Bhavan's Vivekananda College

of Science, Humanities and Commerce
(Sainikpuri, Secunderbad, Telangana – 500094)
Autonomous College – Affiliated to Osmania University
Accredited with 'A' Grade by NAAC

B.Sc (MbBcC)

Program Outcomes:

PO1 Knowledge: Understand the basic concepts, fundamental principles and scientific theories and processes related to the fields of Chemistry, Biochemistry, Biotechnology, Genetics and Microbiology with their relevance in day-to-day life.

PO2 Skills and analysis: Apply the scientific skills in terms of designing experiments, execution of protocols and data analysis in scientific research, industry, and entrepreneurship.

PO3 Creativity and Critical thinking: Think creatively and apply the core concept of Biology and Chemistry to a chosen scientific discipline and generate and interpret scientific data using quantitative, qualitative and analytical methodologies and techniques.

PO4 Science and Society: Implement the acquired knowledge to assess societal, health, safety, legal and cultural issues, and the consequent responsibilities relevant to the professional scientific practice.

PO5 Communication: Communicate effectively on problems, issues, and solutions with 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.

PO6 Ethics &Environment: Apply ethical principles and commit to professional ethics and responsibilities and norms in research and the functional areas, understand the issues of environmental context and sustainable development.

PO7 Individual and Teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO8 Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context of socio, economic and technological changes.

Program Specific Outcomes

PS01: Capacity building to apply knowledge of biological concepts in various thrust areas of Molecular biology, Computational biology, Medical, Environmental, Agricultural, Food and Dairy microbiology considering the demand of academia, research, and industry.

PSO2: Correlate the knowledge of Biochemistry to various metabolic processes, Physiology, Endocrinology, Nutrition, Immunology, Health &disease and suggest solutions to biological problems through research and development.

PSO3: Utilise the concepts of Organic, Inorganic, General and Physical Chemistry to evaluate and develop analytical skills required for drug designing and green lab practices to safe guard the environment.

Course Outcomes:

Name of the Course	**INTRODUCTORY MICROBIOLOGY**
Course Code	**MB 131 Paper I**
CO1	Summarize various discoveries and contributions in the history of Microbiology
CO2	Apply microscopy and staining techniques
C03	Experiment different procedures of sterilization
CO4	Compare various types of viruses and viral replication strategies.

Course Outcomes (biochemistry)

Name of the Course	**BIOMOLECULES - I**
Course Code	**BC134**
CO1	Compare the organization of prokaryotic cell to eukaryotic cell.
CO2	Differentiate the amino acids based on their side chains.
C03	Distinguish between the simple and complex sugars.
CO4	Relate the different types of fats and their importance in cellular architecture.

Course Outcomes-Chemistry

Name of the Course	**Semester -I:Paper-I Inorganic and General Chemistry-I**
Course Code	**CT135**
CO1	Use the knowledge of Ionization energy and Electronegativity to predict types of compounds(Ionic /Covalent) & their reactivity.
CO2	Compare the properties of s-& p-block elements & organometallic compounds.
C03	Familiarize the concept of VBT & MOT to differentiate physical parameters of various diatomic molecules, .Use the knowledge of quantum mechanics to explain atomic structure.
CO4	Interpret organic reaction mechanisms, reactivity of a few organiccompounds & examine the ions in soil, water by the semi micro analysis method.

Name of the Course	**Semester -I: Inorganic Chemistry-I**
Course Code	**CT135P**
CO1	Learn to identify the presence of anions and cations in salt mixtures using systematic semi-micro analytical method.

Name of the Course	**General Microbiology**
Course Code	**MB 231 Paper II**
CO1	Distinguish bacteria based on taxonomy.
CO2	Compare general characters of different microorganisms.
C03	Prepare pure cultures of microorganisms.
CO4	Analyze biomolecules by qualitative analysis and biochemical techniques

Name of the Course	**Biomolecules - II**
Course Code	**BC234**
CO1	Distinguish the structural features and properties of nucleic acids.
CO2	Relate to the structural organization of proteins to their functions.
C03	Interpret the concepts of biological oxidation and energy production.
CO4	Demonstrate the organization of ETC complexes.

COURSE OUTCOMES-CHEMISTRY

Name of the Course	**Semester -II Paper II Physical and General Chemistry-I**
Course Code	**CT235**
CO1	The student will know non-ideal behaviour of gases, PV isotherms, van der Waal's equation and critical phenomenon. They should be familiar with methods used to liquefy gases.
CO2	Implement Nernst Distribution law to relate the solubility of solute in immiscible solvents, to interpret the change in physical parameters to liquefy gases & use of Liquid crystals in LCDs.
C03	At the end of this course, the student will be able to identify whether a molecule is chiral or not by symmetry criteria; the number of stereo isomers possible for a chiral molecule; and the absolute configuration at the chiral centre(s); and the theory of optical activity and internal compensation. The students are expected to know the methods of C – C, C=C formation, reagents and respective name reactions; the difference in reactivity of single, double and triple bonds; the meaning and use of reaction mechanisms with examples.
CO4	The students interpret the theory of aromaticity, aromatic compounds and their reactivity; difference from acyclic conjugated alkenes.

Name of the Course	**Semester -Ii:Inorganic Chemistry-II**
Course Code	**CT235P**
CO1	By the end of this course, students will be able to 1.Prepare inorganic complexes & test the presence of ions in the salt mixtures. 2. Students will be able to utilize green solvents for analyses

Name of the Course	**Microbial Physiology**
Course Code	**MB 331 Paper III**
CO1	List growth media ingredients based on nutritional requirement of microbes.
CO2	Apply enzyme assay methods to determine the enzyme activity.
C03	Sketch and summarize metabolic pathways in microbes.
CO4	Analyse fermentative abilities of various microbes.

Name of the Course	**Food Adulteration**
Course Code	**SEC-1: MB 301**
CO1	Differentiate adulterated and unadulterated food products.
CO2	Apply simple methods to detect food adulterants.

Name of the Course	**Enzymology and Metabolism of Carbohydrates and Lipids**
Course Code	**BC334**
CO1	Interpret the significance and role of enzymes in a living cell.
CO2	Correlate the function of enzymes with cellular homeostasis.
C03	Relate the metabolic events of carbohydrates in conversion of food to energy to run cellular processes.
CO4	Illustrate the pathways of lipid metabolism and their significance in energy production.

Name of the Course	**Medical Diagnostics**
Course Code	**SE334**
CO1	Differentiate different types of tests done with blood and urine
CO2	Compare the results of tests done with blood for DLC, PCV, ESR, HbA1c and urine analysis.

Name of the Course	**Semester -III Paper III Organic And General Chemistry-II**
Course Code	**CT335**
CO1	Differentiate between SN^1 and SN^2 reactions and identify different alcohols. Apply these reactions in organic synthesi
CO2	Write mechanisms of organic reactions involving reactive intermediates.
C03	Solve problems based on various analytical tools. Design experiments with improved sample preparation and new measurement procedures.
CO4	Appreciate the application of nuclear reactions in the field of Agriculture, medicine etc. Determine the symmetry operations of simple molecules. Apply Woodward Hoffman's rules for different molecular systems

Name of the Course	**Semester –III :Inorganic Chemistry-III**
Course Code	**CT335P**
CO1	Acquire quantitative skills in volumetric analysis and gain knowledge about the neutralisation, redox and complexometric titrations. 1. Able to prepare standard solutions. 2. Find the concentrations of unknown solutions

Name of the Course	**Safety Rules in Chemistry Laboratory & Preparing Lab Reagent**
Course Code	**SE335**
CO1	To improve the skills of students in the application of theory and practical knowledge.
CO2	To fill the gap between theory and experimental procedures.
C03	To train the students in understanding laboratory safety rules and to improve the skills in preparation of laboratory regents.
CO4	To make students aware about best lab practices

Course Outcomes:

Name of the Course	**Molecular Biology**
Course Code	**MB 431 Paper IV**
CO1	Solve problems related to DNA basing on Chargaff's rule and Determine the concentration of DNA and RNA.
CO2	Prepare a mind map of types of Mutagens and their mechanism of action.
C03	Extract DNA from bacteria and estimate the molecular weight of isolated DNA.

CO4	Prepare a pictorial representation of various steps involved in Recombinant DNA. technology and present applications of Recombinant DNA technology in various fields.

Name of the Course	**Fundamentals Of Bioinformatics**
Course Code	**SEC-2: MB 401**
CO1	Sketch phylogenetic tree using NCBI.
CO2	Perform pairwise alignment and multiple sequence alignment.

Course Outcomes

Name of the Course	**Biochemical Techniques and Metabolism of Amino Acids and Nucleotides**
Course Code	**BC434**
CO1	Relate the metabolic pathways of amino acids to various cellular functions.
CO2	Correlate metabolic pathways of nucleotides to various cellular functions.
C03	Analyze and apply different techniques according to the sample and design the experiments.
CO4	Apply their analytical skills gained in the course to research projects.

Name of the Course	**Basics of Food and Nutrition**
Course Code	**SE434**
CO1	Differentiate the various food groups with their nutritive values.
CO2	Relate to the effect of different BMI values and check for various nutrients in food sources.

COURSE OUTCOMES-CHEMISTRY

Name of the Course	**Semester-IV Paper IV Inorganic and Physical Chemistry-II**
Course Code	**CT435**
CO1	Identify the basic principles related to structure and properties of lanthanides and Actinides. Apply the concept of lanthanide contraction for separation techniques.
CO2	Identify the structure and bonding in simple metals .Apply the 18- electron rule to simple and bridged metal carbonyls.
C03	Use the phase rule to determine the number of components, phases and degrees of freedom of different systems. Calculate the molecular weights of solutes using colligative properties
CO4	Write equations representing electrochemical cell and calculate electrochemical parameters

Name of the Course	**Semester -IV:Inorganic Chemistry-IV**
Course Code	**CT435P**
CO1	Acquire quantitative skills in volumetric analysis and gain knowledge about the neutralisation, redox and complexometric titrations. 1. Able to prepare standard solutions. 2. Find the concentrations of unknown solutions
CO2	Acquire quantitative skills in volumetric analysis and gain knowledge about the neutralisation, redox and complexometric titrations. 1. Able to prepare standard solutions. 2. Find the concentrations of unknown solutions

Name of the Course	**Green Methods In Chemistry**
Course Code	**SE435**
CO1	Know about green lab practices. Improving reaction efficiency by changing certain parameters and making it more environment friendly.
CO2	Learning about green reagents and their mode of action in making chemistry less hazardous.
C03	Atom economy and its usefulness i.e. utilizing 100% of the reactants
CO4	Acquaint with different green reactions.

Course Outcomes:

Name of the Course	**Agricultural and Environmental Microbiology**
Course Code	**MB 531 Paper V**
CO1	Summarize the role of plant growth promoting rhizobacteria.
CO2	Compare different plant diseases and measures to prevent them.
C03	List the environment friendly methods in agriculture using microorganisms.
CO4	Review on methods of solid and liquid waste disposal using microorganisms.

Name of the Course	**Immunology**
Course Code	**MB 532/A Paper VI**
CO1	Classify the different types of immunity and correlate the role of vaccines in conferring immunity in an individual.
CO2	Review on functions of cells and organs in immune responses.
C03	Illustrate the structure of antibody and antigen highlighting their specific properties and functions.
CO4	Differentiate between Hypersensitivity and Autoimmunity and

	will also be able to practically demonstrate the principlesinvolved in antigen antibody reactions.

Name of the Course	**Clinical Microbiology**
Course Code	**SEC-3: MB 501**
CO1	Comprehend about various microbial diseases caused to human beings
CO2	Acquaint knowledge on methods of clinical specimen collection, processing and culturing
C03	Understand various serological and molecular techniques to detect pathogenic infections
CO4	Learn about antibiotic sensitivity

Name of the Course	**Microbes For Human Welfare**
Course Code	**GE-1: MB 502**
CO1	Basic Knowledge about microbiology and role of microbes in daily life
CO2	Conceptual understanding of role of microbiology in production of industrially important products.
C03	Acquaint with prevention and control strategies of microbial diseases
CO4	Acquire basic knowledge on Cosmetic microbiology

Course Outcome

Name of the Course	**Physiology and Clinical Biochemistry**
Course Code	**BC534**
CO1	Compare the secretion and functions of various endocrine glands.
CO2	Relate physiology of heart beat, muscle contraction, nervous system and vision.
C03	Correlate the relationship of clinical biochemistry in health and disease.
CO4	To relate the structure of organs and the associated function tests.

Name of the Course	**Microbiology, Genetics and rDNA Technology**
Course Code	**BC534A**
CO1	Apply suitable methods in cultivation, identification and characterization of microorganisms.
CO2	Relate the significance of heredity and variation and link with genetic diseases.
C03	Apply the basic knowledge of tools and techniques in gene cloning experiments.
CO4	Implement the various rDNA methods in production of biotechnological products.

Name of the Course	**Automation and Clinical Laboratory Informatics**
Course Code	**SE534**
CO1	Relate the working of auto analyzers and their significance in clinical diagnostics.
CO2	Apply the knowledge of computers in coordinating lab information and hospital information systems

Name of the Course	**Nutrition And Health**
Course Code	**GE534**
CO1	Relate the importance of nutrients present in their diet necessary for maintenance of good health.
CO2	Correlate the relation between the calorie intake and physical activity for a good health.

COURSE OUTCOMES-CHEMISTRY

Name of the Course	**Semester-V Paper V Organic, General and Physical Chemistry-III**
Course Code	**CT535**
CO1	Analyse different nitrogen compounds by conducting simple experiments.
CO2	Identify the principles, structure and reactivity of selected coordination complexes. Utilise the principles of coordination complexes in understanding the functions of biological systems.
C03	Identify the heterocyclic structure in metalloproteins or enzymes. synthesise them through green chemistry approach. Interpret electronic spectra and magnetic properties
CO4	Calculate change in thermodynamic properties.Calculate the absolute value of thermodynamic quantities (U, H, S, A, G).

Name of the Course	**Semester -V:Organic Chemistry- V**
Course Code	**CT535P**

CO1	Develops a skill in organic synthesis and re-crystallisation

Name of the Course	**Semester-V Paper VI Physico-Chemical Methods of Analysis, Spectroscopy And Analysis**
Course Code	**CT535A**
CO1	Acquires a basic knowledge in solvent extraction and all chromatographic techniques
CO2	Acquaint withspectroscopic techniques and colorimetic estimations .Students identify organic compounds using mass spectroscopy.
C03	Identify organic molecules using spectroscopic tools such as UV, IR, Raman and H^1NMR spectroscopy.
CO4	Apply the knowledge of catalysis to carry out atom economy organic synthesis. Acquires the knowledge of how alcohol dehydrogenase catalysis is different in Asians and Europeans

Name of the Course	**Semester -V: Physical Chemistry- VI**
Course Code	**CT535AP**
CO1	Develops a skill to use conductometers, potentiometers, PH meters and colorimeters that are required for the industry

Name of the Course	**Basic Analytical Chemistry**
Course Code	**SE535**
CO1	It enhances the knowledge and skills required for attaining analytical and critical abilities, logical thinking, and ability to apply knowledge learnt to solve issues and problems related to chemical analysis.
CO2	Improve the use of statistical tools.
C03	Used in determining the water quality refers to the chemical, physical, biological, and radiological characteristics of water. It is a measure of the condition of water relative to the requirements of one or more biotic species and or to any human need or purpose.

Name of the Course	**Organic Farming**

Course Code	GE535
CO1	Upon successful completion of this course, students will: Have a better understanding of the basic principles of organic farming. Recognize that organic farming systems, if practiced in a an environmentally sound manner, can constitute a larger philosophy of sustainable agriculture.
CO2	Be able to devise an organic farm management plan.
C03	Have improved their ability to think critically about the opportunities and challenges faced by organic growers.

Course Outcomes:

Name of the Course	Medical Microbiology
Course Code	MB 631 Paper VII
CO1	Summarize the role and distribution of normal flora and describe the host pathogen interactions.
CO2	Compute on causal organisms and pathogenesis of food borne air, water and sexually transmitted diseases.
C03	Differentiate various viral borne diseases, causal organisms, modes of transmission and pathogenesis.
CO4	Practically demonstrate the antibiotic sensitivity tests.

Name of the Course	Food and Industrial Microbiology
Course Code	MB 632/A Paper VIII
CO1	Classify various microbes involved in the food spoilage and properties of spoiled foods.
CO2	Summarize food borne diseases, food poisoning and their detection.
C03	Restate the general methods food preservation.
CO4	Illustrate the steps of various microbial fermentation procedures involved in production of yoghurt, bread, cheese, ethyl alcohol, glutamic acid, Beer, penicillin, citric acid, Vitamin B12, Biogas and insulin.

Name of the Course	Mushroom Cultivation
Course Code	SEC-4: MB 601
CO1	Summarize mushroom cultivation in methods
CO2	Tabulate the nutritional value of mushrooms
C03	List the mushroom preservation procedures.

Name of the Course	Contagious Diseases and Immunization
Course Code	GE-2: MB 602
CO1	Awareness on bacterial and viral diseases
CO2	Understand about mode of infections
C03	Acquaint Knowledge on types of immunity

CO4	Knowledge on vaccination schedule

Course Outcomes

Name of the Course	**Molecular Biology**
Course Code	**BC634**
CO1	Relate the importance of proteins involved in replication and maintaining its fidelity.
CO2	Appreciate the flow of genetic information from DNA to RNA.
C03	Correlate the significance of genetic material to the synthesis of normal proteins.
CO4	Appreciate the adaptability of microorganisms to the changed environment.

Name of the Course	**Immunology And Nutrition**
Course Code	**BC634A**
CO1	Compare the basic mechanisms and functional interplay of innate and adaptive immunity.
CO2	Relate to the basic immunological principles involved in clinical and applied science.
C03	Differentiate between malnutrition and over nutrition.
CO4	Distinguish between the micro and macronutrients with respect to their biochemical role and deficiency disorders.

Name of the Course	**Computational Biochemistry**
Course Code	**SE634**
CO1	Apply the knowledge to analyse the data and draw structures using various software tools.
CO2	Apply the knowledge to use various data bases and molecular modelling methods in studies of proteins, nucleic acids and metabolic events.

Name of the Course	**Human Physiology**
Course Code	**GE634**
CO1	Relate to various body organs and their functions in health and diseased conditions.
CO2	Differentiate the various endocrine secretions and their physiological functions.

COURSE OUTCOMES-CHEMISTRY

Name of the Course	**Semester-VI Paper VII Organic, General and Physical Chemistry-IV**
Course Code	**CT635**

CO1	Identify the carbohydrates and explain its role in living organisms.
CO2	Apply HSAB principle for stability and occurrence of simple salts in nature.
C03	Apply various synthetic strategies in the field of synthesis. Use retro synthesis and disconnection approach for synthesis of drugs.
CO4	Solve problems on rate and rate constants. Calculate the age of rocks, carbon dating etc

Name of the Course	**Semester -VI:Organic Chemistry- VII**
Course Code	**CT635P**
CO1	Organic Analysis-Apply principles of identification techniques in organic analysis) Identify organic compounds Identify the presence of organic compounds in vegetables and fruits

Name of the Course	**Semester-VI Paper VIII Drugs, Pesticides, Macromolecules**
Course Code	**CT 635A**
CO1	Apply the knowledge of drugs & formulation chemistry to the pharmaceutical industry.
CO2	Acquaint with green pesticides and harmful effect of other organic pesticides.
C03	Acquire knowledge in Material science, super conductance and nanotechnology- the allied subjects in chemistry, which find a great place in modern research.
CO4	Students can synthesize different polymers based on their tacticity and different mechanisms of polymerization.

Name of the Course	**Semester -V: Physical Chemistry- VI**
Course Code	**CT635AP**
CO1	Familiarized with calculation of rate constant for first and second order kinetic reactions Utilise the technique of solvent extraction to separate different solutes in a compound or extract medicinal components from herbs.

Name of the Course	**Cheminformatics**
Course Code	**SE635**
CO1	▪ Learn about drawing chemical structures on PC

	▪ Using the tools to search the chemicals in the database to help in research.
CO2	▪ Identification of protein targets. ▪ Spectral predictions of various drugs. ▪ Molecular modelling ▪ Hands on experiment on drug developmentusing cheminformatics.
C03	▪ Hands on MOLINSPIRATION

Name of the Course	**Chemistry of Cosmetics & Perfumes**
Course Code	**GE635**
CO1	▪ Describe fundamentals of chemistry and the scientific basis for cosmetic formulation and the function of the active ingredients.
CO2	▪ Comprehend the efforts of scientists in cosmetic product design and developments.