Programme: B.Sc. Medical (Three-year degree program)

PROGRAMME OUTCOMES (POs)

PO 1: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO 2: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 3: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO 4: Apply appropriate techniques, resources using computer software skills, models, IT tools to solve complex problems with an understanding of the limitations.

PO 5:, and demonstrate the knowledge of, and need for sustainable development.

PO 6: Demonstrate ethical principles and commit to professional ethics and responsibilities and norms of the scientific practice.

PO 7: Communicate effectively on complex activities with the scientific community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO1: Students will be able to clearly understand the concepts and applications in the field of Physics, Chemistry and Mathematics along with Environment and Management, Social and Professional Ethics and Computer Applications.

PSO2: Students have the capability to grasp the technological advancements in the usage of physical science to analyse and design techniques/methods for a variety of applications.

PSO3: Students will be capable for placement opportunities and to pursue career oriented higher education in an interdisciplinary area in India as well as abroad in the practice of Project, Aptitude and Management and Leadership.

PSO 4: Students will be able to develop and demonstrate knowledge of statistical tools used in sciences.

PSO 5: Learners can also acquire practical skills to work as chemist, faculty and other industrial supporting services.

COURSE OUTCOMES (COs)

B.Sc. Medical First Semester	
Course	**Course Outcomes (COs)**
Basic Communication Skills (ENG-101)	CO1: To learn basic about English language and its importance in global commutation. CO2: Develop skills to read and write poems, essays and short stories. CO3: To know how to make effective sentences and use of grammar.
Introduction to Computer Applications (COMP-101)	CO1: To know basic applications of computers in different organizations. CO2: Understanding, types of Computer systems like Micro, Mini, Mainframe and Super Computers. CO2: To know about input and output devices, Data Processing and storage.
Basic Organic Chemistry (CHEM-111)	CO1: To understand the basic concepts of Organic Chemistry. CO2: Learn about different type of reagents and reaction intermediates used in chemical reactions. CO3: Get familiarize with the initial concepts of stereochemistry with special emphasis on optical isomerism, relative and absolute configurations. CO4: Acquire knowledge regarding geometrical isomerism and conformational isomerism. CO5: Gather information pertaining to the synthesis and chemical reactions of alkanes and cycloalkanes. CO 6: Develop the understanding of practical knowledge and apply them in experiments.
Ecology and Environmental Biology (ZOO-111)	CO 1: To equip the students with basic concepts of ecology and environment science such as ecosystem, community, population etc. CO 2: Students should know about environment biome, biosphere, ecosphere and ecological succession. CO 3: To facilitate the students about biotic and abiotic components of the ecosystem and relationships between them. CO 4: Introduction to major ecosystems of the world and effects of climate change on them.
Evolutionary Biology (ZOO-112)	CO 1: Students should know about the evolution of complex organic molecule from complex inorganic compounds and formation of photobionts (first primitive cell). CO 2: Equip the students about patterns of similarities and differences among living beings over time and across habitats through action of biological processes such as natural selection, mutation and genetic drift. CO 3: Students should learn about phylogeny and evolutionary history of horse and man. CO 4: Students should know about geological time scales, eras, epochs and evolution of various animal groups in these ages.
Algae (BOT-111)	CO1. Understand the diversity among Algae. CO2. Know the systematic, morphology and structure, of Algae. CO3. Understand the life cycle pattern of Algae. CO4. Understand the useful and harmful activities of Algae.

Fungi (BOT-112)	CO1. Understand the Biodiversity of Fungi CO2. Know the Economic Importance of Fungi CO3. Understand the morphological diversity of Fungi.
B.Sc. Medical Second Semester	
Basic Inorganic Chemistry (CHEM-121)	CO1: To learn importance of de Broglie matter waves, Schrodinger wave equation and some important basic principles of atomic structure. CO2: To understand the principle of atomic, ionic radii, ionization energy, and electron affinity and electron negativity. CO3: To learn about chemical bonding, VBT theory, and hybridization and VSEPR theory. CO4: To understanding the chemical bonding and Molecular orbital theory. CO5: To understanding the ionic structures, radius ratio effects and coordination numbers.
Environmental Science (EVS-301)	CO1: To understand the need for public awareness for environment. CO2: To learn about renewable and non-renewable resources, problems associated with Natural resources. CO3: To know about ecosystems, structure and function of an ecosystem. CO4: Understand biodiversity and impact on environment, conservations of bio resources. CO5: Environmental pollution and causes and remedies.
Basic Zoology (ZOO-101)	CO 1: Students should learn the basics of Zoology, characteristics of living organisms. Description of typical plant and animal cells, DNA, RNA, mitotic and meiotic cell divisions. CO 2: Students should learn zoological nomenclature and principles of classification of non-chordates. CO 3: Students should learn systematic position of chordates. CO 4: learn fundamental anatomy and physiology of various systems of chordates.
Cell Biology (BIOCHEM-121)	CO 1: Understand basic aspects of prokaryotic and eukaryotic cells, cell theory and classification of cells and molecular composition of cells. CO 2: To learn about cell cycle and its phases, cell membrane structure and models pertaining to it. Membrane proteins and carbohydrates and their role; transport across membranes. CO 3: To know about cell organelles and in depth study of their structure and functions. Cytoskeleton, types and their functions. CO 4: Learn about cancer: its development and causes, types, properties, early detection and treatment.
Genetics (PBG-101)	CO1: To understand basic about elements of heredity and variation CO2: To learn Chromosomes and Heredity CO3: To know about Gene Interactions and modified dihybrid ratios. CO4: To understand Mutations and mutagens, role of induced mutations in crop improvement and monitoring environmental mutagens. CO5: To understand structure and biosynthesis of RNA and DNA; DNA as genetic material; transformation, transduction.
Bryophytes	CO1. Understand the morphological diversity of Bryophytes.

(BOT-121)	CO2. Understand the economic importance of the Bryophytes. CO3. Understand the life cycle of Bryophytes.
Pteridophytes (BOT-122)	CO1. Understand the morphological diversity of Pteridophytes. CO 2. Understand the economic importance of the Pteridophytes. CO 3. Know the evolution of Pteridophytes.
B.Sc. Medical Third Semester	
Basic Physical Chemistry (CHEM-211)	CO1: Student will lean about gaseous state of matter, postulates of Kinetic theory of gases, critical phenomenon. CO2: To understand qualitative discussion of the Maxwell's distribution of molecular velocities and liquefaction of gases. CO3: To learn basic about chemical kinetics and its scope, factors influencing the rate of a reaction-concentration CO4: To understand the importance of second law of thermodynamics with statements, Carnot cycle and its efficiency, some important thermodynamic parameters in thermodynamics and their variation. CO5: To learn the physical significance of Free energy and work function, their variation with temperature and pressure, Maxwell relation and third law of thermodynamics.
Human Values and Ethics (EDU-101)	CO1: Understanding the need, basic guidelines, content and process of value education, self-exploration, continuous happiness and prosperity, fulfillment of basic aspirations of human being. CO2: To learn importance of universal human values and ethical human conduct, basis for holistic alternative towards universal human order CO3: To learn about Professional ethics and issues in professional ethics.
Punjabi Lazmi (PBI-111)	CO: To learn basic about the Punjabi language, writing and speaking.
Diversity of Non chordates–1 (ZOO-211)	CO 1: Introduction to parasitic protozoans of man (*Entamoeba*, *Giardia*, *Trypanosoma* and *Leishmania*. CO 2: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the cnidarian. CO 3: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the aschelminthes. CO 4: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the Platyhelminthes.
Diversity of Chordates –I (ZOO-213)	CO 1: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the Protochordates. CO 2: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the Cyclostomata. CO 3: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the Chondrichthyes.

	CO 4: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the Actinopterygii.
Comparative Anatomy of Chordates –I (ZOO-313)	CO 1: To know about Integumentary System. CO 2: To know about Skeletal System. CO 3: To know about Muscle System. CO 4: To know about respiratory and digestive system.
Gymnosperm (BOT-211)	CO 1. Understand the morphological diversity of Gymnosperms. CO 2. Understand the economic importance of the Gymnosperms. CO 3. Know the evolution of Gymnosperms.
Systematics of Angiosperms (BOT-212)	CO1. Understand the habit of the angiosperm plant body. CO2. Know the vegetative characteristics of the plant. CO3. Learn about the reproductive characteristics of the plant. CO4. Understand the plant morphology and basic taxonomy.
B.Sc. Medical Fourth Semester	
Inorganic Chemistry-III (CHEM-221)	CO1: To learn importance of hydrides of nitrogen, nitrogen halides, oxides and oxyacid. CO2: To understand the principle of chemical reactivity and dioxygen as a ligand (basic idea only), structure of O_3 and H_2O_2, clathrate hydrates allotropic forms of S & Se, structures of halides. CO3: To learn about the halogen Family (chemical reactivity, group trends, chemistry of preparation of fluorine, hydrogen halides. CO4: To understanding the symmetry, group theory symmetry elements and symmetry operations. CO5: To understanding the properties of irreducible representations and character tables.
Physical Chemistry-III (CHEM-222)	CO1: To enhance scientific knowledge in kinetic theory of gases, understand transport properties and some important laws of diffusions. CO2: To understand thermodynamics of diffusion, relation between transport properties. CO3: To learn basic about equilibrium electrochemistry, some important laws, theories and application of conductometric titrations. CO4: To know dynamic electrochemistry, processes at electrodes, double layer at the interface, applications of dynamic electrochemistry in power generation, power storage (batteries). CO5: To enhance knowledge about chemical, kinetics of complex reactions, Importance of catalysts in kinetics.
Diversity of Non Chordates–II (ZOO-221)	CO 1: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the Arthropoda. CO 2: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the Echinodermata. CO 3: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the Mollusca.

	CO 4: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the hemichordata.
Diversity of Chordates –II (ZOO-222)	CO 1: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the amphibia. CO 2: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the reptilia. CO 3: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the aves. CO 4: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the Mammalia.
Plant Physiology (BOT-221)	CO1. Know importance and scope of plant physiology. CO 2. To understand the plants and plant cells in relation to water. CO 3. Understand the process of photosynthesis in higher plants with particular emphasis on light and dark reactions, C3 and C4 pathways. CO 4. Understand the respiration in higher plants with particular emphasis on aerobic and anaerobic respiration. CO 5. Learn about the movement of sap and absorption of water in plant body. CO 6. Understand the plant movements.
Embryology of Angiosperms (BOT-222)	CO1. Know the methods of pollination and fertilization. CO2. Know fertilization, endosperm and embryogeny. CO3. Understand the process of sporogenesis and embryogenic development.
Plant development & anatomy (BOT-223)	CO1. Understand the scope & importance of Anatomy. CO2. Know various tissue systems. CO3. Understand the normal and anomalous secondary growth in plants and their causes. CO4. Perform the techniques in anatomy.
B.Sc. Medical Fifth Semester	
Inorganic Chemistry-IV (CHEM-311)	CO1: To learn importance of coordination compounds, classical ligands, non-classical ligands and multidentate ligands. CO2: To understand the concept of isomerism in coordination compounds, nomenclature and stability of coordination compounds. CO3: To learn about the valence bond theory for bonding in coordination compounds, concept of multiple bonding, strength and weaknesses of valence bond approach. CO4: To understanding the splitting of d-orbitals in different fields for example octahedral and tetrahedral complexes. CO5: To understanding the concept of thermodynamic effects of crystal field splitting and enthalpies of hydration of M2+ ions.
Organic	CO 1: Learn the synthesis and chemical reactions of nitrogen and

Chemistry-IV (CHEM-313)	organosulphur compounds. CO 2: Develop the understanding of five and six membered heterocyclic compounds along with condensed five and six membered heterocyclic. CO 3: Recognize the importance and chemistry of saccharides, disaccharides and polysaccharides. CO 4: Understand the difference between fats and oil, soaps and detergents and get acquaint with the synthesis of synthetic dyes. CO 5: To know the chemistry related to amino acids, peptides, proteins and nucleic acids. CO 6: Practice to perform single and multi-step organic reactions.
Developmental Biology (ZOO-312)	CO 1: To know about gametogenesis with particular reference to differentiation of spermatozoa and vitellogenesis. CO 2: To know about fertilization and metamorphosis. CO 3: Fate maps of chick and frog embroys. CO 4: Mammalian placenta–its formation, types and functions.
Applied Zoology (ZOO-315)	CO 1: To know about useful animals and their products. CO 2: To know about important human and veterinary parasites-protozoan and helminths. CO 3: To know about Arthropods and vectors of human diseases and their mode of transmission. CO 4: Biology and control of chief insect pests, birds and mammals of agricultural importance.
Phytopathology (BOT-313)	CO1. Know the terminologies in plant pathology. CO2. Understand the scope and importance of Plant Pathology. CO3. Know the prevention and control measures of plant diseases and its effect on economy of crops.
Plants Ecology & Environment (BOT-314)	CO1. Understand the ecological concepts as well as the ability to apply ecological knowledge to manage and remediate environmental problems. CO2. To apply systems concepts and methodologies to analyse and understand interactions between social and environmental processes. CO3. To understand the bio-geochemical cycles & ecological successions.
Plants and Human Welfare (Economic Botany) (BOT-315)	CO1. Understand the role plants in human welfare. CO2. Gain knowledge about various plants of economic use. CO3. Know importance of plants & plant products. CO4. Understand the chemical contents of the plant products. CO5. Know about the utility of plant resources.
B.Sc. Medical Sixth Semester	
Physical Chemistry-V (CHEM-322)	CO1: To learn importance of quantum mechanics, failure of classical concepts and some important basic principles of quantum mechanics. CO2: To understand the behaviour of particle in one and three dimensional box with translational energy, energy levels, quantization of energy and applications of particle in a box model. CO3: To learn about angular momentum, approximate Methods, operators used in quantum mechanics.

	CO4: Developing understanding for Valence-bond and molecular orbital approaches, electronic structures and pi-electron approximation.
Organic Chemistry-V (CHEM-323)	CO1: To learn importance of acyclic molecules, conformation, steric stereo electronic effects and enantiomeric relationships. CO2: To understand the concept of free radical, carbanion nucleophile substitution reaction mechanism and regioselectivity. CO3: To learn about the alkylation of aldehydes, Favorskii rearrangements and aldol condensations. CO4: To understanding the concept of photochemistry, Jablonski diagram, inter-system crossing singlet and triplet states.CO5: To understanding the concept of concerted reactions, unimolecular rearrangement and elimination reactions.
Comparative Anatomy of Non-Chordates (ZOO-321)	CO 1: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the Protozoan. CO 2: To know about morphology, anatomy, systematic position, morphology, distinctive characters, distribution ecology and economic importance of the important parasitic protozoans. CO 3: General organisation, Comparative account of canal system, skeletal system, reproduction and development of sponges. CO 4: Corals and coral formation, polymorphism and affinities of the group
Comparative Anatomy of Chordates –II (ZOO-322)	CO 1: To know about sense organs. CO 2: To know about circulatory system. CO 3: To know about nervous system CO 4: To know about urinogenital system and reproductive system
Plant Biotechnology (BOT-322)	CO1. Gain knowledge about the mechanism and essential component required for prokaryotic DNA replication. CO2. Understand the fundamentals of Recombinant DNA Technology. CO3. Know about the Genetic Engineering. CO4. Understand the principle and basic protocols for Plant Tissue Culture. CO5. The concept of operon and its structure and regulation.
Plant breeding and crop improvement (BOT-323)	CO1. Understand the science of plant breeding. CO 2. To introduce the student with branch of plant breeding for the survival of human being from starvation. CO3. To study the techniques of production of new superior crop verities. CO4. Understand the modern strategies applied in plant breeding for crop improvement i.e. Mass selection, Pure line Selection and Clonal selection.