BACHELOR OF SCIENCE (MEDICAL)

COURSE OUTCOMES

SEMESTER I

ZOO 1.1 Life and Diversity from Protozoa to Helminthes

CO1: To study the characters, classification, biodiversity and economic importance of phylum protozoa to Helminthes.

CO2: To impart the knowledge about various distinguishing characters of invertebrates

CO3: Enable students to understand external morphology and internal systems like- digestive system, nervous system, reproductive system, etc. by various studies with the help of charts.

CO4: To explain pathogenic invertebrates, their life history, mode of infection and their pathogenicity with the help of charts.

ZOO 1.2 Cell Biology

CO1: To explain Ultrastructure of different cell organelles like plasma membrane, Endoplasmic Reticulum and Golgi complex of animal cell.

CO2: To understand cell organelles, their structure and function like mitochondria, cytoskeleton, Ribosomes, Lysosomes etc.

CO3: To Impart the knowledge about Ultrastructure and functions of Nucleus: Nuclear· membrane, nuclear lamina, nucleolus, fine structure of chromosomes, nucleosome concept and role of histones.

CO4: To explain cell reproduction, causes of cancer and cellular basis of immunity.

BOT 1.1 Diversity of Microbes

CO1: This course aims at making a familiarity with special groups of bacteria, viruses, fungi, algae and plant reproduction. Creating an understanding by observation and table study of representative members of phylogenetically important groups should be able to make students learn the process of evolution in a broad sense.

CO2: TO study morphology, anatomy, reproduction and developmental changes there in through typological study should create a knowledge base in understanding plant diversity, eco-

nomic values, taxonomy of lower group of plants.

CO3: To acquaint the students with external and internal basic structure and cellular composition of the bacteria, viruses, and fungi. To gain knowledge of diversity, life forms, life cycles, morphology and importance of microorganisms.

CO4: To introduce students with various fungal groups and Lichens, their ecology, classification, characteristics, reproduction and economic importance.

CO5: To acquaint with various plant diseases and their control and to introduce students with phytopathology, its concept and principles. Through field study they will able to see these plants grow in nature and become familiar with the biodiversity.

BOT 1.2 Cell Biology

CO1: Cell biology basically deals with the cellular structure and functions of an organism. It plays an important role to understand the structure and function of cell envelop and the importance of Golgi apparatus, Endoplasmic reticulum, Lysosomes, etc., in the functioning of cell.

CO2: To study the ultra-structure and functions of various cell organelles like chloroplast, mitochondria nucleus, nucleolus etc.

CO3: To understand the ultra-structure of chromosome, this further helps to understand the genetic inheritance.

CO4: To know the various chromosomal aberrations like duplications, deletions, translocation, inversion etc. To have the basic concept of Sex chromosomes and sex determination in plants.

CO5: To study the cell cycle and cell division that helps to understand the various stages of cell division and the formation of daughter cells from the parent cell.

CH-101 Inorganic Chemistry

CO1: To familiarise the concept of atomic structure and properties of periodic table.

CO2: To develop the knowledge about the chemistry of Ionic structure of various solids.

CO3: To develop basic concept about covalent bond.

CO4: Enable students to understand basic concept of chemical bonds, shapes and structures of molecules.

CH-102 Physical Chemistry

CO1: To understand the general characteristics of different states of matter.

CO2: To impart Knowledge to the students about the liquefaction of gases and applications of liquid crystal.

CO3: Familiarise students with various laws and concepts of Physical Chemistry.

CO4: To study classification of solids and laws of crystallography.

CH-103 Organic Chemistry

CO1: To learn the basic methods of structure formation as well as bond formation.

CO2: To improve their concept related to symmetry of compounds.

CO3: To gain knowledge about nomenclature, reaction mechanism and chemical properties.

CO4: To study chemical and physical properties of Alkanes and Cycloalkanes.

English (Chronicles of Time)

CO1: To enable students to appreciate the beauty rhyme and style of poem

CO2: To develop the imagination and aesthetic sense of the students

CO3: To develop knowledge of linguistic conventions for reading, writing and spoken language English.

CO4: To develop an understanding of variety of poetic forms and poetic devices.

CO5: To communicate to pupils the exclusive message of the poem.

CO6: To make them competent in art of speaking and listening by making normal presentations and participate in debates etc.

Environmental Studies

CO1: Environmental studies concepts and methods from ecological and physical science and their environmental problems solving.

CO2: The environmental studies major prepares students for careers as leaders in understanding and addressing complex environmental issues from a problem oriented.

CO3: Students will have an understanding of primary environmental problems invasive species, climate change, small population, water pollution and the science behind those problems and potential solutions.

SEMESTER II

ZOO 2.1 Life and diversity from Annelida to Hemichordata

CO1: To study the characters, classification, biodiversity of phylum Annelida to Hemichordata.

CO2: To explain the external morphology and internal systems like Digestive, nervous, reproductive, excretory systems of invertebrates..

CO3: To understand the distinguishing characters of invertebrates like metamerism in phylum Annelida, torsion and detorsion in Gastropods, affinities and evolutionary significance of various larval stages and Aristotle's lantern of Echinodermates,

CO4: To know about economic importance of various invertebrates.

ZOO 2.2 Genetics

CO1: To impart knowledge to the students about Elements of Heredity and variations, varieties of gene interactions, Linkage and recombination: Coupling and repulsion hypothesis, crossing-over and chiasma formation; gene mapping.

CO2: To study Sex determination and its mechanism, Sex linked inheritance, Extra chromosomal and cytoplasmic inheritance.

CO3: To explain Multiple allelism, Human genetics, Inborn errors of metabolism (Alkaptonuria, Phenylketonuria, Albinism, sickle-cell anaemia).

CO4: To develop an understanding of Nature and function of genetic material, Applied genetics, cell division like mitosis and meiosis.

BOT 2.1 Diversity of Archegoniates

CO1: To make students aware of the status of higher Cryptogams and Gymnosperms as a group in plant kingdom. To introduce the diagnostic features of archegoniate and transition to land habit.

CO2: To study the salient features of Archegoniates. To make the students able to classify Bryophytes and distinguish features of group. To study the economic and ecological importance of Bryophytes.

CO3: To understand the study of ancient plant with respect to systematic position and morphology and to classify Pteridophytes on the basis of their distinguishing features of the group. To introduce students with stellar system of evolution and their importance.

CO4: The students will study the life cycles of selected genera and economic importance of Pteridophytes with respect to their structure and reproduction. Upon completion of course

the students will able to study comparative account among Bryophytes and Pteridophytes with respect to their evolution and reproduction.

BOT 2.2 Genetics

CO1: To know the importance of DNA (the genetic material) structure, their replication and DNA- protein synthesis.

CO2: To acquire the basic knowledge about the nucleosome model, genetic code and repetitive DNA.

CO3: To understand the Mendel's laws of Genetic inheritance, Segregation and Independent assortment.

CO4: To study the mitochondrial and plastid DNA which helps to understand the inter-nuclear inheritance. To know the Mutation and their types, transposable genetic elements, damage and repair of DNA.

CO5: To have the knowledge about the concept of regulation of gene expression including the transfer of genetic information, transcription, translation, protein structure and their synthesis.

CH-201 Inorganic Chemistry

CO1: To understand the qualitative idea of various types of bonds.

CO2: To get knowledge of various concepts of classifications of s & p-block elements.

CO3: To study chemical and physical properties of elements of s & P-block .

CO4: To study applications of elements in various fields.

CH-202 Physical Chemistry

CO1:To study rate, factor and order of reaction and different theories related to it.

CO2: To study electrolytic conduction, factors affecting and applications of kohlrausch's law and transport number.

CO3: To study Buffer and their properties.

CO4: To study applications of conductivity and determination of solubility product of sparingly soluble salt.

CH-203 Organic Chemistry

CO1: Construct the conceptual ideas of basic rules of aromaticity.

CO2: Understanding of reactivity and stereochemistry of various compounds.

CO3:To study Alkanes and their chemical properties.

CO4: Depth knowledge of Arenes and Aromaticity.

English (Ideas a glow)

CO1: To develop intellectual, personal and communicative skills for understanding of essays

CO2: To provide ample practice in writing section such as formal & informal letters, precis writing etc.

CO3: To convey the original tone and intent of a message through translating passages from English to Hindi.

CO4: To develop student's insight and favourable attitude towards English language.

CO5: To develop the ability of appreciation of ideas and critical thinking.

SEMESTER III

ZOO 3.1 Diversity of chordates -I

CO1: To study the basic chordate characters and their classification up to order level and also how the chordates originated and their economic importance.

CO2: To know the functional morphology of different animals belonging to different phyla and subphyla and to study how the animals interact with one another as well as with the environment and the modifications in their body according to their mode of life.

CO3: To aware the students about the animal external morphology and internal systems like digestive system, respiratory system, blood vascular system, nervous system, sense organs, excretory system and reproductive system of chordates like Herdmania, Amphioxus, Petromyzon and Labeo.

CO4: To know about chondricthyes and osteichthyes with their general characters and classification.

ZOO 3.2 Mammalian Physiology-I

CO1: To explain the basic structure, classification and functions of carbohydrate, proteins and lipids.

CO2: To aware the students about the classification of enzymes and their mode of action and also the basic properties, functions and inhibition of enzyme action.

CO3: To understand that how the digestion and absorption of carbohydrates, proteins and fats take place in alimentary canal and how the digestive enzyme secretion is regulated by hormonal and nervous systems in human body.

CO4: To aware the students about the different types of muscle fibre, muscle contraction and importance of neuro-muscular junction in muscle contraction.

CO5: To know the general structure of bone and its classification on the basis of its texture and origin and also discuss the bone formation, resorption and various bone diseases.

BOT 3.1 Biology and diversity of seed plants

CO1: Students will be able to differentiate between Angiosperm and Gymnosperm species present at their surroundings.

CO2: Studies of Affinities between Pteridophyte, Gymnosperm and Angiospermic plants will help to clearly differentiate them without any confusion.

CO3: Students will come to know the utility of Gymnosperms also by studying their economic importance.

CO4: Students will get to know how plants are evolved.

CO5: Geological time table will help them to understand various climatic fluctuations took place during total time span of earth origin.

CO6: Knowledge regarding types of fossil, process of their fossilisation and their preservation techniques will help in choosing an interesting field of Palaeobotany as a career.

BOT 3.2 Plant anatomy

CO1: Study the tissue system to understand the internal morphology and function of plant parts like shoot, root and leaf.

CO2: Clarify tissue :- meristematic and permanent tissue system (simple, complex and secretory).

CO3: Review the students how abnormal secondary growth different from a normal secondary growth occur in plants during their life.

CO4: Make students aware about the development of different type of wood during the season changes. How to identify the best wood for their household.

CO5: Explain various leaf arrangements with their shape and morphology.

CO6: Educate the students regarding the root system, its organisation and structural modification in roots like storage root, respiratory root and epiphytic root.

CH-301 Inorganic Chemistry

CO1: To understand the general characteristics of d & f- block elements.

CO2: To gain knowledge of different theories to explain the bonding in co-ordination compounds.

CO3: To study Non-Aqueous solvents.

CO4: To study chemistry of elements of I, II & III transition series.

CH-302 Physical Chemistry

CO1: To study the thermodynamic terms , properties, process and mathematical relations.

CO2: To study Nernst distribution law.

CO3: To study Le-chatelier principle.

CO4: To study Clausius- clapeyron equation and their applications.

CH-303 Organic Chemistry

CO1: To familiarise with the mechanism of organic reactions.

CO2: To study different factors which affect the reaction rate.

CO3: To know the different types of concerted reaction in organic chemistry and orbital.

CO4: To develop knowledge about UV absorption spectroscopy.

Sanskrit (Literature and language)

'Balkand**'** from valmiki ramayan &words formation by pratyay

CO1: Students will be familiar with Indian culture and values.

CO2: Students will gain knowledge on fundamental principles of Sanskrit grammar.

CO3: To develop intellectual, personal and communicative skills for understanding of stories.

CO4: Students can express command over Sanskrit and its linguistic structure.

SEMESTER IV

ZOO 4.1 Diversity of chordates- II

CO1: To know about general characters, classification (upto order level) and origin, affinities of amphibians, reptiles, aves and mammals.

CO2: To describe about detailed type study of each class with their various systems like digestive system, respiratory system, blood vascular system, arterial system, venous system, nervous system, sense organ, excretory system and reproductive system of the animals.

CO3: To create awareness among students how the different species of frog shows parental care and how do the birds migrate and the reasons responsible for it and various types of adaptations like anatomical, morphological, and physiological adapted by birds for migration.

CO4: To know about poisonous and non-poisonous snakes, poisonous apparatus in snakes.

CO5: We learn them about principles of aerodynamics in bird flight, adaptive radiation and dentition in mammals.

ZOO 4.2 Mammalian Physiology- II

CO1: To aware the students about heart functions, conduction, regulation of heart beat and mechanism of blood coagulation in our body.

CO2: To learn them about transportation of gases and the basic mechanism of respiration.

CO3: To know about basic structure of human excretory system and the role of nephron and the physiology of urine formation.

CO4: To aware the students about the neural integration, the basic structure of neuron and the types of nerve fibres and how the nerve impulse starts the conduction.

CO5: To know about endocrinology and role of various hormones released by glands and also how imbalance in hormone level causes disease in human body.

BOT 4.1 Biology and diversity of seed plants II.

CO1: Taxonomy will help to identify plants at species level.

CO2: Study on diversity of flowering plants and their economic importance will increase interest to know them more therefore present status of availability, distribution and diversity loss also.

CO3: Role of chemical composition, chromosomal studies on taxonomy give an evolutionary line of plants.

CO4: International code of Botanical nomenclature will help students to identify diversity of plants scientifically in different countries.

CO5: Floral terms and their inflorescence types will develop keen interest on studies of floral diversity hence can also give opportunity in floriculture stream.

BOT 4.2 Plant Embryology

CO1: Share the knowledge about the flower microsporangium, microsporogenesis and pollen grain.

CO2: Detailed comparison between male and female gametophyte along with Megasporagenesis.

CO3: Give brief account of pollination, its type and agency along with double fertilisation, endosperm type and its biological importance.

CO4: Brief overview of dicot and monocot embryogenesis and review the structure of dicot and monocot seed.

CO5: Short presentation of fruit type : dispersal mechanism in fruits and seeds. in fruits and seeds.

CH-401 Inorganic Chemistry

CO1: To correlate the optical and magnetic properties of lanthanoids.

CO2: To correlate the optical and magnetic properties of actinoids.

CO3: To impart thorough knowledge of systematic and qualitative analysis of mixtures containing acidic and basic radicals.

CO4: To study chemistry of f- block elements.

CH-402 Physical Chemistry

CO1: To study basics of chemical cell, concepts and various mathematical relations.

CO2: Further detailed study of thermodynamics with stress on third law of thermodynamics.

CO3: To study entropy.

CO4: Mathematical derivation of Gibbs Free Energy and equations.

CH-403 Organic Chemistry

CO1: To predict the outcomes and mechanism of some simple organic reactions, using a basic understanding of the relative reactivity of functional group.

CO2: To study Amines and Diazonium salts.

CO3: Gain knowledge about Nitro Compounds.

CO4: Detailed study of Aldehydes and Ketones.

Sanskrit Grammar-letter writing, word formation and translation chapter-'raghuvansh' by great poet kalidas

CO1: Students will be familiar with Indian culture and moral values. Inculcate skill of speaking Sanskrit language.

CO2: Students will gain knowledge on fundamental principles of Sanskrit grammar.

CO3: To learn the literary background of greatest Sanskrit Granths.

CO4: Enable students to understand Indian culture

SEMESTER V

ZOO 5.1 Fish and Fisheries

CO1: To understand the production, utilisation and demand of World fisheries as well as Indian fisheries and river system of India.

CO2: To understand the Composite fish culture, Cage culture, Running water culture, Recirculated water culture and Preparation and management of fish culture ponds.

CO3: To develop knowledge about fishing Gears and Crafts.

CO4: To know about Fresh water prawn culture and Pearl culture including Pearl producing mollusks, pearl formation, collection of oysters, rearing of oysters, insertion of nucleus, harvesting of pearls, composition & quality of pearl.

CO5: To understand the Technologies in Fisheries development: Cryopreservation of gametes, Gene manipulation and different methods of transfection.

ZOO 5.2 Ecology and Evolution

CO1: To know about Basic concepts of ecology: Definition, significance. Concepts of habitat and ecological niche. Factors affecting environment: Abiotic factors and biotic factors.

CO2: Understand concept of Ecosystem: components, properties and functions; Ecological energetics and energy flow,food chain, food web, trophic structure; ecological pyramids concept of productivity.

CO3: To know about Biogeochemical cycles: Concept, reservoir pool, gaseous cycles and sedimentary cycles.

CO4: Knowledge of Concept and evidences of organic evolution, Theories of organic evolution, Concept of microevolution and concept of species, macro-and mega-evolution with details of phylogeny of horse and Evolution of man.

BOT 5.1 Plant Physiology

CO1: Importance of plant physiology and to have basic knowledge regarding functioning of different plant parts.

CO2: To learn importance of water to plant life, its role in different physiological functions like transportation, imbibition, diffusion, osmosis etc.

CO3: Study macro and micronutrients- their importance in permeability, influence on osmotic pressure of cells, transportation and plant development.

CO4: Understand the significance of photosynthesis without which life would not be possible on earth. Study C3, C4 and C2 cycles, also to know photophosporylation and photorespiration.

CO5: Role of plant growth hormones like Auxins, Gibberlins, Cytokinins, Absorbic acid and Ethylene in morphogenesis, cell division, cell enlargement, tropical responses etc in growth and development of plants.

CO6: To understand the concept of photoperiodism, their responses to light, temperature etc. importance of Florigen, Senescence and Fruit ripening.

BOT 5.2 Ecology

CO1: To understand our environment and environmental factors. The Causes of environmental destruction and how we can overcome them.

CO2: To know how our plants are adaption in different environmental conditions.

CO3: To understand the cause of population increase and its consequences. Ecology tells us that increase in population leads to environmental destruction.

CO4: The various types of interaction in our community that affect our life. From ecology we come to know that how we can deal if such interactions gets disturbed.

CO5: By studying ecology we come to know about various floristic regions of India and various modes of their conservation.

CO6: The Environmental changes that are taking place like global warming, climate change. The preventive measures that we can take to control the environmental problems.

CH-501 Inorganic Chemistry

CO1: To understand metal- ligand bonding.

CO2: To explain magnetic properties, interpret electronic spectra of transition metal complexes.

CO3: To study thermodynamic and kinetic aspects of metal complexes.

CO4: To study electronic spectra of transition metal complexes.

CH-502 Physical Chemistry

CO1: To understand postulates of quantum mechanics, energy of 1-D box.

CO2: To understand dipole moment, magnetic permeability & susceptibility.

CO3: To acquaint knowledge on rotational, vibrational and raman spectra.

CO4: To acquire knowledge of basic concept of Physical spectra.

CH-503 Organic Chemistry

CO1: To study different technique and principle involved in NMR spectroscopy.

CO2: To study types of reactions of carbohydrates.

CO3: To study applications of carbohydrates.

CO4: To study organometallic compounds and their applications.

SEMESTER VI

ZOO 6.1 Entomology

CO1: To aware the students about important insect pests of crops and vegetables like sugarcane, wheat, cotton, rice etc. life cycle, nature of damage caused and control measures.

CO2: To have knowledge of Insect control methods; Biological control, its history, requirement and precautions and feasibility of biological agents for control and Chemical control, history, categories of pesticides.

CO3: To understand the concept of integrated pest management.

CO4: To know important bird and rodent pests of agriculture & their management.

ZOO 6.2 Developmental Biology

CO1: To understand the historical perspectives, aim and scope of Developmental biology.

CO2: To know about Spermatogenesis and Oogenesis.

CO3: To acquaint students with the process of Fertilisation, parthenogenesis, different types of eggs and patterns of cleavage in invertebrates and vertebrates.

CO4: To understand blastulation, Gastrulation in invertebrates and vertebrates, formation of three germinal layers in frog and chick.

CO5: Understand the concepts of Competence, Determination, Differentiation and Regeneration.

BOT 6.1 Biochemistry and plant biotechnology

CO1: To learn the basic concept of enzymes, its nomenclature, characteristics, regulation and action as enzyme plays as an important role in all metabolic processes of plant system.

CO2: Basic concept of respiration, types pathways (Kreb cycle, PEP), oxidative phosphorylation. ATP as energy currency.

CO3: Nitrogen which is an essential part of DNA, RNA, Chlorophyll, Membranes need to be studied for this nitrogen metabolism need to be studied.

CO4: Importance of Fat metabolism i.e. its synthesis, assimilation and storage.

CO5: To learn fundamentals of Genetic engineering, Techniques, Recombinant DNA technology, c-DNA library, Vectors and Gene markers.

CO6: Micropropogation, know about tissue culture techniques, anther culture, ovule culture, proplasm culture which would help to solve many problems related to propagation in natural way.

BOT 6.2 Economic Botany

CO1: Economic Botany describes the cultivation and uses of various food plants like wheat, barley etc.

CO2: To Aware students about commercial plants like cotton, jute and flax and the conditions required by these plants to grow .

CO3: The Importance of Medicinal Plant like Cinchona, Rauwolfia, Opium, Cannabis etc. and to know about their medicinal value.

CO4: To Understand about the processing and uses of various beverages like tea and coffee.

CO5: Economic botany tells about the timber yielding plants and their proper plantation.

CO6: To Know how we can make the petro fuel from plants.

CH-601 Inorganic Chemistry

CO1: To have a basic idea of organometallic compound.

CO2: To understand two disciplines of science (biology and chemistry) are linked.

CO3: To develop understanding for silicones and phosphogenes.

CO4: To study Electronic spectra of Transition metal complexes.

CH-602 Physical Chemistry

CO1: To understand laws of photochemistry.

CO2: To understand concept of potential energy of molecular orbitals.

CO3: To express concentration of solution and gain knowledge regarding phase,degree of freedom and phase rule.

CO4: To study solutions : Dilute solutions and colligative properties.

CH-603 Organic chemistry

CO1: To study types, reactions and physical properties of heterocyclic compounds and organosulphure compounds.

CO2: To study organic synthesis via enolates.

CO3: To study synthetic polymers.

CO4: To study Amino Acids, Peptides and Proteins.

PROGRAMME OUTCOMES

PO1: Demonstrate, solve and an understanding of main concepts in all disciplines of Zoology, Botany and Chemistry.

PO2: Solve practical problems with logical reasoning and independently and draw a conclusion.

PO3: Create an awareness of the impact of studying biology and chemistry on the environment, society, and development outside the scientific community.

PO4: To inculcate the scientific temperament in the students and outside the scientific

community.

PO5: To enable the students to take part in various research programmes and scientific instrument handling in future.

PROGRAMME SPECIFIC OUTCOMES

PSO1: Gain the knowledge of Zoology, Botany and Chemistry through theory and practicals.

PSO2: Study and understand the basic and advanced methods of scientific studies using various technologies.

PSO3: Understand the testing of hypothesis, basic statistical analysis, using modern scientific digital tools and software's, experimental models, charts and equipments.

PSO4: Understand good laboratory practices and safety.

PSO5: Develop research oriented skills.

PSO6: Make them aware and handle the sophisticated instruments/equipments.