

**Mahatma Gandhi Vidyamandir's
Smt. Pushpatai Hiray Mahila Mahavidyalya, Malegaon, Dist. Nashik.
Department of Zoology**

B. Sc. Zoology

After successful completion of B.Sc. Zoology students will be able to achieve following knowledge:-

Program Outcomes: B. Sc. Zoology

1. Aware students about knowledge and skill in the fundamentals and systematics of animal kingdom.
2. Understand various physiological processes of animals from different phyla.
3. Information and skill of advanced biological techniques for experimental purpose.
4. Awareness about environment and its conservation processes, pollution control and its importance.
5. Gain knowledge of protection of vulnerable and endangered species
6. Information and skill of applied zoology including sericulture, apiculture, fisheries, vermiculture, agricultural pests and their control etc.
7. Gain knowledge of communicable and non-communicable diseases to improve personal and public health.

Program Specific Outcomes: B. Sc. Zoology

1. Acquire knowledge on the various aspects of life sciences, cell biology, genetics, taxonomy, physiology, applied zoology, general embryology and public health.
2. Understand good laboratory practices and safety, Carry out experimental techniques and methods of Physiology, Cell biology, Genetics, Applied Zoology, Biological techniques, Toxicology, Sericulture, Biochemistry, Microtomy.
3. Understand the applications of biological sciences in Biotechnology, Apiculture, Fisheries, Agriculture and vermiculture.
4. The students gained the knowledge to use modern sophisticated equipments and tools.

Programme Outcomes: FY B.Sc Zoology

The syllabus of Zoology for First year has been redesigned for Choice based Credit System (CBCS) to be implemented from 2019-2020.

Course Outcome

	SEMESTER I	SEMESTER II
CC	ZO-111 Animal Diversity I	ZO-121 Animal Diversity II
CC	ZO-112 Animal Ecology	ZO-122 Cell Biology
CC	ZO-113 Zoology Practical Paper	ZO-123 Zoology Practical Paper

ZO-111 Animal Diversity I & II

Learning outcomes for the course:

1. The student will be able to understand classify and identify the diversity of animals.
2. The student understands the importance of classification of animals and classifies them effectively using the six levels of classification.
3. The student knows his role in nature as a protector, preserver and promoter of life which he has achieved by learning, observing and understanding life

ZO-112 Animal Ecology

Learning outcomes for the course:

1. The learners will be able to identify and critically evaluate their own beliefs, values and actions in relation to professional and societal standards of ethics and its impact on ecosystem and biosphere due to the dynamics in population.
2. To understand anticipate, analyze and evaluate natural resource issues and act on a lifestyle that on serves nature.
3. The Learner understands and appreciates the diversity of ecosystems and applies beyond the syllabi to understand the local lifestyle and problems of the community.
4. The learner will be able to link the intricacies of food chains, food webs and link it with human life for its betterment and for non-exploitation of the biotic and abiotic components.

5. The working in nature to save environment will help development of leadership skills to promote betterment of environment

ZO-122 Cell Biology

Learning outcomes for Cell Biology

1. The learner will understand the importance of cell as a structural and functional unit of life.
2. The learner understands and compares between the prokaryotic and eukaryotic system and extrapolates the life to the aspect of development.
3. The dynamism of bio membranes indicates the dynamism of life. Its working mechanism and precision are responsible for our performance in life.
4. The cellular mechanisms and its functioning depends on endo-membranes and structures. They are best studied with microscopy.

Course Code: Z0113 and Z0123: Zoology Practical Paper

1. Gain knowledge to identify various animals based on morphological features.
2. Prepare the culture of Paramecium
3. Understand the principle and use of microscopes and micrometry.
4. List the various invertebrate and vertebrate animals in a given class.
5. Understand blood cells as differential and total count with normal range.
6. Gain Knowledge of eutrophication

Programme Outcomes: SY B.Sc Zoology

The syllabus of Zoology for Second year has been redesigned for Choice based Credit System (CBCS) to be implemented from 2020-2021.

Course Outcome

	SEMESTER I	SEMESTER II
CC	ZO - 231 Animal Diversity III	ZO - 241 Animal Diversity IV
CC	ZO - 232 Applied Zoology I	ZO - 242 Applied Zoology II
CC	ZO - 233 Zoology Practical Paper	ZO - 243 Zoology Practical Paper

ZO231 & ZO241_ Animal Diversity III & IV

Objectives –

1. To understand the origin and advancement of higher vertebrates (tetrapoda).
2. To understand general characters of different groups of higher vertebrates.
3. To classify vertebrates and to become able to understand the possible group of vertebrates observed in nature.
4. To understand different behaviours and adaptations in higher vertebrates
5. To understand affinities among different groups of higher vertebrates.

Learning Outcomes for the course -

1. The students will be able to understand, classify and identify the diversity of higher vertebrates.
2. The students will be able to understand the complexity of higher vertebrates
3. The students will be able to understand different life functions of higher vertebrates.
4. The students will be able to understand the linkage among different groups of higher vertebrates.
5. The student will become aware regarding his role and responsibility towards nature as a protector, to understand his role as a trustee and conservator of life which he has achieved by learning, observing and understanding life.

ZO 232 & ZO242 _ Applied Zoology I and II

Objectives :

1. To understand the basic life cycle of the honeybees, beekeeping tools and equipments.
2. To learn for managing beehives for honey production and pollination.
3. To understand the basic information about fishery, cultural and harvesting methods of fishes.
4. To understand fish preservation techniques.
5. To understand the biology, varieties of silkworms and the basic techniques of silk production and harvesting of cocoons.
6. To learn the different silkworm species and their host plants.
7. To study types of agricultural pests and Major insect pests of agricultural importance.
8. To study Pest control practices.

Learning Outcomes of the course:

1. The learner understands the basics about beekeeping tools, equipment, and managing beehives.
2. The learner understands the basic information about fishery, cultural and harvesting methods of fishes and fish preservation techniques.
3. The learner understands the biology, varieties of silkworms and the basic techniques of silk production.
4. The learner understands the types of agricultural pests, Major insect pests of agricultural importance and Pest control practices.

Course: ZY-233 & ZY243: Practicals in Zoology

1. Gain knowledge to identify various animals based on morphological features.
2. Observe the various tools, crafts and gears used in Apiary, Fishery, Sericulture and Pest control.
3. Identify the pests in agriculture and enemies in Apiary.
4. The student will be able to describe the morphology, habit and habitat. Systematic position and various systems in Scoliodon and Rat.
5. Explain the modifications and adaptations in animals
6. Explain the use of tools in Apiary, Sericulture and appliances in Pest control.
7. Describe External features and economic importance of freshwater and Marine water fishes and other aquaculture organisms.

Programme Outcomes: TY B.Sc Zoology

B. Sc. (Zoology). T. Y. B. Sc. (Zoology) Implemented from June, 2015

Course ZY 331: Animal Systematics & Diversity V

CO1: Outline the systematic position of *Pila globosa* and *Calotes versicolor*

CO2: The student will be able to label the organs and systems of *Pila globosa*. and *Calotes versicolor*

CO3: Describe the major features in the Phylum Protozoa, Porifera, Coelenterata and Hemichordata and the reason of their success in the ecosystem.

CO4: Explain the functional anatomy of *Pila globosa*. and *Calotes versicolor*

CO5: Illustrate the morphological peculiarities of Integument, Heart, Kidney and Brain of vertebrates

CO6: Categorize the Accessory respiratory organs in fish.

CO7: Classify the dentition in mammals.

CO7: Gain knowledge to justify the need of electric organs in fish.

Course ZY 332: Mammalian Histology

CO1: Knowledge of basic terms in histology.

CO2: The student will be able to Understands all four types of tissues.

CO3: Identify the histological structure and function of various organs.

CO4: Explain the location, structure and functions of various organs.

CO5: Illustrate the histology of endocrine glands.

CO6: Diagrammatically represent the various organs.

Course ZY – 333: Biological Chemistry

CO1: Knowledge of basic terms in biochemistry.

CO2: The student will be able to explain the structure, functions and reactions of the various biomolecules.

CO3: Correlate the changes in the levels of these biomolecules with the diseases in human

CO4: Calculate pH of buffer solution.

CO5: Attained the knowledge of macromolecule such as carbohydrates, protein and fat, their types and significance.

CO6: Described the enzymes, mechanism of enzyme action and factors affecting the enzyme activity

CO7: Understood the types and importance of vitamins.

Course ZY- 334 Environmental Biology & Toxicology

CO1: Understood and appreciate the environment and ecological services of life on earth..

- CO2: Describe the nature of ecosystem, productivity, food webs, energy flow,
CO3: Describe the resilience of ecosystem and ecosystem management.
CO4: Explain Biosphere, biomes and impact of climate on biomes.
CO5: Explain wildlife management in India and conservation of wildlife.
CO6: Explain the three necessary and sufficient conditions i.e. struggle for existence; variation; and inheritance.
CO7: Illustrate the toxic effects of chemicals in the environment on human and his livestock.
CO8: Imparted knowledge of habitat ecology, pollution and bioremediation of polluted environment.

Course ZY 335 Parasitology

- CO 1: Explain the basic biology and lifecycle of parasites including epidemiology, diagnosis and treatment.
CO2: Recognize morphological characteristics for identification of parasites and their developmental stages.
CO3: Explain animal associations and their types.
CO4: Discuss the life cycle and importance of major parasites.
CO5: Illustrate transmission routes of animal and zoonotic parasites
CO6: Analyze the medical and public health aspects of human parasitic infections.
CO7: Justify the control measures of arthropod vectors.
CO8: Understand the importance of hygiene with respect to epidemic diseases.

Course ZY - 336: Cell Biology

- CO1: Understood the structure of cells and cell organelles in relation to the functional aspects and understanding of the working principles and applications of microscopes
CO2: Described the composition of prokaryotic and eukaryotic cells.
CO3: Understood the structure and functions of chromosome; mitotic and meiotic cell divisions and their significance.
CO4: Describe the three primary components of the cell's cytoskeleton and how they affect cell shape, function, and movement.
CO5: Differentiate between rough and smooth endoplasmic reticulum both in structure and function. Structure and functions of plasma membrane, nucleus, Golgi complex, lysosomes.
CO6: Knowledge of cell transportation, gap and tight junctions.

Course ZY 341: Biological techniques

- CO1: Gain knowledge to prepare solutions of different concentrations
CO2: Learn various separation techniques.
CO3: Gain knowledge to describe the techniques used in haematology.

- C04: Learn the procedure of preparing permanent histological slides.
- C05: Student is able to illustrate the working of microscopes.
- C06: Student is able to analyse the dimensions of the biological samples.
- C07: Gain knowledge of PAS and Feulgen staining methods.

Course ZY- 342: Mammalian Physiology & Endocrinology

- C01: Knowledge of basic terms in physiology.
- C02: Understood about the composition of food and mechanism of digestion absorption and assimilation.
- C03: The student will be able to understand the physiological processes in mammals.
- C04: Explain the anatomy of various systems.
- C05: Illustrate the reproductive cycles with hormonal control.
- C06: Gain knowledge of working of kidney.

Course ZY 343 Genetics & Molecular biology

- C01: Described the genetic variation through linkage and crossing over, gene frequency, chromosomal aberrations and sex determination.
- C02: Understood the theories of classical genetics and blood group inheritance in man
- C03: Explain the concept of mutation.
- C04: Explain DNA structure.
- C05: Paraphrase the Central dogma of molecular biology. Understood the molecular structure of genetic materials and understood the mechanism of gene expression and regulation character formation.
- C06: Illustrate the mechanism of replication, transcription and translation.
- C07: Justify the post transcriptional and post translational modifications.

Course ZY 344: Organic Evolution:

- C01: Understood the theories of evolution and highlighted the role of evidences in support of evolution
- C02: Explain the theories of organic evolution. □ CO 3: Describe the concept of origin of life and theories of origin of life.
- C04: Describe evolution of man.
- C05: Illustrate the presence of organisms at various geological time scale.
- C06: Apply the knowledge in relevant experimentations.
- C07: Categorize different zoogeographical realms.
- C08: Compare animal distribution in different zoogeographical realms.
- C09: Described the evolutionary knowledge through the concepts of coloration and mimicry.

Course ZY – 345: General Embryology

- CO1: Explain the principles and process of fertilization and cleavage.
- CO2: Prepare the flow chart of gametogenesis process.
- CO3: Identify the developmental stages
- CO4: Understood the process of development of animals.
- CO5: Describe the process of gametogenesis.
- CO6: Understood the process of organogenesis of selected organs, development of extra embryonic membrane and the nature and physiology of placenta.
- CO7: Explain the theories of preformation, and concepts like growth, differentiation and reproduction.

Course ZY 347 Practical Paper I

- CO1: Identify the organs by studying the histological slides.
- CO2: Identify hormonal disorders using pictures.
- CO3: Use techniques like chromatography, spectrophotometry in biological experiments.
- CO4: Explain the anatomical features of brain, heart of vertebrates.
- CO5: Demonstrate the importance of modifications in animal for their survival.
- CO6: Demonstrate the structure of tissues by making temporary slides.
- CO7: Demonstrate haemin crystals and effect of osmolarities on RBCs.
- CO8: Sketch and label the various systems and organs of Pila, Balanoglossus and Calotes.
- CO9: Prepare blood smear and identify the various cells.
- CO10: Draw exact figures of structures/organism using camera lucida.
- CO11: Measure the cell/organism dimensions (Micrometry).
- CO12: Process animal tissues and prepare permanent histological slides.
- CO14: Count total leucocytes from blood samples.
- CO15: Estimate blood glucose level.

Course ZY 348 Practical Paper II

- CO1: Identify the fossil types/ adaptations in animals.
- CO2: Explain the stages of human evolution.
- CO3: Demonstrate the effect of physical and chemical factors on enzyme activity.
- CO4: Explain the evidences of evolution
- CO5: Demonstrate physical and chemical properties of water and soil samples.
- CO6: Illustrate the application of Hardy –Weinberg law
- CO7: Detect given carbohydrates using biochemical tests.
- CO8: Measure the pH of given samples.
- CO9: Isolate protein from milk.
- CO10: Prepare acid and base solutions and titrate them.
- CO11: Collect and identify freshwater planktons.
- CO12: Determine LD50 and LC50.

CO13: Prepare temporary mounting of Polytene chromosome.

CO14: Prepare paper model of DNA.

CO15: Record zoogeographical distribution of animals.

Course ZY 349 Practical Paper III

CO1: Identify the life cycle stages of few parasites.

CO2: Identify and explain the types of eggs, blastulae and gastrulae

CO3: Identify the age of chick embryo.

CO4: Identify the phases of cell division.

CO5: List the household Pest and social insects.

CO6: Explain the pathogenicity and morphology of few ectoparasites.

CO7: Explain the diseases spread by vectors.

CO8 : Explain the effects of household insects on human health.

CO9: Demonstrate rectal parasites in cockroach

CO10: Prepare temporary slide of chick embryo to identify the stage and age.

CO11: Justify the effect of colchicine on cell division

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