

**Kalna College**  
**Department of Zoology**

**COURSE OUTCOMES (General paper)**

**ZOOG – Animal Diversity (CC-I)**

End of the course, students are able to understand:

**CO 01:** General characters and classification of Protozoa, Porifera, Cnidaria, Platyhelminthes, Nematoda, Annelida, Arthropoda, Mollusca, Echinodermata, Agnatha, Pisces, Amphibia, Reptiles, Aves and Mammals

**CO 02:** Locomotion in Protozoa, Canal system in Porifera, Polymorphism in Hydrozoa, Life history in *Taenia* and *Ascaris*, Nephridia in Annelida, Vision and metamorphosis in insects, Respiration in *Pila*, Water vascular system in *Asterias*

**CO 03:** Feeding in *Branchiostoma*, Osmoregulation in fishes, Metamorphosis in Toad, Poisonous and non-poisonous snakes, Biting mechanism in snakes, Flight adaptations in bird, Cranial nerves in *Cavia*

**ZOOG – Animal Diversity Practical (CC-I)**

End of the course, students are able to:

**CO 01:** Identify with significance of numerous specimen of Non-chordate and Chordate animals

**CO 02:** Study of the permanent slides of Transverse section of male and female *Ascaris*

**CO 03:** Identify with key for poisonous and non-poisonous snakes

**CO 04:** Prepare An “animal album” containing photographs, cut outs, with appropriate information

**ZOOG – Comparative Anatomy and Developmental Biology of Vertebrates (CC-II)**

End of the course, students are able to understand:

**CO 01:** Integument with glands and digital tips; Evolution of Visceral arches, Heart, Aortic arches Kidney and Urinogenital ducts; Alimentary canal and Digestive

glands; Brief account of Gills, Lungs, air sacs, swim bladder and auditory receptors; Comparative account of Brain; Classification of receptors

**CO 02:** Gamatogenesis, fertilization, early development of frog and chick, cleavage, fate maps, morphogenic movements, Neurulation in frog; Implantation of embryo in humans, formation and functions of Placenta; Placental type on the basis of histology; Metamorphic events of frog and its hormonal regulation

**CO 03:** Gene activation, determination, induction, differentiation, morphogenesis, intercellular communication, cell movements and cell death

### **ZOOG – Comparative Anatomy and Developmental Biology of Vertebrates Practical (CC-II)**

End of the course, students are able to:

**CO 01:** Identify limb bones and girdles of *Columba* and *Cavia*

**CO 02:** Identify skulls of *Cavia* and *Canis*.

**CO 03:** Study of developmental stages of frog by whole mounts and sections through permanent slides or photomicrographs

**CO 04:** Study of the different types of placenta- histological sections through permanent slides or photomicrographs.

**CO 05:** Examine sperm and ova of frog/rat through permanent slides or photomicrographs.

### **ZOOG – Physiology and Biochemistry (CC-III)**

End of the course, students are able to understand:

**CO 01:** Structure and Potential of neuron, origin of action potential and its propagation; Physiology of Digestion, Absorption of Carbohydrates, lipids, proteins; Ventilation, Respiratory volumes and capacities, Transport of O<sub>2</sub> and CO<sub>2</sub>; Nephron Structure, Urine formation, Counter-current Mechanism

**CO 02:** Homeostasis, Heart structure, cardiac impulse, cardiac cycle; Physiology of male and female reproduction, Hormonal control of spermatogenesis and menstrual cycle; Structure and function of Pituitary, thyroid, Pancreas and Adrenal

**CO 03:** Structure and Metabolism of Carbohydrates, Lipids and Proteins; Classification of Enzymes, Mechanism of action, Enzyme Inhibition and

## Regulation

### **ZOOG – Physiology and Biochemistry Practical (CC-III)**

End of the course, students are able to:

**CO 01:** Hand on preparation of hemin crystals

**CO 02:** Identify mammalian pituitary, thyroid, pancreas, adrenal gland, small intestine, liver, lung, kidney through permanent histological sections

**CO 03:** Identify functional groups of carbohydrates in given solutions: Glucose (Benedict's test), Sucrose (Iodine test) by Qualitative test

**CO 04:** Estimate total protein in given solutions by Lowry's method by Quantitative test

**CO 05:** Study activity of salivary amylase under optimum conditions

### **ZOOG – Genetics and Evolutionary Biology (CC-IV)**

End of the course, students are able to understand:

**CO 01:** Molecular Basis of genetic information, Chromosome Theory of Inheritance, Incomplete Dominance, co-dominance, Multiple and Lethal alleles; epistasis, Pleiotrophy, Types of Inheritance; Linkage and Crossing over; Gene Mapping; Types of Chromosomal and Gene mutations; Mechanisms of sex determination, Dosage compensation in humans

**CO 02:** Origin of life, Lamarkism, Darwinism, Neo-Darwinism; Types and Dating of Fossils; Evolution of Horse; Isolating Mechanisms, Types of Natural Selection, Artificial Selection; Biological Species Concept; Modes of speciation

**CO 03:** Macro-evolution, Mass-extinction, Role of extinction in evolution

### **ZOOG – Genetics and Evolutionary Biology Practical (CC-IV)**

End of the course, students are able to:

**CO 01:** Study Mendelian Inheritance and gene interactions using suitable examples. Verify the results using Chi-square test.

**CO 02:** Study Linkage, recombination, gene mapping using the data.

**CO 03:** Study Human Karyotypes; normal and abnormal conditions (Turner's, Down's and Klinefelter syndrome) from photographs.

**CO 04:** Demonstrate fossil evidences from plaster cast models / pictures

**CO 05:** Demonstrate homology and analogy from suitable specimens/ pictures

**CO 06:** Prepare a chart on phylogeny of horse with diagrams/ cut outs of limbs and teeth of horse ancestors

**CO 07:** Prepare a chart on Darwin's Finches with diagrams/ cut outs of beaks of different species

**CO 08:** Submit a report after visiting any Zoological Museum

### **ZOOG – Applied Zoology (DSE-I)**

End of the course, students are able to understand:

**CO 01:** Host-Parasitic Relationship, Epidemiology of Tuberculosis and Typhoid; Brief of *Rickettsia*, *Borrelia* and *Treponema*; Life history and Pathogenicity of *Entamoeba*, *Plasmodium*, *Trypanosoma*, *Ancylostoma* and *Wuchereria*

**CO 02:** Biology, control and damage of Insect pest; Medical importance and control of Insects; preservation of semen, Artificial Insemination in cattle

**CO 03:** Principles of Poultry Breeding, Management of Breeding stock and Broilers; Induced Breeding and Transportation of fish seed, Genetic improvements in aquaculture industry

### **ZOOG – Applied Zoology Practical (DSE-I)**

End of the course, students are able to:

**CO 01:** Study and Identify *Plasmodium vivax*, *Entamoeba histolytica*, *Ancylostoma duodenale* and *Wuchereria bancrofti* and their life stages through permanent slides/photomicrographs or specimens.

**CO 02:** Study and Identify arthropod vectors associated with human diseases: *Pediculus*, *Culex*, *Anopheles*, *Aedes* and *Xenopsylla*.

**CO 03:** Study and Identify insect damage to different plant parts/stored grains through damaged products/photographs.

**CO 04:** Identify features and economic importance of *Nilaparvata lugens*, *Apion corchori*, *Scirpophaga incertulus*, *Callosobruchus chinensis*, *Sitophilus oryzae* and *Tribolium castaneum*

**CO 05:** Submit a visit report on poultry farm/ animal breeding centre/ vector biology/ parasitology Centre.

**CO 06:** Demonstrate of maintenance of freshwater aquarium

### **ZOOG – Insect, Vectors and Diseases (DSE-II)**

End of the course, students are able to understand:

**CO 01:** Head, eyes, antennae, mouthparts of insects; Types of vectors and Host-vector Relationship, Host specificity; Study and Importance of Diperan, Siphonopteran, Siphunculatan, Hemipteran vectors;

**CO 02:** Study of Mosquito-borne and Flea-borne Diseases; Control of mosquitoes, louse and bugs

### **ZOOG – Insect, Vectors and Diseases Practical (DSE-II)**

End of the course, students are able to:

**CO 01:** Hand on mounting and study of different kinds of mouth parts of insects

**CO 02:** Identify the insect vectors through permanent slides/ photographs

**CO 03:** Demonstrate different diseases transmitted by insect vectors

**CO 04:** Submit a project report on any one of insect vectors and disease transmitted by them

### **ZOOG – Apiculture (SEC-I)**

End of the course, students are able to understand:

**CO 01:** Classification and biology of Honey Bees, Bee colony; Artificial Bee rearing, Bee Pasturage, Selection of Bee species, Bee Keeping Equipment, Methods of Honey extraction

**CO 02:** Bee Disease and enemies, control and Preventive measure; Apiculture Industry and uses; Modern Methods in artificial Beehives for cross pollination

### **ZOOG – Sericulture (SEC-III)**

End of the course, students are able to understand:

**CO 01:** Types, Distribution and races of Silkeorms, Life cycle of *Bombyx*, Structure of silk gland and silk; Rearing house, appliances and disinfectants of Silkworms; Rearing Technology, types of Mountages, spinning and harvesting of cocoons

**CO 02:** Control and prevention of Pest of Silkworm, Pathogenesis of silkworm diseases; Sericulture industries in different states, various sericulture centres

## **PROGRAMME OUTCOMES**

**PO-1:** Students will be able to identify the major groups of organisms with an emphasis on animals and be able to classify them within a phylogenetic framework. Students will be able to compare and contrast the characteristics of animals that differentiate them from other forms of life.

**PO-2:** Students will be able to use the evidence of comparative biology to explain how the theory of evolution offers the only scientific explanation for the unity and diversity of life on earth. They will be able to use specific examples to explicate how descent with modification has shaped animal morphology, physiology, life history, and behavior.

**PO-3:** Students will be able to explicate the ecological interconnectedness of life on earth by tracing energy and nutrient flows through the environment. They will be able to relate the physical features of the environment to the structure of populations, communities, and ecosystems.

**PO-4:** Students will be able to explain how organisms function at the level of the gene, genome, cell, tissue, organ and organ-system. Drawing upon this knowledge, they will be able to give specific examples of the physiological adaptations, development, reproduction and behavior of different forms of life.

**PO-5:** Students will be proficient to apply the scientific method to questions in the laboratory work of biology and also able to present scientific hypotheses and data both orally and in writing in the formats that are used by practicing scientists.

**PO-6:** There will be capable for different scopes in different areas like sericulture and apiculture department as demonstrator, care taker of the farm, trainer for others etc.

**PO-7:** Students will be also capable in the department of Fisheries as extension officer, care taker, induced breeders, management, marketing, aquaculture like breeding and rearing of ornamental fishes either local or exotic. In case of self employment apiculture, sericulture, fisheries and lac culture are the important areas are covered by zoology.

**PO-8:** Students gain through knowledge on environmental science in their Zoology course, may help to solve environment related problem in our society like Pollution which is a burning problem of modern days.

**PO-9:** Pathology laboratory needs technician for different analytical purposes and in forensic laboratory also need so, the zoology student may be treated as key persons.

**PO-10:** Beside these in higher studies in different curriculum the students of zoology may be engaged such departments are Zoological Survey of India, Archeology, Museum curator, wild life management, wild life documentation and photographer, food processing etc.