

General Electives

(GEC offered by the Dep. Of Zoology for students studying with honours level core courses other than offered by the Dep. Of Zoology)

Same as offered as core courses for the BSc general students

ZOOHGEC01T: Animal Diversity	
Theory (Credits 4)	Class
Unit-1 Kingdom Protista	
General characters and classification of Subkingdom Protozoa up to Phylum (Levine et al., 1980); Locomotory Organelles and locomotion in Protozoa	3
Unit-2 Phylum Porifera	
General characters and classification up to classes; Canal System in <i>Sycon</i>	3
Unit-3 Phylum Cnidaria	
General characters and classification up to classes; Polymorphism in Hydrozoa	3
Unit-4 Phylum Platyhelminthes	
General characters and classification up to classes; Life history of <i>Taenia solium</i>	3
Unit-5 Phylum Nematoda	
General characters and classification up to classes; Life history of <i>Ascaris lumbricoides</i> and its parasitic adaptations	3
Unit-6 Phylum Annelida	
General characters and classification up to classes; Nephridia in Annelida	3
Unit 7 Phylum Arthropoda	
General characters and classification up to classes; Vision in insect, Metamorphosis in Insects	5
Unit-8 Phylum Mollusca	
General characters and classification up to classes; Respiration in <i>Pila</i>	3
Unit-9 Phylum Echinodermata	
General characters and classification up to classes; Water-vascular system in <i>Asterias</i>	4
Unit-10 Protochordates	
General features; Feeding in <i>Branchiostoma</i>	2
Unit-11 Agnatha	
General features and classification up to classes (Young, 1981)	2
Unit-12 Pisces	
General features and Classification up to Subclasses (Romer, 1959); Osmoregulation in Fishes	3
Unit-13 Amphibia	
General features and Classification up to living orders (Duellman & Trueb, 1986); Metamorphosis in Toad	3
Unit-14 Reptiles	
General features and Classification up to living Subclass (Young, 1981); Poisonous and non-poisonous snakes, Biting mechanism in snakes	4
Unit-15 Aves	
General features and Classification up to orders (Young, 1981); Flight adaptations in birds	3
Unit-16 Mammals	
Classification up to Subclasses (Young, 1981); Origin & distribution of Cranial nerves in <i>Cavia</i>	3
Suggested Readings [Consult Latest Editions]	
1. Barnes, R. D. & Ruppert, E. E., (1994). Invertebrate Zoology. 6thEd. Brooks Cole.	
2. Brusca, R. C. & Brusca, G. J. (2002). Invertebrates. 4th Ed. Sinauer Associates.	
3. Kardong, K.V. (2002). Vertebrates: Comparative anatomy, function evolution. Tata McGraw Hill.	
4. Kent, G.C. & Carr, R.K. (2001). Comparative anatomy of theVertebrates. 9thEd. McGraw Hill.	
5. Romer, A.S. & Parsons, T.S.(1986).The vertebrate body. 6thEd. Saunders College Pub.	
6. Ruppert E. E., Fox, R. & Barnes R. D. (2003). Invertebrate Zoology: a Functional Evolutionary Approach. 7th Ed. Brooks Cole.	
7. Young, J. Z.(2004).The Life of Vertebrates. III Edition. Oxford university press.	

ZOOHGEC01P: Animal Diversity Lab (Credits 2)**1. Spot identification of the following specimens:**

Amoeba, Euglena, Plasmodium, Paramecium, Sycon, Euspongia,, Obelia, Physalia, Aurelia, Tubipora, Metridium, Taenia solium, Male and female Ascaris lumbricoides, Aphrodite, Nereis, Pheretima, Hirudinaria, Palaemon, Cancer, Limulus, Palamnaeus, Scolopendra, Julus, Periplaneta, Apis, Chiton, Dentalium, Pila, Unio, Loligo, Sepia, Octopus, Pentaceros, Ophiura, Echinus, Cucumaria and Antedon, Balanoglossus, Herdmania, Branchiostoma, Petromyzon, Sphyrna, Pristis, Torpedo, Labeo, Exocoetus, Anguilla, Ichthyophis/Ureotyphlus, Salamandra, Bufo, Hyla, Chelone, Hemidactylus, Chamaeleon, Draco, Vipera, Naja, Crocodylus, Gavialis, Passer, Psittacula, Alcedo, Sorex, Pteropus, Funambulus, Suncus

2. Study of the following permanent slides: Transverse section of male and female *Ascaris*

3. Identification of poisonous and non-poisonous snakes

4. An “animal album” containing photographs, cut outs, with appropriate write up about the above mentioned taxa. Different taxa/ topics may be given to different sets of students for this purpose.

Suggested Readings:

1. Chatterjee and Chatterjee: Practical Zoology

2. Ghosh, K.C. and Manna, B. (2015): Practical Zoology, New Central Book Agency, Kolkata

ZOOHGEC02T, Physiology and Biochemistry

Theory (Credits 4)	Class
Unit-1 Nerve and muscle	8
1. Structure of a neuron, Resting membrane potential, Graded potential, Origin of Action potential and its propagation in myelinated and non-myelinated nerve fibres.	
2. Ultra-structure of skeletal muscle, Molecular and chemical basis of muscle contraction.	
Unit-2 Digestion	5
Physiology of digestion in the alimentary canal; Absorption of carbohydrates, proteins, lipids	
Unit-3 Respiration	5
Pulmonary ventilation, Respiratory volumes and capacities, Transport of Oxygen and carbon dioxide in blood	
Unit-4 Excretion	5
Structure of nephron, Mechanism of Urine formation, Counter-current Mechanism	
Unit-5 Cardiovascular system	6
Composition of blood, Homeostasis, Structure of Heart, Origin and conduction of the cardiac impulse, Cardiac cycle	
Unit-6 Reproduction and Endocrine Glands	7
Physiology of male reproduction: hormonal control of spermatogenesis; Physiology of female reproduction: hormonal control of menstrual cycle. Structure and function of pituitary, thyroid, pancreas and adrenal	
Unit 7 Carbohydrate: Structure and Metabolism	8
Introduction to Carbohydrates, Structure & Types of Carbohydrates, Isomerism, Introduction to Intermediary metabolism: Glycolysis, Krebs cycle, Pentose phosphate pathway, Gluconeogenesis, Electron transport chain	
Unit-8 Lipid: Structure and Metabolism	5
Introduction to Lipids: Definitions; fats and oils; classes of lipids; Lipoproteins; Biosynthesis and β oxidation of palmitic acid	
Unit-9 Protein: Structure and metabolism	5
Proteins and their biological functions, functions of amino acids, physicochemical properties of amino acids. Peptides – structure and properties; primary structure of protein, secondary, tertiary and quaternary structures. Transamination, Deamination and Urea Cycle.	
Unit-10 Enzymes	4
Introduction, Classification of Enzymes, Mechanism of action, Enzyme Kinetics, Inhibition and Regulation	

Suggested Readings

1. Berg, J. M., Tymoczko, J. L. and Stryer, L. (2006). Biochemistry. VI Edn. W.H Freeman & Co.

2. Chatterjea, MN and Shinde, R (2012) . A Textbook of Medical Biochemistry. 8th Edn. Jaypee Pub., N.Delhi

3. Guyton, A.C. and Hall, J.E. (2011). Textbook of Medical Physiology, XII Edition, Harcourt Asia Pvt. Ltd/ W.B. Saunders Company

4. Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2009). Harper's Illustrated Biochemistry.

- XXVIII Edition. Lange Medical Books/Mc Graw3Hill.
- Nelson, D. L., Cox, M. M. and Lehninger, A.L. (2009). Principles of Biochemistry. IV Edition. W.H. Freeman and Co.
 - Sherwood, L. (2013). Human Physiology from cells to systems. 8th Edn., Brooks & Cole
 - Tortora, G.J. and Derrickson, B.H. (2009). Principles of Anatomy and Physiology, XII Edition, John Wiley & Sons, Inc.
 - Widmaier, E.P., Raff, H. and Strang, K.T. (2008) Vander's Human Physiology, XI Edition., McGraw Hill
 - Elaine N. Marieb, 2006. Human Anatomy & Physiology, Pearson Education.

ZOOHGEC02P: Physiology and Biochemistry Lab (Credits 2)

- Preparation of haemin crystals
- Identification of permanent histological sections of mammalian pituitary, thyroid, pancreas, adrenal gland, small intestine, liver, lung, kidney
- Qualitative tests to identify functional groups of carbohydrates in given solutions: Glucose (Benedict's test), Sucrose (Iodine test)
- Quantitative estimation of total protein in given solutions by Lowry's method.
- Study of activity of salivary amylase under optimum conditions.

ZOOHGEC03T: Insect, Vectors and Diseases

Theory (Credits 4)	Class
Unit-1 Introduction to Insects	6
General Features of Insects, Morphological features, Head – Eyes, Types of antennae, Mouth parts with respect to feeding habit	
Unit-2 Concept of Vectors	6
Brief introduction to Vectors (mechanical and biological), Reservoirs, Host-vector relationship, Adaptations as vectors, Host specificity	
Unit-3 Insects as Vectors	8
Detailed features of insect orders as vectors – Diptera, Siphonoptera, Siphunculata, Hemiptera	
Unit-4 Dipteran as Disease Vectors	14
Study of important Dipteran vectors – Mosquitoes, Sand fly, Houseflies Study of mosquito-borne diseases – Malaria, Dengue, Chikungunya, Viral encephalitis, Filariasis Control of mosquitoes	
Unit-5 Siphonaptera as Disease Vectors	6
Fleas as important insect vectors; Host-specificity, Study of Flea-borne diseases – Plague, Typhus fever; Control of fleas	
Unit-6 Siphunculata as Disease Vectors	4
Human louse (Head, Body and Pubic louse) as important insect vectors; Control of human louse	
Unit-7 Hemiptera as Disease Vectors	6
Bugs as insect vectors; Blood-sucking bugs; Chagas disease, Bed bugs as mechanical vectors, Control and prevention measures	

ZOOHGEC03P: Insect Vectors and Diseases Lab (Credits 2)

List of Practical

- Mounting and Study of different kinds of mouth parts of insects
- Spot identification of following insect vectors through permanent slides/photographs: *Aedes*, *Culex*, *Anopheles*, *Pediculus humanuscapitis*, *Pediculus humanuscorporis*, *Phthiruspubis*, *Xenopsylla cheopis*, *Cimex lectularius*, *Phlebotomus argentipes*, *Musca domestica*
- Study of different diseases transmitted by above insect vectors
- Submission of a project report on any one of the insect vectors and disease transmitted

Suggested Readings

- Anathakrishnan : Bio resources Ecology 3rdEdition
- Goldman : Limnology, 2ndEdition
- Odum and Barrett : Fundamentals of Ecology, 5thEdition
- Pawlowski : Physicochemical Methods for Water and Wastewater Treatment, 1stEdition

5. Trivedi and Goyal : Chemical and biological methods for water pollution studies
6. Welch : Limnology Vols. I-II
7. Wetzel : Limnology, 3rd edition

ZOOHGEC04T , Environment and Public Health

Theory (Credits 4)	Class
Unit 1: Introduction	
Sources of Environmental hazards, Hazard identification and accounting, Fate of toxic and persistent substances in the environment, Dose response evaluation, Exposure assessment	10
Unit 2: Climate Change	
Greenhouse gases and global warming, Acid rain, Ozone layer destruction, Effect of climate change on public health	10
Unit 3: Pollution	
Air, water, noise pollution sources and effects, Pollution control	5
Unit 4: Waste Management Technologies	
Sources of waste, types and characteristics, Sewage disposal and its management, Solid waste disposal, Biomedical waste handling and disposal, Nuclear waste handling and disposal, Waste from thermal power plants.	15
Unit 5: Diseases	
Causes, symptoms and control of tuberculosis, Asthma, Cholera, Minamata disease, typhoid, filariasis	10

Suggested Readings [Consult Latest Editions]

1. Cutter, S.L., Environmental Risk and Hazards, Prentice-Hall of India Pvt. Ltd., New Delhi, 1999.
2. Kolluru Rao, Bartell Steven, Pitblado R and Stricoff "Risk Assessment and Management Handbook", McGraw Hill Inc., New York, 1996.
3. Kofi Asante Duah "Risk Assessment in Environmental management", John Wiley and sons, Singapore, 1998.
4. Kasperson, J.X. and Kasperson, R.E. and Kasperson, R.E., Global Environmental Risks, V. N. University Press, New York, 2003.
5. Joseph F Louvar and B Diane Louver Health and Environmental Risk Analysis fundamentals with applications, Prentice Hall, New Jersey 1997.

ZOOHGEC03P: Environment and Public Health Lab (Credits 2)

1. To determine pH, Cl, SO₄, NO₃ in soil and water samples from different locations.