

WEST BENGAL STATE UNIVERSITY



REVISED SEM I, III & V

**SYLLABUS FOR THREE-YEAR DEGREE COURSE IN
ZOOLOGY (GENERAL) UNDER CHOICE BASED
CREDIT SYSTEM (CBCS) 2020-2021**

BSc General with Zoology (Credit values given within brackets)

Core Courses for Zoology (CC)

Core Course (CC)			
CC- 1A: Animal Diversity	CC- 1B: Human Physiology and Biochemistry	CC- 1C: Insect Vector and diseases	CC- 1D: Environment and Public Health

Choices for Discipline Specific Electives (DSE)

Discipline Specific Elective (DSE) Any Four (2) Course from 1 to 4			
Applied Zoology	Food Nutrition and Health	Aquatic Biology	Immunology

Choices for Skill Enhancement Courses (SEC)

Skill Enhancement Course-1 & Skill Enhancement Course-2, any two course from 4	
Aquarium Fish Keeping	Vermicompost

Sem	Core*	DSE	GE	AECC	SEC	Total credits
I	ZOOGCOR01T (4) ZOOGCOR01P (2) (Animal Diversity) CEMGCOR01T (4) CEMGCOR01P (2) BOTGCOR01T (4) BOTGCOR01P (2)			ENVSAEC01T (2)		20
II	ZOOGCOR02T (4) ZOOGCOR02P (2) (Human Physiology & Biochemistry) CEMGCOR02T (4) CEMGCOR02P (2) BOTGCOR02T (4) BOTGCOR02P (2)			ENGLAEC01T (2)		20
III	ZOOGCOR03T (4) ZOOGCOR03P (2) (Insect Vectors and Diseases) CEMGCOR03T (4) CEMGCOR03P (2) ZOOGCOR03T (4) ZOOGCOR03P (2)				ZOOSSEC01M (2) (Aquarium Fish Keeping) OR An SEC offered by any other department	20
IV	ZOOGCOR04T (4) ZOOGCOR03P (2) (Environment and Public Health) CEMGCOR04T (4) CEMGCOR04P (2)				ZOOSSEC02M (2) Vermicompost Production OR An SEC offered by any other department	20

	BOTGCOR04T (4) BOTGCOR04P (2)					
V		ZOOGDSE01T (4) ZOOGDSE01P (2) (Applied Zoology) OR ZOOGDSE02T (4) ZOOGDSE02P (2) (Food Nutrition and Health) ----- BOTGDSE01T (4) BOTGDSE01P (2) OR BOTGDSE02T (4) BOTGDSE02P (2) ----- CEMGDSE01T (4) CEMGDSE01P (2) OR CEMGDSE02T (4) CEMGDSE02P (2)			An SEC offered by any other department	20
VI		ZOOGDSE03T (4) ZOOGDSE03P (2) (Aquatic Biology) OR ZOOGDSE04T (4) ZOOGDSE04P (2) (Immunology) ----- BOTGDSE03T (4) BOTGDSE03P (2) OR BOTGDSE04T (4) BOTGDSE04P (2) ----- CEMGDSE03T (4) CEMGDSE03P (2) OR CEMGDSE04T (4) CEMGDSE04P (2)			An SEC offered by any other department	20
Total number of	12	6	0	2	4	120

Core Courses for Zoology (CC)

In view of the prevailing Covid pandemic situation the syllabus is reduced for the current Semester I, III & V 2020-2021 (strikethrough portions will be omitted till further notice)

ZOOGCOR01T: Animal Diversity SEMI	
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 Branchiostoma	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 the Vertebrates. 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.	

ZOOGCOR01P: Animal Diversity Lab (Credits 2)

1. Identification of the following specimens: (Photograph only)

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*,

Suggested Readings:

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

ZOOGCOR03T: Insect, Vectors and Diseases SEM III	
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	
ZOOGCOR03P: Insect Vectors and Diseases Lab (Credits 2) [either by Demonstration/slides/photographs, ppt. presentation where applicable] List of Practical 1. Mounting and Study of different kinds of mouth parts of insects 2. Spot identification of following insect vectors through permanent slides/photographs: <i>Aedes</i> , <i>Culex</i> , <i>Anopheles</i> , <i>Pediculus humanuscapitis</i> , <i>Pediculus humanuscorporis</i> , <i>Phthiruspubis</i> , <i>Xenopsylla cheopis</i> , <i>Cimex lectularius</i> , <i>Phlebotomus argentipes</i> , <i>Musca domestica</i> 3. Study of different diseases transmitted by above insect vectors 4. Submission of a project report on any one of the insect vectors and disease transmitted	
Suggested Readings 1. Anathakrishnan : Bio resources Ecology 3rdEdition 2. Goldman : Limnology, 2ndEdition 3. Odum and Barrett : Fundamentals of Ecology, 5thEdition 4. 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, 3rdedition 8. Bose, M. (2017). Parasitoses and Zoonoses, New Central Book Agency	

Discipline Specific Electives (DSE) SEM V

DSE 1 Credits: 6	
ZOOGDSE01T: Applied Zoology	
Theory (Credits 4)	Class
Unit-1 Introduction to Host-parasite Relationship	3
Host, Definitive host, Intermediate host, Parasitism, Symbiosis, Commensalism, Reservoir, Zoonosis	
Unit-2 Epidemiology of Diseases	7
Transmission, Prevention and control of diseases: Tuberculosis, Typhoid	
Unit-3 Rickettsia and Spirochetes	3
Brief account of <i>Rickettsia prowazekii</i> , <i>Borrelia recurrentis</i> and <i>Treponema pallidum</i> .	
Unit-4 Parasitic Protozoa	6
Life history and pathogenicity of <i>Entamoeba histolytica</i> , <i>Plasmodium vivax</i> and <i>Trypanosoma gambiense</i>	
Unit-5 Parasitic Helminthes	4
Life history and pathogenicity of <i>Ancylostoma duodenale</i> and <i>Wuchereria bancrofti</i>	
Unit-6 Insects of Economic Importance	8
Biology, Control and damage caused by <i>Helicoverpa armigera</i> , <i>Pyrrilla perpusilla</i> and <i>Papilio demoleus</i> , <i>Callosobruchus chinensis</i> , <i>Sitophilus oryzae</i> and <i>Tribolium castaneum</i>	
Unit-7 Insects of Medical Importance	8
Medical importance and control of <i>Pediculus humanus corporis</i> , <i>Anopheles</i> , <i>Culex</i> , <i>Aedes</i> , <i>Xenopsylla cheopis</i>	
Unit-8 Animal Husbandry	3
Preservation of semen and artificial insemination in cattle	
Unit-9 Poultry Farming	4
Principles of poultry breeding, Management of breeding stock and broilers, Processing and preservation of eggs	
Unit-10 Fish Technology	4
Genetic improvements in aquaculture industry; Induced breeding and transportation of fish seed	

Suggested Readings

1. Arora, D. R and Arora, B. (2001). *Medical Parasitology*. II Edition. CBS Publications and Distributors.
2. Atwal, A.S. (1986). *Agricultural Pests of India and South East Asia*, Kalyani Publishers.
3. Banerjee, G.C. Animal husbandry.
4. Chatterjee, K. D. (2009). *Parasitology: Protozoology and Helminthology*. XIII Edition, CBS Publishers & Distributors(P) Ltd
5. Dennis, H. (2009). *Agricultural Entomology*. Timber Press (OR).
6. Dunham R.A. (2004). *Aquaculture and Fisheries Biotechnology Genetic Approaches*. CABI publications, U.K.
7. Hafez, E. S. E. (1962). *Reproduction in Farm Animals*. Lea & Fabiger Publisher
8. Kumar and Corton. *Pathological Basis of Diseases*.
9. Paniker, C.K.J., Ghosh, S. [Ed] (2013). *Paniker's Text Book of Medical Parasitology*. Jaypee, New Delhi.
10. Parija, S.C. Text book of medical parasitology, protozoology & helminthology (Text and colour Atlas), II Edition, All India Publishers & Distributors, Medical Books Publishers, Chennai, Delhi
11. Park, K. (2007). *Preventive and Social Medicine*. XVI Edition. B.B Publishers.
12. Pedigo, L.P. (2002). *Entomology and Pest Management*, Prentice Hall.
14. Ratan Lal Ichhpujani and Rajesh Bhatia. *Medical Parasitology, III Edition*, Jaypee Brothers Medical Publishers(P) Ltd., New Delhi
15. Bose, M. (2017). *Parasitoses and Zoonoses*, New Central Book Agency
16. Chaudhuri, S. (2017). *Economic Zoology*, New Central Book Agency

ZOOGDSE01P: Applied Zoology, Lab (Credits 2) (Any 3) [either by Demonstration/slides/photographs, ppt. presentation, where applicable]

1. Study and Identification of *Plasmodium vivax*, *Entamoeba histolytica*, *Ancylostoma duodenale* and *Wuchereria bancrofti* and their life stages through permanent slides/photomicrographs or specimens.
2. Study and Identification of arthropod vectors associated with human diseases: *Pediculus*, *Culex*, *Anopheles*, *Aedes* and *Xenopsylla*.
3. Study and Identification of insect damage to different plant parts/stored grains through damaged products/photographs.
4. Identifying features and economic importance of *Nilaparvata lugens*, *Apion corchori*, *Scirpophaga incertulus*, *Callosobruchus chinensis*, *Sitophilus oryzae* and *Tribolium castaneum*
5. Visit to poultry farm/ animal breeding centre/ vector biology/ parasitology Centre. Submission of visit report
6. Maintenance of freshwater aquarium.

DSE 2 Credits: 6

ZOOGDSE02T: Food, Nutrition and Health

Theory (Credits 4)	Class
Unit 1: Basic concept of food and nutrition	6
Food Components and food nutrients	
Concept of a balanced diet, nutrient needs and dietary pattern for various groups- adults, pregnant and lactating mothers, infants, school children, adolescents and elderly	
Unit 2: Nutritional Biochemistry	16
Carbohydrates, Lipids, Proteins- Definition, Classification, their dietary source and role Vitamins- Fat-soluble and Water-soluble vitamins- their dietary source and importance Minerals- Iron, calcium, phosphorus, iodine, selenium and zinc ; their biological functions (outline ideas)	
Unit 3: Health	14
Introduction to health- Definition, concept of health and disease Major nutritional Deficiency diseases- Protein Energy Malnutrition (kwashiorkor and marasmus), Vitamin A deficiency disorders, Iron deficiency disorders, Iodine deficiency disorders- their causes, symptoms, treatment, prevention and government programmes, if any. Life style related diseases- hypertension, diabetes mellitus, and obesity- their causes and prevention through dietary and lifestyle modifications Social health problems- smoking, alcoholism, drug dependence and Acquired Immuno Deficiency Syndrome (AIDS) - their causes, treatment and prevention Common ailments- cold, cough, and fevers, their causes and treatment	
Concepts of Nutrigenomics and health informatics	

Potable water- sources and methods of purification at domestic level

Food and Water borne infections: Bacterial infection: cholera, typhoid fever, dysentery; Viral infection: hepatitis, poliomyelitis, Protozoan infection: Amoebiasis, Giardiasis; Helminths infection: Taeniasis, Ascariasis; Vector borne diseases: Malaria and Dengue, their transmission, causative agent, sources of infection, symptoms and prevention

Brief account of food spoilage: Causes of food spoilage and their preventive measures

SUGGESTED READINGS

1. Mudambi, SR and Rajagopal, MV. Fundamentals of Foods, Nutrition and Diet Therapy; Fifth Ed; 2007; New Age International Publishers
2. Srilakshmi B. Nutrition Science; 2002; New Age International (P) Ltd.
3. Srilakshmi B. Food Science; Fourth Ed; 2007; New Age International (P) Ltd.
4. Swaminathan M. Handbook of Foods and Nutrition; Fifth Ed; 1986; BAPPCO.
5. Bamji MS, Rao NP, and Reddy V. Text Book of Human Nutrition; 2009; Oxford & IBH Publishing Co. Pvt Ltd.
6. Wardlaw GM, Hampl JS. Perspectives in Nutrition; Seventh Ed; 2007; McGraw Hill.
7. Lakra P, Singh MD. Textbook of Nutrition and Health; First Ed; 2008; Academic Excellence.
8. Manay MS, Shadaksharaswamy. Food-Facts and Principles; 1998; New Age International (P) Ltd.
9. Gibney et al. Public Health Nutrition; 2004; Blackwell Publishing

ZOOGDSE02P: Food Nutrition and Health, Lab (Credits 2) (Any 3)

[either by Demonstration/slides/photographs, ppt. presentation where applicable]

1 To detect adulteration in a) Ghee b) Sugars c) Tea leaves and d) Turmeric

2. Lactose and calcium estimation in food by titrimetry

3. Methylene Blue Reductase Test (MBRT) of milk. Gram staining of bacteria.

4. Study of the stored grain pests and mosquito vectors (Anopheles, Culex and Aedes) from slides/ photograph (Sitophilus oryzae, Trogoderma granarium, identification, habitat and food sources, damage caused and control. Preparation of temporary mounts of the above stored grain pests.

5. Project- Undertake computer aided diet analysis and Anthropometric nutritional assessment for different age groups.

OR

Identify nutrient rich sources of foods (fruits and vegetables), their seasonal availability and price

OR

Study of nutrition labelling on selected foods

