VIVEKANANDA GOVERNMENT DEGREE COLLEGE,
VIDYANAGAR, HYDERABAD

(Affiliated to Osmania University)

Accredited by NAAC with "B" Grade ISO 9001:2015

Life Sciences

Programme Outcomes
Programme Specific Outcomes
Course Outcomes

Department of Botany
Department of Zoology

PROGRAMME	PROGRAMME OUTCOMES(PO)
B.Sc. (Life Sciences)	• **PO1:** Acquire knowledge in Life Sciences with a thrust on fundamental principles and theories related to various scientific phenomena and their relevance in day-to-day life. • **PO2:** Graduates attain practical knowledge through hands-on training and project experience to meet the industrial needs. • **PO3:** Graduates develop critical thinking skills to identify, analyze and solve problems of their core areas using modern tools. • **PO4:** Ability to communicate effectively the comprehended scientific data and knowledge, write effective reports, design documentation and make effective presentations. • **PO5:** Ability to appreciate the benefits of experiential learning by inculcating good work habits, time management and self-discipline. • **PO6:** Ability to apply critical thinking, decision making, and reasoning skills in the process of quality education
PROGRAMME SPECIFIC OUTCOMES(PSO)	
B.Sc. (BZC)	• **PSO 1**: Emphasizes the diversity in form and function of plants and animals, create an awareness of the impact of Chemistry on the environment, society, appraise role of green chemistry in environment sustainability. • **PSO 2:** Students will be able to pursue higher education & focuses on scientific research, and apply this knowledge in both real life and in a laboratory setting. • **PSO 3:** The fundamental skills within the field of Biology and Chemistry are understood and hence can function effectively as professionals in the Life Science based industries. • **PSO 4:** This programme is vital to further increase their understanding of human health and environmental issues. • **PSO 5**: Students will be able to understand the fundamental theories, concepts and applications in four basic areas of research in Chemistry (Analytical, Inorganic, Physical & Organic). Develop the ability to explore new areas of research in Chemistry and allied field of Life sciences.

B.Sc (BZCA/BZCS)	• **PSO 1**: Emphasizes the diversity in form and function of plants and animals. • **PSO 2:** Students will be able to pursue higher education & focuses on scientific research, and apply this knowledge in both real life and in a laboratory setting. • **PSO 3:** The fundamental skills within the field of Biology and Zoology are understood and hence can function effectively as professionals in the Life Science based industries. • **PSO 4:** They will be able to use databases, computational tools, decipher scientific data and can act as a bridge between physical & life sciences. Become competent to function both in wet as well as dry labs.

S.No.	Course Code	Course Title	Course Outcomes (CO)
1.	BS104	Paper I Microbial Diversity and Lower plants	On completion of this course, the students will be able to: **CO1:** Develop understanding on the concept of microbial nutrition. **CO2:** Classify viruses based on their characteristics and structures. **CO3:** Develop critical understanding of plant diseases and their remediation. **CO4:** Examine the general characteristics of bacteria and their cell reproduction/ recombination. **CO5:** Increase the awareness and appreciation of human friendly viruses, bacteria, algae and their economic importance **CO6:** Develop critical understanding on morphology, anatomy and reproduction of• Bryophytes, Pteridophytes. **CO7:** Understanding of plant evolution and their transition to land habitat. **CO8:** Demonstrate proficiency in the experimental techniques and methods of appropriate analysis of Bryophytes, and Pteridophytes.
2.	BS204	Paper-II Gymnosperms, Taxonomy of Angiosperms and Ecology	On completion of this course, the students will be able to: **CO1:** Develop critical understanding on morphology, anatomy and reproduction of Gymnosperms. **CO2**: Demonstrate proficiency in the experimental techniques and methods of appropriate analysis of Gymnosperms **CO3:** Comprehend the basic concepts of plant ecology and taxonomy and botanical nomenclature **CO4:** Analyse the characteristics of different plant communities. **CO5**: Evaluate the significance of herbarium. **CO6:** Analyse the implications of biometrics, numerical taxonomy and cladistics.
3.	BS 304	Paper – III Plant Anatomy and Embryology	At the end of the course the students will be able to **CO1:** Understand the fundamental concepts of plant anatomy and embryology **CO2:** Analyze and recognize the different organs of plant and secondary growth. **CO3:** Examine the structure and functions of eco-system. **CO4:** Evaluate the structural organization of flower and the process of pollination and fertilization.

4.	**BS 301**	**SEC – Nursery and Gardening**	On completion of this course the students will be able to; **CO1:** Understand the process of sowing seeds in nursery. **CO2:** List the various resources required for the development of nursery. **CO3:** Distinguish among the different forms of sowing and growing plants **CO4:** Analyse the process of Vegetative propagation. **CO5:** Appreciate the diversity of plants and selection of gardening. **CO6:** Examine the cultivation of different vegetables and growth of plants in nursery and gardening
5.	**BS 302**	**SEC- Biofertilizers and Organic farming**	On the completion of this course, the students will be able to; **CO1**: Develop their understanding on the concept of bio-fertilizer. **CO2:** Identify the different forms of biofertilizers and their uses. **CO3:** Compose the Green manuring and organic fertilizers. **CO4:** Develop the integrated management for better crop production by using both nitrogenous and phosphate bio fertilizers and vesicular arbuscular mycorrhizal (VAM).
6.	**BS 404**	**Paper – IV – Cell Biology, Genetics and Plant Physiology**	On the completion of this course, the students will be able to; **CO1**: Identify the concept that explains chemical composition and structure of cell wall and membrane **CO2:** Compare the structure and function of cells & explain the development of cells. **CO3:** Have conceptual understanding of laws of inheritance, genetic basis of loci and alleles and their linkage. **CO4:** Comprehend the effect of chromosomal abnormalities in numerical as well as structural changes leading to genetic disorders. **CO5:** Develop critical understanding of chemical basis of genes and their interactions **CO6**: Analyse the effect of mutations on gene functions and dosage. Examine the structure, function and replication of DNA. **CO7:** Understand Water relation of plants with respect to various physiological processes. **CO8:** Explain chemical properties and deficiency symptoms in plants. **CO9:** Classify aerobic and anaerobic respiration.

			CO10: Explain the significance of Photosynthesis and respiration **CO11**: Assess dormancy and germination in plants.
7.	**BS 401**	**SEC-3: Green house Technology**	The students will be able to **CO1:** Identify and practice safe use of tools, equipment and supplies used in greenhouse management careers **CO2:** Demonstrate an understanding of the composition, fertility and biology of soil and how they relate to good plant growth **CO3:** Demonstrate understanding of sustainable production techniques commonly used in the greenhouse industry **CO4:** Describe common greenhouse design features and the materials used to build them **CO5:** Distinguish the various types of environmental control systems used in closed environments **CO6:** Apply fertilizing techniques in a closed environment system **CO7:** Identify the most important greenhouse pests and diseases and be able to apply biological remediation techniques
8.	**BS 402**	**SEC-4: Mushroom culture and Technology**	On completion of this course, the students will be able to: **CO1:** Recall various types and categories of mushrooms. **CO2:** Demonstrate various types of mushroom cultivating technologies. **CO3:** Examine various types of food technologies associated with mushroom industry. **CO4:** Value the economic factors associated with mushroom cultivation. **CO5:** Device new methods and strategies to contribute to mushroom production.
9.	**BS 501**	**GE1 – Industrial Microbiology**	After completion of the course, the students will be able to; **CO1:** Understand concepts of industrial microbiology. **CO2:** Apply the usage of microorganisms in industry. **CO3:** Measure the growth of microorganisms. **CO4:** Analyze the use of microbes in industries such as dairy and medicines. **CO5:** Explain the concept of fermentation. **CO6:** Understand the use of patent with respect to industrial microbiology.

10.	**BS502**	**DSE1A: Biodiversity and conservation**	After the completion of this course, the learner will be able to: **CO1:** Develop understanding of the concept and scope of plant biodiversity. **CO2:** Identify the causes and implications of loss of biodiversity. **CO3:** Apply skills to manage plant biodiversity. **CO4:** Utilize various strategies for the conservation of biodiversity. **CO5:** Conceptualize the role of plants in human welfare with special reference to India.
11.	**BS502**	**DSE 1B: Economic Botany**	On completion of this course, the students will be able to: **CO1:** Understand core concepts of Economic Botany and relate with environment. **CO2:** Develop critical understanding on the evolution of concept of organization of apex new crops/varieties, importance of germplasm diversity, issues related to access and ownership. **CO3:** Develop a basic knowledge of taxonomic diversity and important families of useful plants. **CO4:** Increase the awareness and appreciation of plants & plant products encountered in everyday life **CO5:** Appreciate the diversity of plants and the plant products in human use.
12.	**BS502**	**DSE 1C: Seed Technology**	After completion of the course, the students will be able to; **CO1:** Understand the theoretical orientation of seed development. **CO2:** Analyse the different ways of seed processing in different plants. **CO3:** Examine the various methods of Seed testing. **CO4:** Understand the method of seed production in different plants. **CO5:** Explain the concept of hybrid seed production.
13.	**BS602**	**DSE2A: Plant Molecular Biology**	On completion of this course, the students will be able to; **CO1:** Analyse the structures and chemical properties of DNA and RNA through various historic experiments. **CO2:** Differentiate the main types of prokaryotes through their grouping abilities and their characteristics. **CO3:** Evaluate the experiments establishing central dogma and genetic code. **CO4:** Gain an understanding of various steps in transcription, protein synthesis and protein modification.

14.	**BS602**	**DSE2B: Tissue Culture and Biotechnology**	On the completion of the course the students will be able to **CO1:** Understand the core concepts and fundamentals of plant biotechnology and genetic engineering. **CO2:** Develop their competency on different types of plant tissue culture. **CO3:** Analyze the enzymes and vectors for genetic manipulations. **CO4:** Examine gene cloning and evaluate different methods of gene transfer. **CO5:** Critically analyze the major concerns and applications of transgenic technology.
15.	**BS602**	**DSE2C: Analytical Techniques in Plant Sciences**	On completion of this course the students will be able to: **CO1:** Develop conceptual understanding of cell wall degradation enzymes and cell fractionation. **CO2:** Classify different types of chromatography techniques. **CO3:** Explain the principles of Light microscopy, compound microscopy, Fluorescence microscopy and confocal microscopy. **CO4:** Apply suitable strategies in data collections and disseminating research findings.

S.No.	Course Code	Course Title	Course Outcomes (CO)
1.	BS105	**Paper I** Animal Diversity-Invertebrates	After successfully completing this course, the students will be able to: **CO1:** Develop understanding on the diversity of life with regard to protists, non-chordates and chordates **CO2:** Understand the difference between Invertebrates and Vertebrates. **CO3:**Group animals on the basis of their morphological characteristics/ structures **CO4:** Develop an understanding of the characters used to classify besides being able to differentiate the organisms belonging to different taxa. **CO5:** Study the various aspects of physiology, morphology, habits, habitats and adaptations in Non-chordate and Chordate life forms. **CO6:** Describe pathogenesis and treatment for important diseases like Amoebiasis, Giardiasis, malaria, leishmaniasis,schistosomiasis, etc. **CO7:** Understand the relative position of individual organs and associated structures through dissection of the invertebrate representatives.
2.	BS205	**Paper-II** Animal Diversity-Vertebrates.	After successfully completing this course, the students will be able to: **CO1:** Develop understanding on the diversity of life of chordates. **CO2:**Group animals on the basis of their morphological characteristics/ structures **CO3:** Develop an understanding of the characters used to classify besides being able to differentiate the organisms belonging to different taxa. **CO4:** Study the various aspects of physiology, morphology, habits, habitats and adaptations in Chordate life forms.
3.		**Paper – III –Animal**	After successfully completing this course, the students

		Physiology and Animal Behaviour	will be able to: **CO1:** Understand the physiology at cellular and system levels. **CO2:** Understand the mechanism and regulation of breathing, oxygen consumption and determination of respiratory quotient. **CO3:** Understand how mammalian body gets nutrition from different biomolecules. **CO4:** Understand the process of digestion, circulation and excretion. **CO5:** Understand the organization of nervous system and process of nerve conduction. **CO6:** Understand the process of Homeostasis. **CO7:** Understand the process of Muscle contraction. **CO8:** Understand the types of behavior, types of learning, social behavior, communication and biological rhythms.
4.		**SEC –I.Sericulture**	After successfully completing this course, the students will be able to: **CO1:** Gain knowledge of types of silk worms and silk worm rearing. **CO2:** Study various systems of silk worm, pests and diseases associated with silk worm, cocoons, defective cocoons and reeling of silk. **CO3:** Study the Mulberry cultivation, pests and diseases associated with Mulberry and control measures. **CO4:** Gain self-employment, as the Sericulture is agro based cottage industry in India.
5.		**SEC-II. Public Health and Hygiene**	After successfully completing the course, the students will be able to: **CO1:** Identify current national and global public health problems. **CO2:** Aware about the issues of food safety, water safety, vaccination, exercise and obesity, exposure to toxins. **CO3:** Frame a public health plan during any epidemic or spread of infectious disease etc. **CO4:** Analyze case studies of infant mortality and obesity.

			CO5: Assess the health inequalities with regard to gender, race, ethnicity, income etc. **CO6:** Students may make an oral presentation and compare the health care system of India with a country having advanced one.
6.		**Paper – IV – Cell Biology, Genetics, and Developmental Biology**	After successfully completing this course, the students will be able to: **CO1:** Improve knowledge of structure and functions of Cell and Cell organelles. **CO2:** To understand the cellular components underlying cell division. **CO3:** Understand how DNA encodes genetic information and the function of mRNA and tRNA **CO4:** Apply the principles of Mendelian inheritance. **CO5:** Acquire knowledge on Mendelian and Non-Mendelian inheritance, genetic disorder, and Sex-determination. **CO6:** Understand the cause and effect of alterations in chromosome number and structure. **CO7:** Explain and contrast the processes of spermatogenesis, oogenesis. **CO8:** Demonstrate an understanding of the hormonal control of reproduction in males and how this is regulated **CO9:** Develop critical understanding how a single-celled fertilized egg becomes an embryo and then a fully formed adult by going through three important processes of cell division, cell differentiation and morphogenesis.
7.		**SEC-3:Vector Biology**	After successfully completing this course, the students will be able to: **CO1:** Develop awareness about the causative agents and control measures of many commonly occurring diseases. **CO2:** Develop understanding about the favorable breeding conditions for the vectors. **CO3:** Devise strategies to manage the vectors population below threshold levels, public health importance. **CO4:**Undertake measures or start awareness

			programs for maintenance of hygienic conditions, avoidance of contact from vector, destruction of breeding spots in the vicinity of houses and cattle shed by public health education campaign
8.		**SEC-4: Aquaculture**	After successfully completing this course, the students will be able to: **CO1:**Understand the aquaculture systems **CO2:**Understand conditioning factors and how they can be manipulated **CO3:**Describe water depuration mechanisms **CO4:**Understand the environmental impacts of aquaculture.
9.		**GE1–Preventive medicine**	After completing this course the learners will be able to: **CO1:** Develop and implement public health interventions. **CO2:** Engage with health systems and public health initiatives. **CO3:** Increase their skills, attitudes and knowledge towards causes of diseases. **CO4:** Apply knowledge of the principles of disease, injury prevention and control. **CO5:** Prepare expert educational outreach lectures and presentations. **CO6:** Increase their skills towards knowledge of community health improvement.
10.		**GE2- Integrated Pest Management**	After completing this course the learners will be able to: **CO1:** Able to understand the definition of pest, pest population dynamics, Economic injury level, Economic threshold and pest surveillance. **CO2:** Gain knowledge on the concepts of IPM, and components of IPM. **CO3:** Acquire knowledge on Major IPM strategies, strategies for IPM Mechanical, Physical, Cultural and Biological. **CO4:** Gain Knowledge on Bio control agents, and Genetic control. **CO5:** Acquire knowledge on chemical control.
11.		**DSE-IA. Physiological Chemistry and**	After successfully completing this course, the students will be able to:

		Endocrinology.	**CO1:** Understand the types and classification of biomolecules. **CO2:** Understand the structure and the metabolism of carbohydrates, amino acids, proteins, lipids and nucleic acids. **CO3:** Understand the enzymes, their classification and enzyme kinetics, and mechanism of enzyme action. **CO4:** Understand neurohormones and neurosecretions. **CO5:** Learn about hypothalamo and hypapophysial axis. **CO6:** Understand about different endocrine glands and their disorders. **CO7:** Understand the mechanism of hormone action.
12.		DSE-IB. **Immunology and Animal Biotechnology.**	After successfully completing this course, the students will be able to: **CO1:** Identify the major cellular and tissue components which comprise the innate and adaptive immune system. **CO2:** Understand how are immune responses by CD4 and CD8 T cells, and B cells, initiated and regulated. **CO3:** Understand how the immune system distinguish self from non-self. **CO4:** Impart knowledge on cells of immune system, types of Immunity, Antigen-Antibody reaction, vaccines and types of vaccines. **CO5:** Gain knowledge on cloning vectors, Recombinant DNA technology, transgenesis, stem cells and their applications.
13.		DSE-IIA-**Fisheries and Limnology**	After successfully completing this course, the students will be able to: **CO1:** Gain knowledge on types of Fisheries and

			Aquaculture systems. **CO2:**Understand Culturing and Management practices of Fisheries. **CO3:** Learn about Feeding, Breeding, and Hatchery management of Finfish and Shellfish. **CO4:** Aquire knowledge on Characteristics and distribution of fresh water bodies, and Dynamics of Lentic and Lotic environments. **CO5:** Understand the Influence of Physical, Chemical conditions on Living Organisms in Inland waters. **CO6:** Gain Knowledge on Productivity of Lakes.
14.		DSE-IIB. **Ecology, Zoogeography, and Evolution.**	After successfully completing this course, the students will be able to: **CO1:** Understand the types of Ecosystems, Biogeochemical cycles, Concept of Species, Structure and Dynamics of Community. **CO2:** Effects and controlling measures of pollution. **CO3:** Acquire knowledge about Biodiversity and Biodiversity Hotspots in India, and its Conservation. **CO4:** Gain knowledge regarding the distribution of animals on Earth in different regions, the evolutionary history and relationship of the animals. **CO5:** Understand the Origin of Life, Evolutionary theories, Natural Selection and Speciation, causes and role of extinction in Evolution. **CO6:** Gain knowledge regarding the distribution of animals on Earth in different regions.