



**List of Courses Focus on Employability/ Entrepreneurship/  
Skill Development**

**Department : Zoology**

**Programme Name : B.Sc.**

**Academic Year : 2016-17**

**List of Courses Focus on Employability/ Entrepreneurship/Skill**

Sr. No.	Course Code	Name of the Course
1	ZOO-CC-Practical	Cell Biology
2	ZOO-CC-Practical	Biochemistry Lab
3	ZOO-CC-VI	Economic Zoology
4	ZOO-CC-Practical	Economic Zoology Lab Course
5	ZOO-CC-VII	Microbiology and Immunology
6	ZOO-CC-Practical	Microbiology and Immunology Lab Course

*Dr. V. K. Bhasara*

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Guru Ghasidas Vishwavidyalaya, Bilaspur



**Scheme and Syllabus**

Department of Zoology, GGV, Bilaspur (CG)

Approved Scheme of Examination, 2015-16  
**Integrated B.Sc. (Honors) Zoology**  
(Based on Choice Based Credit System, CBCS)

Semester I:

Course type	Course Code	Title of Course	Credits	Hrs/ Wk	Hrs/ Sem
Core Course (CC) Zoology (H)	ZOO-CC-I	Animal Diversity-I (Non-chordates)	2	2	
	ZOO-CC-II	Cell Biology	2	2	
	ZOO-CC- Practical	Lab Course (I + II)	2	4	
<b>Total Credits</b>			6		
CC Chemistry	CHEM-CC-I CHEM-CC-II Practical				
CC (Optional) Botany/ Biotech.	BOT/BT-CC-I BQT/ BT-CC-II Practical				
Foundation course/ Ability Enhancement Compulsory Course (AECC)	ZOO-AECC-I	English and Hindi			

Semester II:

Course type	Course Code	Title of Course	Credits	Hrs/ Wk	Hrs/ Sem
CC Zoology (H)	ZOO-CC-III	Animal Diversity-II (Hemichordates, Protochordates and Chordates)	2	2	
	ZOO-CC-IV	Fundamentals of Biochemistry	2	2	
	ZOO-CC- Practical	Lab Course (III+ IV)	2	4	
<b>Total Credits</b>			6		
CC Chemistry	CHEM-CC-III CHEM-CC-IV Practical				
CC (optional) Botany/ Biotech.	BOT/ BT-CC-III BOT/ BT-CC-IV Practical				
Foundation course/ Ability Enhancement Compulsory Course (AECC)	ZOO-AECC-II	English and Hindi			

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Semester III:

Course type	Course Code	Title of Course	Credits	Hrs/ Wk	Hrs/ Sem
CC Zoology (II)	ZOO-CC-V	Genetics and Evolution	2	2	
	ZOO-CC-VI	Economic Zoology	2	2	
	ZOO-CC- Practical	Lab Course (V + VI)	2	4	
<i>Total Credits</i>			6		
CC Chemistry	CHEM-CC-III				
	CHEM-CC-IV				
	Practical				
CC (optional) Botany/ Biotech.	BOT/BT-CC-III				
	BOT/BT-CC-IV				
	Practical				
Foundation course/ Ability Enhancement Compulsory Course (AECC)	EVS-I	Environment Science- I/ DM			

Semester IV:

Course type	Course Code	Title of Course	Credits	Hrs/ Wk	Hrs/ Sem
CC Zoology (II)	ZOO-CC-VII	Microbiology and Immunology	2	2	
	ZOO-CC-VIII	Endocrinology and Developmental Biology	2	2	
	ZOO-CC- Practical	Lab Course (VII + VIII)	2	4	
<i>Total Credits</i>			6		
CC Chemistry	CHEM-CC-III				
	CHEM-CC-IV				
	Practical				
CC (optional) Botany/ Biotech.	BOT/BT-CC-III				
	BOT/BT-CC-IV				
	Practical				
Foundation course/ Ability Enhancement Compulsory Course (AECC)	EVS-II	Environment Science- I/ DM			

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B.Sc. (Hon's) Zoology SEMESTER I

ZOO-CC- Practical (Credits- 02)

Lab Course (I + II)

Animal Diversity (Non Chordates)

1. Study of transverse sections/chart of the following: *Sycon* (as an example of Parazoa to show its structure, spicules and canal system), *Hydra* (as an example of diploblastic animal), *Fasciola* (as an example of triploblastic acoelomate animal), *Ascaris* (as an example of triploblastic pseudocoelomate animal), *Hirudinaria* (as an example of triploblastic schizocoelomate animal).
2. Study of museum specimens/permanent slides of the following non-chordates with special emphasis on their adaptive characters: *Euglena*, *Plasmodium*, *Paramecium*, *Euplectella*, *Physalia*, *Corallium*, *Taenia*, *Ascaris* (male and female), *Nereis* (including hctronereid stage), *Hirudinaria*, *Bonellia*, *Chiton*, *Mytilus*, *Octopus*, *Limulus*, *Eupagurus*, *Saccidina*, *Asterias*, *Echinus*, *Holothuria*.
3. Study of external features of earthworm

Cell Biology

1. Drawing of ultrastructure of cell and different organelles (from photographs provided)
2. Familiarization with the student's light and dissecting microscope.
3. Permeability of plasma membrane- effect of isotonic and hypertonic solution.
4. Mitosis in onion root tips
5. Meiosis in grasshopper testis (from slides/photographs provided)

  
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B.Sc. (Hon's) Zoology SEMESTER II

ZOO- CC- Practical (Credits- 02)

Lab Course (III + IV)

Hemichordates, Protochordates and Chordates

1. Study of *Balanoglossus*, *Herdmania*, *Branchiostoma*, Sections of *Balanoglossus* through proboscis and branchiogenital regions, Sections of *Amphioxus* through pharyngeal, intestinal and caudal regions.
2. Study of *Scoliodon*, *Sphyrna*, *Pristis*, *Torpedo*, *Mystus*, *Heteropneustes*, *Labeo*, *Exocoetus*, *Echeneis*, *Anguilla*, *Hippocampus*, *Tetrodon*, *Anabas*.
3. Study of *Ichthyophis*, *Necturus*, *Bufo*, *Hyla*, *Alytes*, *Salamandra*
4. Study of *Chelone*, *Trionyx*, *Hemidactylus*, *Varamus*, *Uromastix*, *Chamaeleon*, *Ophirosaurus*, *Draco*, *Bungarus*, *Vipera*, *Naja*, *Hydrophis*
5. Study of *Sorex*, Bat (Insectivorous and Frugivorous), *Funambulus*
6. Keys for identification of poisonous and non-poisonous snakes
7. Study of types of beaks and claws in birds

Biochemistry

1. Action of salivary amylase under optimum conditions
2. Effect of pH, temperature and inhibitors on the action of salivary amylase
3. Ninhydrin test for  $\alpha$ -amino acids
4. Qualitative estimation of carbohydrate: Benedict's test for reducing sugars, Iodine test for starch
5. Qualitative estimation of lipid, determination of acid value of oil
6. Structural study of DNA and RNA through Models

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**B.Sc. (Hon's) Zoology SEMESTER - III**

**ZOO-CC-VI: ECONOMIC ZOOLOGY (Credits- 02)**

**Unit 1:** Introduction to Economic Zoology: Beneficial and harmful organisms; life cycle of Protozoan parasites: *Entamoeba histolytica*, *Leishmania donovani*, *Trypanosoma gambiense*, *Plasmodium*-pathogenesis, treatment and prevention. (5 hrs)

**Unit 2:** Life cycle of Parasitic Helminths: *Echinococcus granulosus*, *Schistosoma haematobium* and *Fuchereria bancrofti*, Ancylostoma- pathogenesis, treatment and prevention. (5 hrs)

**Unit 3:** *Aquaculture*: Fish culture, Fish by-products, Prawn culture, Pearl culture. (4 hrs)

**Unit 4:** *Sericulture*: Types of silk, Mulberry silk worm culture; Apiculture: Species of honey bees, Life history of honey bees, Bee products and their uses; Lac Culture: Lac insect and its life cycle, processing and uses of lac. (6 hrs)

**Unit 5: Animal husbandry and Poultry**

Introduction to common dairy animals, Techniques of dairy management; *Poultry*: Types of breeds, Rearing methods, Diseases and control measures. (4 hrs)

Books Recommended

1. Jabde: Text Book of Applied Zoology: Vermiculture, Apiculture, Sericulture, Lac culture, Agricultural Pests and their Control (2005, Vedams eBooks (P) Ltd. New Delhi)
2. Jadhav U. Aquaculture Technology and Environment. (2011, PHI Learning)
3. Mani: Insects, NBT, India, 2006
4. Shukla and Upadhyaya : Economic Zoology (Rastogi Publishers, 1999-2000)
5. Shrivastava: Test book of Applied Entomology, Vol. I & II (Kalyani Publishers, 1991)

  
  
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B.Sc. (Hon's) Zoology SEMESTER III

ZOO- CC- Practical (Credits- 02)

Lab Course (V + VI)

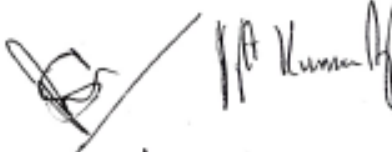
Genetics and Evolution

1. Application of probability in the law of segregation with the coin tossing
2. Frequency of following genetic trait in human: attached ear lobe, widow's peak, hairs type, dimple in chin, mid-digital hair, hypertrichosis, color blindness, PTC (phenyl thiocarbamide)
3. Study of mode of inheritance of the following traits by pedigree charts – attached ear lobe, widow's peak
4. Preparation of temporary slide of Barr body by own cheek epithelium or hair root.
5. Study of specimens and models relevant to theory paper.

Economic Zoology

1. Study of permanent slides of different larvae of insects.
2. Study of life cycle of silkworm through chart/specimens.
3. Study of life cycle of honey bee through chart/specimens
4. Study of life cycle of lac insect through chart.
5. Study of external morphology of honey bee
6. Study of sting apparatus of honey bee
7. Study of different types of antenna in insects.

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B.Sc. (Hon's) Zoology SEMESTER - IV

**ZOO-CC-VII: MICROBIOLOGY AND IMMUNOLOGY (Credits- 02)**

**Unit 1:** Microbiology: Introduction to microbes: Viruses, Bacteria and Eukaryotic microorganisms; classification of bacteria based on shape and size, nutrition and staining methods, beneficial and harmful interactions of microbes with human. **5 hrs**

**Unit 2: Viruses** – General structure, properties, classification and replication, lytic cycle, lysogeny. Virions, Prions, Virulence factor and toxins. **4 hrs**

**Unit 3:** Techniques in microbiology: media preparation, culture and growth of microorganisms, Applied microbiology: production of antibiotics, biopesticides, biopolymers; Dairy Microbiology; fermentation and fermentable microbes. **5 hrs**

**Unit 4:** Introduction to immunity; Innate and acquired immunity; Cells and organs of immune system: Types of immune cells, Primary and secondary lymphoid organs and lymphatic system. **4 hrs**

**Unit 5:** Humoral immunity: Antigen, Immunoglobulins (types, diversity), antigen antibody interaction, Cell mediated immunity: Structural organization of MHC complex, Antigen processing and presentation, Functions of T-cells.

**Book Recommended**

**Microbiology**

1. Madigan, Martinko and Parker: Brock Biology of Microorganisms (12<sup>th</sup> ed. 2009, Pearson/Benjamin Cummings).
2. Stanier, Ingraham, Wheelis and Painter: General Microbiology (5<sup>th</sup> ed. 2005, McMillan)
3. Tortora, Funke and Case: Microbiology: An introduction (2008)
4. Willey, Sherwood and Woolverton: Prescott, Harley and Klein's Microbiology (7<sup>th</sup> ed. 2008, McGraw Hill Higher Education)

**Immunology**

1. Acharya et al.: Immunology (2nd ed. 2011, Kalyani Publishers, Ludhiana, Punjab)
2. Abbas et al.: Cellular and Molecular Immunology (6th ed. 2007, Saunders Publication)
3. Janeway's Immunobiology (7th ed. 2008, Garland Science Publication)
4. Kubey et al.: Immunology (6th ed. 2007, W.H. Freeman and Company Publication, New York)
5. Roitt and Delvis: Roitt's Essential Immunology (6th ed. 2006, Blackwell Publication)

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B.Sc. (Hon's) Zoology SEMESTER IV

ZOO-CC- Practical (Credits- 02)

Lab Course (VI + VIII)

**Microbiology and Immunology**

1. Identification of gram positive and gram negative bacteria through temporary slides.
2. Study of bacterial growth curve.
3. Differential counting of blood immune cells.
4. Identification of Blood Group with Rh factor

**Endocrinology and Developmental Biology**

1. Study of histological slides of the following endocrine glands in rat: pituitary, thyroid, adrenal, endocrine pancreas, testis and ovary
2. Study of eggs and tadpoles of frog from collected/preserved material
3. Demonstration of chick embryonic development through model and chart
4. Window preparation of fertilized egg
5. Study of whole mount preparations of chick embryos of 16-18, 24-28, 33-36 and 42-48 hrs. of development

*D. K. ...*

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