

Bachelor of Science

PSYCHOLOGY, BOTANY & ZOOLOGY (PBZ)

Programme Outcome

After completion of B.Sc. program in either Physical Sciences or Life Sciences the student will be able to:

- PO1. Understand the basic concepts of science, its relevance to society and impact on the human race and environment.
- PO2. Effectively communicate scientific ideas through electronic media, report writing and publication of articles.
- PO3. Display the spirit of team work and collaboration towards building healthy inter personal relationships.
- PO4. Demonstrate the ability for critical thinking and logical reasoning towards scientific research.
- PO5. Exhibit self-confidence, high self-esteem and a sense of pride for themselves and the nation.
- PO6. Acquire the ability to engage in self-learning and lifelong learning towards building resilience in the dynamic macro environment.
- PO7. Recognize the ethical, cross-cultural and historical context of environmental issues and the links between human and natural systems.
- PO8. Identify specific issues concerning the nation, critically evaluate and find solutions through application of knowledge of science.

Programme Specific Outcome

On Successful completion of PBZ, students will be able to:

- PSO1. Understand various psychological disorders, myths and misconceptions and models of abnormality with various treatment procedures.
- PSO2. Determine the cognitive, psychological, social, cultural, motor, language and emotional development in all stages of life.
- PSO3. Analyze the relationship between plants, animals and microbes towards conservation of the biosphere.
- PSO4. Design and develop solutions from medicinal plants for various health problems, disorders and diseases prevailing in the society.
- PSO5. Understand the importance of applied Zoology in various fields such as Sericulture, Apiculture, Aquaculture, Vermiculture, Industrial microbiology & Zoology, rDNA technology and medicine.

Course Outcome

On Successful completion of PBZ, students will be able to:

Semester I

Psychology

Basic Psychological Processes Paper 1

- CO1.1: Comprehend the major perspectives and concepts of Psychology.
- CO1.2: Apply the concepts and perspectives for a better understanding one's own and others' behaviours and mental processes.
- CO1.3: Conduct scientific inquiry and bridge the gap between theory and practice through experiments.
- CO1.4: Grasp the neurological and physiological processes involved in learning and retention.

Practicals

- CO1: Apply various intelligence tests in clinical settings.
- CO2: Understand the practical applications of memory tests.
- CO3: Develop the skills of observation and scientific reporting.

BOTANY

BOT.T1-1

- CO1.1 Enumeration of the microbial world.
- CO1.2 Provide insight on plants-microbes interaction.
- CO1.3 Thorough knowledge on the diversity of morphology and reproduction of few selected forms of Viruses, Bacteria, Cyanobacteria and Phycology.
- CO1.4 Elucidate the importance of Bacteria, Cyanobacteria and algae in the field of industries, agriculture and medicines.
- CO1.5 Inculcating a complete knowledge on microbes and algae towards sustainability.

Practicals

BOT.P1-1

- Handling Microscope.
- Principle, working and applications of instruments viz, Autoclave, Incubator, Inoculation loop, LAF and Hot air oven.
- Identification and staining technique of Bacteria, Cyanobacteria and Algae.
- Submission of a report based on visit to a neighbouring waterbody and study of phytoplanktons in the water sample.

ZOOLOGY

ZOO.T1-1

- CO1.1: This unit helps to understand evolution of animals at various levels. This knowledge finds applications in evolutionary biology, paleontology, phylogeny and so on.
- CO1.2: Origin and evolution of single celled organism paving path to understand physiology, reproduction and other physiological functions at unicellular level.
- CO1.3: This unit will enable students to understand the cellular grade of organization, which is crucial to understand cell-cell interactions, evolution of higher organisms.
- CO1.4: Applications in phylogenetic studies
- CO1.5: Origin and evolution of tissue grade of animals. This unit also deals with importance of coral and coral reef which is world's amazing natural phenomenon. Coral reefs as habitat for array of other organisms creating a biodiversity in itself and a need for protection of coral reefs.

Practicals

ZOO.P1-1

- Learn how to use and handle microscopes – both simple and compound microscopes.
- Study of bottled specimens and permanent slides bridges the gap between the theoretical and real-time knowledge.
- Knowledge of parasites, their life history and their prophylaxis equip the students to quickly identify similar infections and diseases wherein timely intervention could improve the health of the individual.

Semester II

Psychology

Basic Psychological Processes Paper 2

CO2.1: Enhance critical and creative thinking skills.

CO2.2: Dispel myths and misconceptions about a host of important everyday behavioral concepts.

CO2.3: Communicate with self and others empathetically.

CO2.4: Develop into a Whole Person by integrating the physical, emotional, Spiritual, social and psychological aspects of one's personality.

Practicals

CO1: Grasp concepts like reasoning, brain dominance, illusion and Suggestibility practically.

CO2: Identify various personality types through experiments.

CO3: Develop the skills of observation and scientific reporting.

BOTANY

BOT.T2-2

CO2.1 Determining the scope, variation in structure, reproduction and application of fungi.

CO2.2 Know the prevention and control measures of plant diseases and its effect on crop plants.

CO2.3 Understand the morphology, reproduction, life cycle and importance of Bryophytes.

CO2.4 Familiarizing with the internal structure of vascular plants.

CO2.5 Application of wood in various industries.

Practicals

BOT.P2-2

- Free hand Sectioning and learning of the internal anatomy of plant parts.

- Identification of Fungi, Plant Diseases and Bryophytes.
- Preparing herbaria for plant pathology specimens.
- Report submission on Mushroom cultivation.

ZOOLOGY

ZOO.T2 – 2

- CO2.1: This unit deals with unique characters along with general characters which signifies phylum Arthropoda as one of the most successful phyla existing from billions of years. Type study of prawn, respiratory organs, sense organs of Arthropoda will reinforce the evolution of organs which are precursor for other next level of organization among animals.
- CO2.2: As soft bodied organism with external exoskeleton, which phylum is unique in its own way, which has enormous economical benefits employed in aquaculture.
- CO2.3: Echinoderms are unique, spectacular and exclusively marine animals. Students understand survival strategies of these creatures in oceans.
- CO2.4: Phylogenetic applications.
- CO2.5: All the topics in this unit deals with imparting basic theoretical knowledge to students which shall help them to pursue their interest in future (M.Sc. sericulture, M.Sc. Fisheries so on) and also become entrepreneurs.
- CO2.6: Importance of animals from minor phyla in maintaining ecosystems, ecological balance, biodiversity

Practicals

ZOO.P2-2

- Students learn to observe and identify different animals based on the museum specimens and permanent slides provided.
- Knowledge on insect vectors help in the mitigation and management of insect pest.
- They learn the skill of doing minor dissections which later aids them in the research field.

Semester III

Psychology

Developmental Psychology Paper 3

- CO3.1: Evaluate the effectiveness of theories in terms of their practical applications in parenting and teaching.

CO3.2: Analyse the interdependence of the cognitive, psychosocial, and physical domains of development.

CO3.3: Comprehend major developmental milestones for children from conception through childhood using research methods.

CO3.4: Understand the different stages of childhood with different facets of development.

Practicals

CO1: Understand the various approaches to learning.

CO2: Identify issues that students face in their personal and academic life.

CO3: improve their self-concept by understanding themselves.

CO4: Develop the skills of observation and scientific reporting.

BOTANY

BOT.T3-3

CO3.1 Equipped with the knowledge of first evolved vascular plants and to understand the structural and reproductive diversities.

CO3.2 Identification of new traits to differentiate Pteridophytes and Gymnosperms.

CO3.3 Knowledge of ecological, edaphic and biotic factors regulating different ecosystems and their components.

CO3.4 Elucidate the importance of biodiversity and its conservation, and geographical distribution of plants in India and Karnataka.

Practicals

BOT.P3-3

- Identification of Tracheophytes.
- Estimation of Chloride and Oxygen content in water.
- Enumerate various parameters of Edaphic Factor.
- Identifying plants with ecological adaptations.

- Report submission on case study/ survey with reference to topics related environment.

ZOOLOGY

ZOO.T3-3

- CO3.1- Identify and summarize the morphological and anatomical features and basis of chordate classification. Know how to examine and describe representative species for chordate subphyla; such as Cephalochordata, Urochordata, Hemichordata, and Vertebrata. The course gives a clear idea about the evolution of anatomical and organo-systems of Amphioxus features of the different classes of chordates especially vertebrate animals including fishes and tetrapods that are the matter of study in this course. Compare between specific characters of chordates classes using their representative examples.
- CO3.2- This unit helps understand the evolution of fishes at various level and also about different system in scoliodon.
- CO3.3- This unit helps to know how amphibians play important role in nature both as predator and prey. At the end of the lesson, the students will be able to define Parental Care, explain parental Care in Amphibians, list the different modes of Parental Care in amphibians and elucidate how they protect their eggs and young ones
- CO3.4- Adaptive radiations of reptiles helps to know the existence of a suite closely related species adapted to exploit different habitats or life style Adaptive features of crocodile and turtles has special focus on how the structure has adapted in response to the functional requirements of the different habits and habitats
- CO3.5- Migration helps in finding the geographical location of birds in adverse condition. understanding flight adaptation inspires the students to come up with new models for more sustainable and efficient air craft.
- CO3.6- Migration has considerable ecological significance, the findings of these study emphasize the importance of trans –frontier areas in conservation of the greater land scape
- CO3.7 - This unit helps to know the process in different industries such as poultry, pisciculture and dairy. This unit help students in understanding of experiential learning on the methodology of fish culture, poultry and dairy. It will also provide information about economic aspects of culturing animals. It would promote Community and Youth Development.
- CO3.8 - It helps to improve practical knowledge about handling experimental animals, which motivates students for research.

Practicals

ZOO.P3-3

- The students understand the biological significance of the prepared slides and bottle specimens.

- Study of Dissections of various systems of shark and rat are crucial in understanding the basic models of research.

Semester IV

Psychology

Developmental Psychology Paper 4

CO4.1: Understand the various causes or reasons for disturbances in the developmental process.

CO4.2: Understand the shift in the family dynamics, vocation and relationships from generation to generation.

CO4.3: Examine key principles of aging including factors associated with successful aging.

CO4.4: Identify mental, physical, social and spiritual aspects of grief responses and help in the grieving process.

Practicals

CO1: Administer peer pressure and emotional maturity scale to adolescents for an understanding of their adjustment to their environment and their emotional growth.

CO2: Understand the mental and physical health of individuals in the later stages of life through administering of inventories.

CO3: Develop the skills of observation and scientific reporting.

BOTANY

BOT.T4-4

CO4.1 Knowledge on development and organization of reproductive organs in angiosperms.

CO4.2 Enumeration of pollen morphology, identification, classification and its application.

CO4.3 Understanding the process of inter-relationship of anther and ovule with respect to fertilization and post fertilisation changes.

CO4.4 Familiarise with physiological process of water and nutrient transport.

CO4.5 Understanding of stress physiology in plants with reference to selected physical factors.

Practicals

BOT.P4-4

- Identification of various stages of development in anther and ovule.
- Understanding the plant vascular tissues water relations.
- Learn the importance of mineral nutrients in the growth of plants.
- Preparation and submission of permanent slides from pollen grains and section of ovules.

ZOOLOGY

ZOO.T4-4

CO4.1 - The unique features of humans helps to know why humans are different from other animals. it is a practical oriented subject and interesting in knowing about their own system. It helps in clearing the fundamental concepts as to how our bodies function. Studying different body system helps to know their vital role in physiology and it is foundation for their higher studies. Studying nervous system helps to know about the neurons and their function.

CO4.2 - This unit illustrate the structural and fundamental unit of living organisms, studying giant chromosomes helps to study function of genes in transcription. Cell to cell Interaction puts a foundation to understand immune system. Biology of cancer describes the fundamental mechanistic principles behind cancer diagnosis and prevention.

CO4.3 - This unit able to identify the cellular and molecular basis of immune responsiveness and describe the role of the immune system in both maintaining health and contributing to disease. The antigen and antibody reaction helps to know about blood transfusion and also about drugs and vaccine

CO4.4- This unit helps to identify the basic structure of cells, tissues and organs and describe their contribution to normal function and also helps in identifying pathological condition of tissues. Studying histological techniques helps them to take tissue sections and slide preparations in their higher studies

Practicals

ZOO.P4-4

- Students learn the comparative structures of heart, brain, skin and integument which gives them a clear view on the function and origin of organs.
- They learn to prepare whole mounts, permanent slides and other laboratory preparation which increases their practical skill component in handling various cells and tissues.

Semester V

Psychology

Abnormal Psychology Paper 5

CO5.1: Acquire an understanding of historical development of abnormal behaviour

CO5.2: Comprehend the classification of psychological disorders.

CO5.3: Understand assessment, symptoms, and treatments of the major psychological disorders.

CO5.4: Acquire understanding of abnormal behaviour patterns and thereby learn to distinguish abnormal behaviour from normal.

Practicals

CO1: Use various tests for diagnostic and counselling purpose.

CO2: Administer, analyse and create a report.

Industrial Psychology Paper 6

CO6.1: Apply psychological principles and improve the productivity, satisfaction, safety, health and well-being of those within the workplace environment.

CO6.2: Gain understanding on the nuances of selection and placement process.

CO6.3: Understand how employee morale is akin to affective climate of an organization

CO6.4: Understand how our thoughts, beliefs, and perceptions influence how we buy and relate to goods and services.

Practicals

CO1: Recognise different abilities using psychometric tests.

CO2: Assess career interest in adolescents.

BOTANY

BOT.T5-5

CO5.1 Study different types of classification to understand the evolution.

CO5.2 Understanding the functionality of various Herbaria and Botanical gardens.

CO5.3 Acquire knowledge on taxonomic study through molecular, numerical and chemical evidences.

CO5.4 Identification of selected families of Polypetalae, Gamopetalae, Monochlamydeae and Monocotyledons based on Bentham and Hookers system of classification.

CO5.5 Correlating the diversity and richness of the flowering plants of the country with their economic importance.

BOT.T6-6

CO6.1 Deep understanding of the process of Nitrogen metabolism, Photosynthesis and Respiration in plants.

CO6.2 Comprehend the assimilation of different biochemicals.

CO6.3 Knowledge on plant growth and applications of Phytohormones.

CO6.4 Understand the process of defence mechanism displayed in Plants.

CO6.5 Knowledge on Sensory photobiology and Movements exhibited by plants.

Practicals

BOT.P5-5

- Students learn Herbarium techniques and assign flowering plants to family level.
- Economic importance of plants and various parts modified as food storage organs in plants.
- Submission of herbarium sheets of angiosperms and Economic Botany Chart.

BOT.P6-6

- Identification and estimation of different phytochemicals from plant sources.
- Determination of various by-products evolved during different metabolic activities of plants.
- Separation of photosynthetic pigments using Paper chromatography.
- Submission of Mini Project report.

ZOOLOGY

ZOO.T5-5

CO5.1- The students develop a clear understanding on the working principles and fundamentals of ecology which makes them sensitive to their immediate environment in which they live. It also gives a bird's view on the current environmental issues like global warming, green house effect, Acid rain and Global ozone layer depletion wherein the cause, effects and mitigation are discussed which equips the students to solve the real-time issues on an individual level. The unit also enlightens students on aquaponics which nurtures them to be entrepreneurs.

CO5.2- The students demonstrate an understanding of the core concepts of toxicology, identify different types of toxins, compare how wide spread they are and discuss perceptions of

their effects including hazard identification, and an understanding of the mechanisms of action and effects of toxic chemicals at multiple levels of biological organization. Demonstrate critical thinking skills including creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information. The students can analyze and identify simple domestic and agricultural pest problems and formulate ethical solutions using the principles of IPM. Students understand the new and renewable source of energy available in nature and develop innovative ideas on using cost-effective, sustainable and clean energy to overcome the energy crisis and improve the economic development of the country. Students learn about solid waste management, disposal and recovery and can apply the knowledge to reduce carbon footprint on an individual level. The students can identify different species of wildlife and are sensitized to the need of conserving them and are aware of human wildlife conflict and how to mitigate it. Students develop knowledge on remote sensing, different types of satellite and sensors, GIS and apply the concept to solve issues in forestry department, resource management, urban planning and many more.

CO5.3: Students grasp knowledge on instinct and acquired behavior of animals, their social and migratory behavior which helps them to identify, interpret and resolve adaptive problems in behavioral ecology. Helps students to understand human behavior and learn better survival strategies. Understanding of biological and circadian rhythms equip students to understand and improve the efficiency of their body physiology. Knowledge of various types of animal communication can inspire the students to come up with creative ideas to develop new methods of communication. The unit sparks the student's interest to pursue higher studies and research in the field of wildlife and forestry, animal studies and many more.

ZOO.T5-6

CO6.1: This unit will give the knowledge about basic topics of developmental biology, like development and formation of male and female gametes, different types of eggs and egg membrane. Students also learn about different patterns of development and mechanisms of fertilization. These basic knowledge's help the students in their higher studies. Students can confidently take this paper as specialization.

CO6.2: The unit II is continuation of unit I, student will get detailed knowledge about early development of organisms. This unit deals with blastulation, gastrulation and neurulation, types of placenta, transplantation experiment. This gives detailed knowledge to the students about development after fertilization. This also tells about how development differ from one organism to other, this basic learning about development make the students curious and they may show interest towards further detailed study through research. Therefore these studies may create more research interest in students.

CO6.3: This unit is very interesting to students because this deals with evolution of organism including man and origin of new species. Learning about Darwinism creates excitement in student to know more about evolution, origin of new species and evidences of evolution. This basic knowledge will help the student while taking up competitive exams in life

science. All together this makes the student more fascinated towards research on evolution.

Practicals

ZOO.P5-5

- Students learn to examine and estimate various limnological parameters like BOD, Salinity, DOM, pH and total hardness.
- They learn on various unique ecological adaptations of animals which generate ideas on creating bio mimicking products.
- They also learn statistics which is helpful in understanding and interpreting data.

ZOO.P5-6

- Students understand the embryological aspects of animal development which enable them for further thought synthesis of the topic.
- They also learn about evolution through specimen evidences and connecting links.

Semester VI

Psychology

Abnormal Psychology

CO7.1: Pursue higher education and build a career in Clinical Psychology.

CO7.2: Identify and Apply the various techniques of therapies.

CO7.3: Understand the diagnosis and treatment of psychological disorders and be an advocate for mental health care services.

CO7.4: Enhance personal and social interactions by using the knowledge of major theories of abnormal behaviour.

Practicals

CO1: Use various tests for diagnostic and counselling purpose.

CO2: Administer, analyse and create a report.

Industrial Psychology

CO8.1: Connect the basic principles of I/O psychology to personnel and human resources management within the organization.

CO8.2: Analyse an individual's performance by administering different performance appraisal tools.

CO8.3: Understand the role of training in bridging the gap between the skills of an employee and job requirements.

CO8.4: Learn about communication skills and why it is the foundation for success as a member of a team and as a leader.

Practicals

CO1: Understand how an effective team improves work culture.

CO2: Differentiate between verbal and non-verbal intelligence tests.

BOTANY

BOT.T7-7

CO7.1 Understanding the Chromosomal Biology and significance of Cell division.

CO7.2 Familiarising Plant Genetics and Sex determination.

CO7.3 Gaining knowledge on plant breeding and its importance in Polyploidy.

CO7.4 Evolutionary concepts and its significance in achieving plant hybrids.

BOT.T8-8

CO8.1 Understanding about the genomic organization and DNA replication.

CO8.2 Learning the steps involved in Biosynthesis of proteins and their regulation in Prokaryotic and Eukaryotic cells.

CO8.3 Elucidate the fundamentals of Recombinant DNA Technology.

CO8.4 Knowledge on Genetic Engineering and its significance.

CO8.5 Principles and basic protocols for Plant Tissue Culture.

CO8.6 Applications of Biotechnology in Plant and Human welfare.

Practicals

BOT.P7-7

- Preparation and Identification of different stages of cell divisions.

- Solving Genetic Problems to understand the factors governing the alleles.
- Learning various vegetative plant propagation techniques.
- Submission of prepared permanent slides of different stages of cell divisions.

BOT.P8-8

- Estimation of RNA.
- Extraction of DNA from plant sample.
- Micropropagation.
- Submission of a Report on Industrial visit.

ZOOLOGY

ZOO.T6-7

CO7.1 - Topics in this unit help students to have a strong fundamental knowledge of inheritance of genes. Advanced topics namely epigenetics, role of RNA in inheritance and gene silencing help to understand gene regulation. Its applications are in the field of drug designing, plant and animal biotechnology.

CO7.2 - This unit deals with causes for various syndromes, gene mutations which are responsible for onset of diseases, cancer etc. Knowledge about mutation is important for gene therapy. In pharmaceutical industry to develop drugs to counteract the effects of mutations and also nutraceutical industry, Research & Development of new drug target molecules for cancer treatment,

CO7.3 - This unit deals with basic knowledge of genetic engineering which has enormous potential in various fields. Some of the applications of the same are - gene therapy, animal improvement, fermentation industry/ breweries, bio-engineering, forensic sciences, fingerprinting technique for hybrid plant for better yield.

ZOO.T7-8

CO8.1 - Study of Animal Physiology helps in understanding the physiological functions of the human organs and disorders, diagnosis and preventive measures associated with it. Muscle physiology is one of the important aspects in the field of physiotherapy, sports. To understand about neurotransmitter, their role in aging neurological disorders, like stress, epilepsy, Alzheimer's and their diagnosis. To enhance the knowledge in the topics in pharmaceutical fields, Diagnostic centers, Hospitals etc

CO8.2- It provides basic knowledge of the endocrine system, its functions and how homeostasis is maintained. To understand role of endocrine hormones, their role in controlling mood, growth, the way organ works, metabolism and reproduction especially in adolescence.

CO8.3- To provide students with a broad conceptual background of biological sciences. To demonstrate a thorough understanding of important principles and laboratory techniques, in at least two different biological sub disciplines-(a)Cellular and molecular biology (b)Organism biology and physiology To have a general understanding of the standard laboratory tools. Methodology and process of biological research and scientific writing. To gain the knowledge about the assays and analyzing data in different fields of biology.

Practicals

ZOO.P6-7

- Students learn drosophila genetics which paves way in analyzing and correlating higher studies on genomics in research field.
- They also learn to perform many experiments on genetics and biotechnology which furthers their interest and expertise in the field.
- Students present Investigatory Research paper which inculcates research interest and identify new, frontier areas in the field of research and development.
- This unique initiative has helped students to hone their soft skills (presentation, analytical)

ZOO.P6-8

- By performing physiological experiments, students understand and analyse the principles which governs the system physiology of organisms.
- Students develop hands-on skills while performing various techniques.