention and Control of Non-Communicable Diseases - Community Diagnosis: Alzheimer's - Asthma - Chronic Kidney Disease - Diabetes

UNIT - III

Hereditary disease: Symptoms, Prevention - Control measures of Diseases: Cystic fibrosis - Sickle Cell Anemia - Marfan syndrome.

UNIT - IV

Zoonotic disease: Symptoms, Prevention - Control measures: Anthrax - Animal influenza - avian influenza.

UNIT - V

Nutritional deficiency: Symptoms, Prevention - Control measures of Diseases: Rickets - Goiter - Anemia - Beriberi.

References

1. Textbook of human disease in dentistry by M. Greenwood, R. A. Seymour & J. G. Meechan UK.
2. White, Tim (19 December 2014). "What is the Difference Between an 'Injury' and 'Disease' for Commonwealth Injury Claims?" Tindall Gask Bentley. Archived from the original on 27 October 2017. Retrieved 6 November 2017.
3. "What is the deadliest disease in the world? WHO. 16 May 2012. Archived from the original on 17 December 2014. Retrieved 7 December 2014

Total topics	Local	Regional	National	Global
21	5	5 ¹	5	21

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Programme: B.Sc., Zoology

Subject Code: 18UZO4SBE1

Semester: IV

No. of Hours Allotted: 2

Title of the Paper: Ornamental Fish Farming (SBE)

No. of Credits: 2

OBJECTIVES:

To enlighten the non–major elective students about ornamental fish farming a profitable culture practice.

To help Arts students about this self–employment programme.

UNIT I

Importance and scope of ornamental fish culture, Economics –**Commercial value**–potential trends in ornamental fish farming in the world and in India. Budget required for setting up an Aquarium–**Fish Farm as a Cottage Industry.**

UNIT II

Important freshwater and marine ornamental fishes –**Indigenous –Exotic species:** Guppy, Sword tail, Gold fish, Angel fish, Blue morph, Anemone fish, Butterfly fish, Zebra fish, Koi, Tetra, Molly, Glass fish, Cichlids, Hippocampus and Scat fishes.

UNIT III

Mass production of fancy fishes: Preparations for breeding – breeding behaviour of chosen fishes– molly and fighter fish – Induced breeding –**Food and feeding:** Preparation and composition of formulated fish feeds – **Live feeds:** rotifers, tubifex– **Live fish transport**–Fish handling, packing and forwarding techniques.

UNIT IV

Aquarium design, Construction and preparation: size, shape, substrate, ornamental aquatic plants– **Construction and functions of Bio filters, aerators –accessories for fish tanks – hood and light, nets, suction tube.**

UNIT V

General Aquarium maintenance – Maintenance of water quality: controlling ammonia build up, pH, feeding regimes–**Disease management:** Common bacterial, viral, fungal, protozoan and crustacean infections their **treatment and control**– **Hazards for ornamental fish culture.**

TEXT BOOK

1. Santhanam, R., N. Sugumaran and P. Natarajan. 1987. A manual of Fresh water aquaculture. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.

2. Shanmugam, K. 1992. Fishery Biology and Aquaculture. Leo Pathipagam, Madras.

REFERENCES:

1. Jameson, J.D. and R.Santhanam (1996). Manual of ornamental fisheries and farming technology. Fisheries College and Research Institute, Thoothukudi.
2. Mitchell Beazley, 1998. The complete guide to tropical aquarium fish care. Read and Consumes Book Ltd., London.
3. Jingran V.G., 1991: Fish and Fisheries in India – Hindustan Publ. Co. New Delhi – India.
4. Mill Dick, 1993: Aquarium Fish, DK Publ. Co. Inc. New York – USA.
5. Day, F, 1978: Fishes of India Vol. I & II, William Danisan& Sons, India. Gupta, S.K and Gupta, P.C. 2006. General and Applied Ichthyology. S.Chand and company Ltd. New Delhi.
6. Mitchell Beazley, 1998. The complete guide to tropical aquarium fish care. Read and Consumes Book Ltd., London

Total topics	Local	Regional	National	Global
23	5	12	1	5

Programme: B.Sc., Zoology
Semester: V
Title of the Paper: Animal physiology

Subject Code: 18UZO5CC5
No.of Hours Allotted: 5
No.ofCredits: 5

OBJECTIVE

To understand the basic definition and functions in the fields of Physiology

UNIT I

Definition, Fields of Physiology and Scope – Physiology of Digestion: Protein – Carbohydrates – Lipids – Digestive enzymes– Hormonal regulation of Digestion.

UNIT II

Muscle: Types of muscle cells –Ultra structure of muscle cells – Muscle contraction and types of muscle contraction– mechanism of muscle contraction

UNIT III

Respiration –Respiratory pigments and their functions –Hormones– composition of blood and their functions –Factors of coagulation – Intrinsic and extrinsic factors – Cardiac cycle – Cardiac Rhythm– Conduction of heart beat & cardiac output.

UNIT IV

Nerve: Nervous coordination: **Transmission of impulses in nerve cells** – Michalis Menton constant – Ramachandran Plot – Clinical and Industrial Applications of enzymes.

UNIT V

Urine formation: Ultra filtration, reabsorption, secretion – Hormonal regulation –Hormonal action: Pituitary – Thyroid – Adrenal–Pancreas – Sex hormones and their functional significance.

TEXT BOOKS

1. Parameswaran, Anantha Krishnan and AnanthaSubramaniam, 1975. Outlines of Animal Physiology, S. Viswanathan, Printers and Publishers, Pvt. Ltd., 329 pp.

REFERENCES

2. Berg J.M. Tymoczke., J. L. and Styer L. Palmer D.T. Handbook of enzymes.
3. Biological chemistry by H.R. Mabler and E. Corder (1986).
4. Enzyme by Dixon and Webb.
5. Molecular Biotechnology by Click and Paster hark, ASM press.
6. General and comparative Animal Physiology by William Hoar.

Total topics	Local	Regional	National	Global
30	1	1	1	30

Programme: B.Sc., Zoology

Subject Code: 18UZO5CC6

Semester V

No. of Hours Allotted: 5

Title of the Paper: Immunology

No. of Credits: 5

OBJECTIVES:

To learn the structural features of the components of the immune system as well as their functions, but the primary emphasis will be on the mechanisms involved in immune system development and responsiveness.

UNIT I

Scope, History – Innate immunity – Acquired immunity– Structure and functions of Primary and Secondary lymphoid organs – Cells of Immune System: Types of Lymphocytes – Macrophages – Antigen Presenting Cells – Mast cells – Polymorpho nuclear cells

UNIT II

Antigens: Types and Properties of Antigens – Haptens – Adjuvants – Immunioglobulins –Types – Structure and Functions– Biological properties of Antibodies –Vaccines and its types

UNIT III

Immune response:Antigen: Antibody reaction – Primary and Secondary immune response – Humoralimmunity – Cell mediated Immune response – Role of B cells in Antibody production – Cytokines – Lymphokines.

UNIT IV

Major Histocompatibility Complex in man; Human Leukocyte Antigen (HLA) – Complements: Salient features: Functions – Hypersensitivity:Types: Anaphylaxis –Auto Immune diseases – Immunodeficiency diseases

UNIT V

Immunological Techniques: Agglutination – Precipitation – Simple double and single radial immune diffusion – Counter current and Rocket –Immuno electrophoresis – ELISA – Western Blotting – Southern Blotting – Northern Blotting – WIDAL – VDRL test – Hybridoma technology.

TEXT BOOKS

1.NandhiniShetty (1994) Immunology, Introductory Text Book, New Age Int. (P) Ltd. Publications, New Delhi.

2. Dulsy Fatima et al., (2000) Immunology, Saras Publications, Nagercoil, Tamil Nadu.

REFERENCES

1. Roitt, (3rd Edition) Immunology, Crover Medical Publishing Company, London
2. Barret, J. T. (1983) Text Book of Immunology (5th Edition), The C.V. Mosby Company.
3. Richard, H.M. (1992), Immunology (2nd Edition), Williams and Wilkins, Baltimore Maryland.
4. Hidemann, W.H. (1980) Essentials of Immunology, Elsevier Science Publishing Co. Inc.
5. Weinn. D.M. and Steward, L. (1993), Immunology, Singapore Publishers Private Ltd.,

Total topics	Local	Regional	National	Global
41	1	1	1	41

Programme: B.Sc., Zoology

Subject Code: 18UZO5CC7

Semester: V

No. of Hours Allotted: 5

Title of the Paper: Ecology

No. of Credits: 5

OBJECTIVES:

To understand the relationship between every organism and its environment.

To study the impact of ecological factors on the distribution and life of organisms.

To have a clear understanding about the concept and theories of evolution.

UNIT – I

Ecology, environment and ecosystem: Abiotic factors – Light, Water, Temperature and Soil and their impact on organisms – component of biotic factors – Ecosystem: Pond and River – Food Chain: Food Web; Trophic level: Energy Flow – Ecological Pyramids: Biomass, Number and Energy.

UNIT-II

Species interaction, population & community ecology: Biotic factors – Animal relationships: Symbiosis, Commensalism – Mutualism – Antagonism: Antibiosis – Predation – Parasitism – Competition: Intraspecific and Interspecific competition.

UNIT-III

Population Ecology: Definition: Characteristics – Community Ecology: Types – Components – Ecotone – Edge effect – Ecological niche – Ecological succession – Concept of climax.

UNIT- IV

Natural resources, biodiversity & conservation: Natural Resources – Renewable and Non-renewable: Resources Management – Wild life Conservation and Management – Biodiversity: Types – Mega diversity – hotspots with reference to India – Conservation of Biodiversity – IUCN threat categories.

UNIT-V

Environmental Pollution: Air, Water and Land –Sewage and Solid Waste disposal and Management – Global Warming and Climate change – Green House Effect – Ozone Layer and its significance –Acid Rain.

TEXT BOO

1. Odum, E.P. 1996. Fundamentals of Ecology (III Edn.), NatrajPub.Dehradun..
- 2.Rastogi, V.B. and M.S. Jayaraj. Animal Ecology and Distribution of Animals,Kedarnath Ramnath. 1989

REFERENCES

1. Clarke, G.L. Elements of Ecology. John Wiley & Sons, N: y.3rd Edition, 1954.
- 2.Rastogi, V.B. and M.S. Jayaraj. Animal Ecology and Distribution of Animals,Kedarnath Ramnath. 1989
- 2.Kendeigh, S.C. Animal Ecology. Prentice Hall.2nd Edition, 1961.
- 3.Sharma, P.D. Ecology and Environment. Rastogi Publications. Meerut. 1990.
4. Southwick,C.H. Ecology and the quality of Environment. D.VasNostrand Co. 1976.
5. Verma, P.S. and V.K. Agarwal, Principles of Ecology. S.Chand& Co. NewDelhi. 1996.
6. Dowdeswell,P.M. The Mechanism of Evolution, Heinemann London 2nd Edition, 1956, Mayr.El. Animal species and evolution.Harvard University Press. (1963).

Total topics	Local	Regional	National	Global
35	2	2	4	31

Programme: B.Sc., Zoology

Subject Code: 18UZO6CP3

Semester: V

No. of Hours Allotted: 4

Title of the Paper: Animal physiology, Immunology and Ecology (P)

OBJECTIVES:

To study the biochemical constituents of macromolecules in animal systems;

To impart knowledge on immune systems, the benefits of productive insects,

To develop skill in estimating environmental parameters.

Animal Physiology

1. Human Salivary Amylase activity in relation to Temperature and pH
2. Effects of Temperature on the ciliary activity of Freshwater Mussel and calculation of Q10
3. Identification of Nitrogenous Waste Products.
4. Total count of RBC and WBC & Differential count of WBC.
5. Quantitative tests for Carbohydrates, Proteins, and Lipids.
6. Simple tests for Sugar, Albumin, and Urea in Human Urine.
7. Estimation of Haemoglobin.
8. Estimation of the rate of O₂ consumption in fish with reference to body weight.

Spotters

Centrifuge, pH meter, Colorimeter, ECG, Sphygmomanometer, Pregnancy test kit, Haemoglobinometer, Haemocytometer, Amino acids Model.

1. Immunology

Primary and Secondary Lymphoid organs in fish–Immunoglobulins: IgA, IgG, IgM and IgE.

Spotters: Immunoelectrophoresis, ELISA, Blotting techniques: Southern, Northern, Western.

Ecology

1. Estimation of dissolved oxygen
2. Estimation of salinity

3. Estimation of Calcium.

4. Mounting and identification of plankton (fresh water / marine)

5. Visit to a local polluted area – Solid waste / sewage treatment plant

Spotters: Animal association– Intertidal fauna–Secchidisk–Maximum and minimum thermometer– Barometer–Luxmeter–Turbidity meter–Electrical conductivity meter.

Total topics	Local	Regional	National	Global
15	13	-	-	3

Programme: B.Sc., Zoology

Subject Code: 18UZO5MBE1

Semester: V

No. of Hours Allotted: 5

Title of the Paper: Economic Entomology (MBE)

No. of Credits: 5

OBJECTIVES:

To enlighten the students on beneficial and harmful insects, their biology, their nature of damage and their management measures.

To teach our students about pests which attack our crops and their management measures.

UNIT I

Insect Pests: Definition – Classification–Primary and Secondary pests – Major and Minor pests: Pests of Paddy –Sugarcane –Cotton: Their Biology, Nature of damage and management methods (Any four Major pests for each crop) – Pest outbreak – Pest resurgence – Pests of stored products and their Management methods.

UNIT II

Principles of insect control: Prophylactic measures: An overview of cultural, mechanical, physical, biological and chemical methods–Pesticides: classification – types of pesticide formulation – mode of action – toxicity – Nonconventional methods of Insect Management: Insect Growth Regulators (IGRs) –Repellents– Antifeedents– Pheromones –Chemosterilants– Irradiation – Quarantine methods: Botanical Pesticides and their use in management of insect pests of crops

UNIT III

Integrated Pest Management (IPM): Definition and Integration of methods –Potential components of IPM and its application – Insect plant interactions –Pest: Predator Complex – Ecological balance – Economic Threshold Levels (ETLs)

UNIT IV

Beneficial insects: Economic importance of honey bee–silk worm – lac insect – Pollinators – soil builders – scavengers – Biological control agents of Insect Pests: Pathogens –Parasites and Predators – Utilization of Bio–control agents in managing insect pests.

UNIT V

Insects and Diseases: Biology of insect vectors *i.e.*, Housefly, Mosquito, Flea - Pediculus -Cockroaches – Mode of transmission pathogens and epidemiology of typhoid fever – dengue – plague– Relapsing fever.

TEXT BOOKS

1. David, B.V.2001. Elements of Economic Entomology. Popular Book Depot, Chennai.
2. Fenemore, P.G. and Prakash, A. 2006. Applied Entomology. New Age International (P) Limited Publishers, New Delhi.

REFERENCES

1. Chapman, R. F. 1988. The Insects Structure and function. Cambridge University Press, U.K.
2. Kumar, A. and Nigam, P.M. 2003. Economic and Applied Entomology.Emkay Publications, Delhi.
3. Pedigo, L.P.2003. Entomology and pest management.Pearson Education (Singapore) Pvt. Ltd., Delhi.
4. Prakash, I and Mathur, R.P.1987. Management of Rodent Pests. ICAR, New Delhi.
5. Singh, R. and Sachan, G.C. 2004. Elements of Entomology.Rastogi Publications, Meerut.
6. Fitzwater, W.D. and Prakash, I. 1989. Handbook of vertebrate pest control. ICAR, New Delhi.
7. Ambrose, D.P. 2004.General Entomology. Kalyan Publishers, West Bengal.
8. Rathinasamy, T.K.1986. Medical Entomology.SViswanathan and Co., Madras, India.

Total topics	Local	Regional	National	Global
42	3	11	7	21

Programme: B.Sc., Zoology

Subject Code: 18UZO5SBE2

Semester: V

No. of Hours Allotted: 2

Title of the Paper: Applied Zoology (SBE)

No. of Credits: 2

OBJECTIVE

To disseminate information on economic aspects of Zoology and thereby motivate for self-employment.

UNIT I

Vermiculture: Classification of earthworm; Species of Earthworms – Life cycle of *Lampitoma mauritii*– Preparation of vermin bed –Vermiwash–Vermicomposting – Economic importance– Earthworms in medicine – bio waste management –Organic farming.

UNIT II

Apiculture: Classification of honey bee – Species of Honey Bees: colonial structure of honey bee – Biology of Honey bee – Types of bee hives –Extraction of honey – Nutritive and medicinal value of honey.

Lac culture: Classification of lac insect – species of lac insect – host plant –Types; Life cycle of Lac insect – Extraction of Lac:Processing; purification – Economic importance of Lac –Uses of Lac: Medicina, Industrial, Ornamental.

UNIT III

Sericulture: Classification –Species; Life cycle of *Bombyxmori*– Rearing of silk worm –Paraffin paper rearing – Box rearing – New net method – Co-operative methods –Moriculture – types of mulberry plants – planting methods –Diseases of silk worm: Protozoan – Bacterial –Viral diseases (each two) –Reeling of silk – Economic importance of sericulture – Marketing of silk²

UNIT IV

Aquaculture: Freshwater fishes (Indian major carps) –Site selection and construction of pond – Fish feed – Induced breeding – Fish diseases – rearing methods –Furunculosis– Epizootic Ulcerative Syndrome (EUS) – Vibriosis –Fresh water Prawn culture – Ornamental fish culture.

UNIT V

Poultry farming: Types of fowls – Rearing methods of Broilers and Layers –Poultry nutrition – Poultry diseases (NCD, IBV & Fowls) –Issues and limitations of poultry farming – **Dairy farming:** Breeds of Dairy animals (Cow, Buffalo and Goat) and their characteristics.

TEXT BOOK

1. Ganga.G and SulochanaChetty. J., An introduction to Sericulture (2nd edition) Oxford & IBH Publishing company.

REFERENCES

1. Shukla.G.S. andUpadhya.V.B. Economic Zoology (Rastogi Publications).
2. Ahsan, J and Sinha, S.P. A Handbook on Economic Zoology, S.Chand& Co.
3. Sardarsingh – Beeking in India.
4. Santhanam – Aquaculture.
5. Ullal.S.R. andNarasimhanna, M.N – Central Silk Board, Govt. of India, Bombay.
6. Singh – Livestock and poultry production.
7. Jhingran – Fish and fisheries.
8. T.V.R. Pillai – Coastal Aquaculture.
9. Maine product export development authority – Freshwater fishes, Ornamental fishes, Shrimph culture – MPEDA Publication series.

Total topics	Local	Regional	National	Global
55	5	2	19	29

Programme: B.Sc., Zoology

Subject Code: 18UZO5SBE3

Semester: V

No. of Hours Allotted: 2

Title of the Paper: Health education (SBE)

No. of Credits: 2

OBJECTIVE

To impart awareness on Public Health and Hygiene and to create knowledge on Health Education.

UNIT I

Health: Definition, Dimensions of health –Health education: Definition, principles–Nutrition and health: Balanced diet – macronutrients –micronutrients – vitamins and minerals – Food hygiene: perishable: non-perishable –shelf life – sterilization – food poisoning.

UNIT II

Environment & Health: Water –Air –Noise pollution– Pollutants: Effects,prevention and control– Effects of smoking and alcoholism–Causes effects and control measures of Life style diseases: Stroke – Obesity – type 2 diabetes

UNIT III

Concept of disease: Phases of disease – Prepathogenesis and Pathogenesis –concept of prevention and control – Common Helminthic and Arthropod borne diseases–Immunity: Types of vaccinations – Live – Attenuated – Killed – Toxoid –Transgenic vaccines.

UNIT IV:

Air and Water Born Diseases:Bacterial and Viral diseases – Causative agents and factors – Mode of transmission: air – water – droplets – contact– Symptoms and treatment of Tuberculosis– Typhoid –cholera - Hepatitis A & B.

UNIT V

Mental Health: Definition, characteristics – causes and prevention of mental health – Occupational health & hazards, prevention– Health care services – Primary health care – Hospitals – Principles of First Aid – First aid procedures for Accidents, food poisoning, snake bites and heart attacks.

TEXT BOOK:

1. E. Park & Park: Textbook of Preventive and Social Medicine (Published by Banarsidas Bhanot, 1st Edition, 1278 Napier Town.)

Total topics	Local	Regional	National	Global
46	2	2	2	46

SEMESTER-V

Course Code: 18USSD

Programme: B.Sc., Zoology

Subject Code: 18UZO6CC8

Semester: VI

No. of Hours Allotted: 6

Title of the Paper: **Developmental Biology**

No. of Credits: 6

OBJECTIVES:

Developmental Biology is an experimental science, which provides understanding of the processes of early embryonic development, to analyze the mechanisms of development by experimental manipulation of developing embryos and to review current developments in the field of embryology.

UNIT I

Gametogenesis: Spermatogenesis; Cells in seminiferous tubules, Spermiogenesis– structure and types of sperm– Oogenesis; Growth of oocyte, vitellogenesis–organization of egg cytoplasm – Polarity and symmetry – Maturation of egg –egg envelopes –Types of eggs.

UNIT II

Fertilization: External and Internal fertilization – sperm – egg interaction– physiological changes in the organization of egg cytoplasm – Theories of fertilization –Cleavage: Patterns of cleavage – radial, spiral and bilateral–Types; meroblastic, holoblastic and superficial – Factors affecting cleavage –Chemodifferentiation.

UNIT III

Blastulation: Types of blastula– Fate maps– – Determination of fate map – Presumptive organ forming areas in Frog – Chick–Gastrulation in Frog– Chick – Morphogenetic movements – Development of brain and eye in Frog – Developmental stages of Chick embryo up to 96 hours and organogenesis.

UNIT IV

Foetal membranes in Chick and Mammals – Placentation in Mammals–types and physiology–Organizer concept and embryonic induction–Regeneration in Planarians and Amphibians–Metamorphosis in Amphibians.

UNIT V

Precautions and health care during Human Pregnancy and Gestationinfertility–Artificial Insemination – Concept of test tubebaby–Birth control methods –Factors involved in Teratogenesis.

TEXT BOOK:

1. Beril., N. J.1974. Developmental Biology. Tata McGraw–Hill PublishingCompany Ltd. New Delhi.
2. Berry.A.K.2007. An Introduction to Embryology, Emkay Publications, NewDelhi–51.

REFERENCES:

1. Arumugam.N. 1998. Developmental Biology, Saras Publications,2. Balinsky, B.I. 1981. An Introduction to Embryology. W.B. SaundersCompany. Philadelphia.
3. S.Banerjee, Development Biology, Dominant Publishers, New Delhi
4. Verma, P.S. And Agarwal V.K. 2005. Chordate Embryology (DevelopmentalBiology) S. Chand&Company Ltd., New Delhi.
5. Veer balarastogi, Developmental biology, Kedarnath Ram nath publishers, meerut.
6. Rastogi, V.B and Jayaraj, M.S. 2002. Developmental Biology KedarNath Ram Nath, Meerut.
7. Twymann, R.M. 2003. Developmental Biology. Viva Books Private Ltd., New Delhi.

Total topics	Local	Regional	National	Global
39	2	2	2	39

Programme: B.Sc., Zoology

Semester: VI

Title of the Paper: Evolution

Subject Code:18UZO6CC9

No.of Hours Allotted: 6

No.of Credits: 6

OBJECTIVES

To introduce the major principles of evolutionary theory, and ranges from the origins of life, through the evolution of animal to the evolution of behaviour.

To have a clear understanding about the concept and theories of evolution.

UNIT I

Lamarckism: Postulates of Lamarckism –Summary of four postulates of Lamarckism – Evidences in favour of Lamarckism – Neo-Lamarckism– Significance: Criticism of Lamarckism.

UNIT II

Darwinism–Theory of Natural Selection – Postulates of Darwinism –Evidences in favour of Darwinism – Evidences against Darwinism– Darwin finches – –Neo-Darwinism or Modern Concept or Synthetic Theory of Evolution –Postulates of Neo-Darwinism.

UNIT III

Hugo de Vries; Mutation Theory of Evolution – Evidences in favour of Mutation theory–Evidences against Mutation theory.

UNIT– IV

Concept and theories of evolution: Evidences of Evolution –Morphological and Anatomical (Homologous, Analogous and vestigial organs) – Embryological evidences –Paleontological – Physiological and Biochemical evidences – Elemental forces of evolution: Selection, Recombination, Isolation, Migration, Mutation and Genetic drift –Patterns of Evolution; Sequential Evolution – Divergent Evolution, Microevolution – Macroevolution – Mimicry.

UNIT – V

Evolutionary time scale and evolution of man: Geological time scale: Eras, Periods and Epochs – **Fossils: Types and Formation** –Dating of fossils –Extinction: Types, causes – Extinct animals–Living fossils – Connecting Links – Missing Links. –Evolution of Man – Cultural and Biological evolution– Future evolution.

TEXT BOOKS

1. Savage. Evolution, Modern Biology Series, 3rd Edition, 1969.
2. Simpson, G.G. The major features of Evolution, CUP. (1953).
3. Arumugam, N, 2006. Organic Evolution, Saras publication, Nagercoil.

REFERENCES

4. "Unlocking the Mystery of Life," documentary by Illustra Media, 2002.
5. Michael Denton, "Evolution: A Theory in Crisis," 1986, p. 250.

Total topics	Local	Regional	National	Global
37	1	1	1	37

Programme: B.Sc., Zoology

Subject Code: 18UZO6CP4

Semester: VI

No. of Hours Allotted: 5

Title of the Paper: Practical –Developmental Biology and Evolution No. of Credits: 5

OBJECTIVES:

To learn the Developmental stages of animals. To learn the genetic importance of animals.

Developmental Biology

1. Observation of the structure of live spermatozoa of Bull.
2. Observation of prepared micro slides to study
 - A. Egg, cleavage, blastula and yolk plug stage in frog.
 - B. Chick embryo –24 hrs, 36 hrs, 48 hrs, 72 hrs and 96 hrs
3. Hen's egg

Evolution

1. Animals of evolutionary importance: Peripatus, Limulus, Archaeopteryx.
2. Homologous organs: Forelimbs of Frog.
3. Analogous organs: Wings of Insects and Birds.
4. Fossils: Trilobite, Nautilus.
5. Mimicry: Leaf insects, Stick insects, Monarch and Viceroy butterfly.
6. Colouration: Chameleon, Lycodon.

Total topics	Local	Regional	National	Global
10	4	-	-	6

Programme: B.Sc., Zoology

Semester: VI

Title of the Paper: Biophysics & Biostatistics (MBE)

Subject Code: 18UZO6MBE2

No. of Hours Allotted: 6

No. of Credits: 5

OBJECTIVES:

The objective of Biostatistics is to emphasize basic idea about the Biostatistics and its application. The Biophysics course is to emphasize the principle and biological applications of Microscope, chromatograph, electrophoresis and spectroscope.

UNIT I

Scope of Biophysics in Biology – structure and properties of atoms and molecules – chemical bonds – types – molecular interactions – Colloids description and properties – Thermodynamic principles – Membrane biophysics – diffusion, active transport – Tyndall effect, Surface tension, Brownian movement, filtration, osmosis, and dialysis.

UNIT II

Biophysical instruments: Introduction – Principles – description and applications of pH meter – analytical and ultracentrifuge – colorimeter – visible spectroscopy – electrophoresis – chromatography – Micrometry.

UNIT III

Biostatistics: Collection of Data – Types – Classification and tabulation of data – Presentation of data: Bar diagram and its types, Pie diagram – Histogram – Pictogram – Frequency polygon – Frequency curve and Ogives – Types of variables: Continuous and discontinuous variables, Qualitative and quantitative variables.

UNIT IV

Measures of Central tendency: Mean, Median and Mode – Uses and calculation of Mean, Median and Mode – Measures of dispersion: Range and Standard deviation calculations and uses – Co-efficient of variation – Standard Error.

UNIT V

Correlation analysis: Types and methods of studying correlation – Scatter diagram – Karl Pearson's co-efficient of correlation – Rank correlation – Regression analysis based on biological data–Testing of hypothesis: Chi-square test – Student *t* test – ANOVA: one way and two-way analysis.

TEXT BOOK:

1. Daniel, M. 1992 – Basic Biophysics and Biologists, Wiley International, New Delhi.
2. Gupta S.P. Statistical Methods, Sultan Chand & Sons Publishers, New Delhi
3. Palanichamy S, and Manoharan M, Statistical Methods for Biologists, Palani Paramount Publications, Palani

REFERENCES:

1. Das, D. 1996 – Biophysics and Biological Chemistry, Academic Publishers, Calcutta.
2. Bailey, N.T.J (1997) Statistical methods in Biology, III Ed., Cam. University Press, N.Y.
3. Ramakrishnan 2007 Biostatistics, Saras Publications, Periyavilai, Nagaercoil
4. Khan &Khanum 1994 Fundamental of Bostatistics, Ukaaz Publications, Hyderabad
5. Snadecor, G.W. and W.G.Cochran (1967) – Statistical methods, Oxford &IBH Publishing, New Delhi.
6. Sokal, R and James, F (1973), Introduction to Biostatistics, W.H. Freeman and Company Ltd., Tokyo, Japan.
7. Zar, J.H. (1974) – Bio statistical analysis – Prentice Hall Inc., New Jersey, USA.

Total topics	Local	Regional	National	Global
41	1	1	1	41

Programme: B.Sc., Zoology

Subject Code: 18UZO6MBE3

Semester: IV

No. of Hours Allotted: 6

Title of the Paper: Human diseases(MBE)

No. of Credits: 5

OBJECTIVES

To help the students study the human diseases and causative agents. To make them examine and understand proper control procedures.

UNIT - I

Communicable Diseases: Symptoms - Prevention and Control of Communicable Diseases - Community Diagnosis: Tuberculosis

UNIT - II

Non-communicable Diseases: Symptoms, Prevention and Control of Non:Communicable Diseases - Community Diagnosis: Alzheimer's - Asthma - Chronic Kidney Disease - Diabetes

UNIT - III

Hereditary disease: Symptoms, Prevention - Control measures of Diseases: Cystic fibrosis - Sickle Cell Anemia - Marfan syndrome.

UNIT - IV

Zoonotic disease: Symptoms, Prevention - Control measures: Anthrax - Animal influenza - avian influenza.

UNIT - V

Nutritional deficiency: Symptoms, Prevention - Control measures of Diseases: Rickets - Goiter - Anemia - Beriberi.

TEXT BOOKS:

Textbook of human disease in dentistry by *M. Greenwood, R. A. Seymour & J. G. Meechan*

UK: Wiley–Blackwell price £39.99; pp 325 ISBN 9781405170338.

REFERENCES

1 *White, Tim (19 December 2014)*. "What is the Difference Between an 'Injury' and 'Disease' for Commonwealth Injury Claims?".TindallGask Bentley. Archived from the original on 27 October 2017. Retrieved 6 November 2017.

2. "What is the deadliest disease in the world?".WHO. 16 May 2012. Archived from the original on 17 December 2014. Retrieved 7 December 2014.

Total topics	Local	Regional	National	Global
22	5	5	5	22