

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 (BtGC)

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: Devise and apply the concepts of Biotechnology such as Molecular and Biophysical techniques along with Computational biology in various fields of animal/plant/industrial and environmental biotechnology and to build entrepreneurial skills.

PS02: Interpret and apply the principles and concepts of Genetics, Genetic engineering, Genomics, Genetic Counselling and Evolutionary biology in reasoning, problem solving, mathematical analysis to understand the process of inheritance and genetic disorders.

PS03: 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		Cell Biology and Genetics
Course Code		BT133
CO1	Compare the cell structure and function of prokaryotic and eukaryotic cells.	
CO2	Identify Chromosome organisation and cell division.	
CO3	Solve problems based on Mendelian Laws and Mechanism of inheritance.	
CO4	Interpret the fundamentals of recombination, linkage and sex determination	

Name of the Course		Cell Biology and Genetics
Course Code		BT133P
CO1	Students expertise in Microscopy skills and genetics problem solving	

Course Outcomes (Genetics)

Name of the Course		Transmission Genetics
Course Code		GT132
CO1	Apply Mendelian laws and genetic notation for problem-solving.	
CO2	Solve problems using gene mapping and recombination.	
CO3	Examine the molecular mechanisms in cell cycle and chromosomal segregation.	
CO4	Identify chromosome structure and chromosomal aberrations.	

Name of the Course		Transmission Genetics
Course Code		GT132P
CO1	Students learn genetic annotations and develop analytical skills for problem solving.	

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.	
CO3	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 organic compounds & 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.

Course Outcomes:

Name of the Course	Nucleic Acids, Cell culture and Bioinformatics
Course Code	BT233
CO1	Compare the structure and function of Nucleic acids in prokaryotes and eukaryotes.
CO2	Differentiate the different models of DNA replication.
CO3	Interpret the fundamentals of Cell culture.
CO4	Construct homology using BLAST program based on concepts of Bioinformatics.

Name of the Course	Nucleic Acids, Cell culture and Bioinformatics
Course Code	BT233P
CO1	Students expertise in estimating DNA and RNA and also in analysis of biological data using bioinformatics tools.

Course Outcomes (Genetics)

Name of the Course	Genetic Analysis
Course Code	GT232
CO1	To distinguish structures of DNA and RNA.
CO2	Learn the fundamental aspects of gene expression such as transcription, translation and mRNA splicing.
CO3	Identify different mechanisms of gene regulation.
CO4	Recognize the significance of rDNA technology in agriculture and medicine.

Name of the Course	Genetic Analysis
Course Code	GT232P
CO1	Students understand the underlying principle involved in extraction of DNA, estimation of DNA/RNA, basic techniques used in Microbial Genetics.

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.
C04	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
C01	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	

Course Outcomes:

Name of the Course		Biochemistry
Course Code		BT333
C01	To appreciate the structural and functional aspects of carbohydrates and Proteins.	
C02	To evaluate Lipids, Enzymes, Vitamins and Minerals	
C03	To appraise the metabolism of carbohydrates and lipids	
C04	To appraise the metabolism of Proteins and Photosynthetic pathways	

Name of the Course		Biochemistry
Course Code		BT333P
C01	Expertise in qualitative and quantitative analysis of biomolecules.	

Name of the Course		Integrated Pest Management
Course Code		SE333
C01	Students expertise in tackling the pests in an eco-friendly way	
C02	Students are motivated to go for biological pesticides and employ IPM strategies for pest control.	

Course Outcomes (Genetics)

Name of the Course		Gene Structure, Organization and Expression
Course Code		GT332
CO1	To distinguish nucleic acid structures and types.	
CO2	To differentiate types of sequences in the genome.	
CO3	To recognize fine structure of the gene.	
CO4	To contrast gene expression in prokaryotes and eukaryotes.	

Name of the Course		Gene Structure, Organization and Expression
Course Code		GT332P
CO1	They learn the basics of sterilization, microbial culture and biochemical methods of estimation.	

Name of the Course		Genetically Modified Organisms
Course Code		SE332
CO1	Students learn the basic concepts of gene transfer protocols.	
CO2	They learn to appreciate the role of Agrobacterium as a natural genetic engineer.	
CO3	They are acquainted with the significant role of transgenic plants in agriculture.	
CO4	Students learn from their field study the usage of GMOs in the local area.	

Course Outcomes-Chemistry

Name of the Course		Semester -III Paper III Organic and General Chemistry-II
Course Code		CT335
CO1	Differentiate between SN1 and SN2 reactions and identify different alcohols. Apply these reactions in organic synthesis	
CO2	Write mechanisms of organic reactions involving reactive intermediates.	
CO3	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.
CO3	To train the students in understanding laboratory safety rules and to improve the skills in preparation of laboratory reagents.
CO4	To make students aware about best lab practices

Name of the Course	Microbiology and Biophysical Techniques
Course Code	BT433
CO1	To interpret microorganism's structure and identify techniques to isolate them in pure forms
CO2	To analyze microbial pathogenesis
CO3	To locate and interpret the working of Photometry and micrometry
CO4	To list the uses of Biophysical techniques

Name of the Course	Microbiology and Biophysical Techniques
Course Code	BT433P
CO1	Students expertise in growing bacteria and explore electrophoresis analysis of proteins along with paper chromatography

Name of the Course	Bioinformatics
Course Code	SE433
CO1	The students interpret the data using various computational tools
CO2	Using BLAST program students analyse data in the databases.

Course Outcomes (Genetics)

Name of the Course	Molecular Genetics
Course Code	GT432
CO1	Differentiate types of gene regulation mechanisms in Prokaryotes and Eukaryotes.
CO2	Value rDNA technology as a tool for genetic engineering

C03	Identify the molecular mechanisms of gene mutation
C04	Recognize mechanisms of replication and transposable elements with examples.

Name of the Course		Molecular Genetics
Course Code		GT432P
C01	The students improve their analytical skills by working out problems based on replica plating, SLRL and restriction mapping. They understand the effect of UV on bacterial growth They understand the principle of DNA extraction from different sources	

Name of the Course		Genetic Counselling
Course Code		SE432
C01	The students learn the concepts of Human genetic disorders.	
C02	Students learn the different steps involved in genetic counselling.	
C03	They also learn various methods involved in carrier detection.	
C04	They learn to appreciate the prenatal diagnostic techniques.	

Course Outcomes-Chemistry

Name of the Course		Semester-IV Paper IV Inorganic And Physical Chemistry-II
Course Code		CT435
C01	Identify the basic principles related to structure and properties of lanthanides and Actinides. Apply the concept of lanthanide contraction for separation techniques.	
C02	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	
C04	Write equations representing electrochemical cell and calculate electrochemical parameters	

Name of the Course		Semester -IV: Inorganic Chemistry-IV
Course Code		CT435P
C01	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.	
CO3	Atom economy and its usefulness i.e. utilizing 100% of the reactants	
CO4	Acquaint with different green reactions.	

Name of the Course		Molecular Biology
Course Code		BT533
CO1	To differentiate and organize the genes and sketch their kinetic classes	
CO2	To understand and demonstrate the various levels of Genomic organisation	
CO3	To relate and interpret gene expression	
CO4	To formulate new strategies applicable to state the function of various genes	

Name of the Course		Molecular Biology
Course Code		BT533P
CO1	Expertise in isolating DNA and analysing it by electrophoresis.	

Name of the Course		Animal and Plant Biotechnology
Course Code		BT533A
CO1	To differentiate different types of animal cell cultures.	
CO2	To value the applications of animal cell culturing.	
CO3	To apply plant tissue culture principles	
CO4	To justify concepts of plant tissue culture and its applications	

Name of the Course		Animal and Plant Biotechnology
Course Code		BT533A P
CO1	To expertise in plant tissue culture and animal cells like leucocytes and understand bacterial growth curve by measuring the rate of growth at different time intervals	

Name of the Course		Plant Tissue Culture
Course Code		SE533
CO1	The students expertise in plant tissue culture techniques	
CO2	Students expertise in encapsulating embryos using sodium alginate .	

Name of the Course	Food Preservation and Adulteration
Course Code	GE533
CO1	Students learn the basic method of food preservation.
CO2	Students interpret the health risks with different adulterants present in foods

Course Outcomes (Genetics)

Name of the Course	Population Genetics
Course Code	GT532
CO1	Demonstrate the concept of Genetic Equilibrium.
CO2	Recognize HWE and relate it to mutation.
CO3	Differentiate types of selection with examples.
CO4	Distinguish the mechanisms for maintenance of balanced polymorphism.

Name of the Course	Population Genetics
Course Code	GT532P
CO1	Students learn to use Mathematics and Statistics in problem solving. They understand the dynamics of Genetic Equilibrium and how it can be altered by the evolutionary processes.

Name of the Course	Advanced Techniques in genome analysis and Genetic Engineering
Course Code	GT532A
CO1	To value biophysical techniques such as electrophoresis, Hybridization techniques, PCR
CO2	To appreciate advanced genome analysis techniques like NGS and DNA Microarray.
CO3	To differentiate gene transfer strategies for the development of Genetically Modified Organisms

Name of the Course	Advanced Techniques in genome analysis and Genetic Engineering
Course Code	GT532A P
CO1	The students learn cytogenetic techniques like Karyotyping and biophysical techniques like Agarose and Polyacrylamide gel electrophoresis.

Name of the Course	Vermicomposting
Course Code	SE532
CO1	The students learn to identify the different species of Earthworm.
CO2	They learn to make their own vermi-compost.
CO3	They can also start a start-up programme on vermicomposting.
CO4	This skill enhancement course encourages entrepreneurship.

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.	
CO3	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 with spectroscopic techniques and colorimetric estimations. Students identify organic compounds using mass spectroscopy.	
CO3	Identify organic molecules using spectroscopic tools such as UV, IR, Raman and ¹ H NMR 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.
CO3	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.	
CO3	Have improved their ability to think critically about the opportunities and challenges faced by organic growers.	

Name of the Course		Genetic Engineering and Immunology
Course Code		BT633
CO1	To explain the concept and techniques of Genetic Engineering	
CO2	To state the applications and limitations of cloning.	
CO3	To identify the cellular and molecular basis of immune system	
CO4	To describe the roles of immune system in both maintaining health and combating the disease	

Name of the Course		Genetic Engineering and Immunology
Course Code		BT633P
CO1	Expertise in Immunology and Molecular Biology	

Name of the Course		Industrial and Environmental Biotechnology
Course Code		BT633A
CO1	To justify different bioreactors designed	
CO2	To expertise fermentation technology.	
CO3	To appraise various biofuels and nanotechnology	
CO4	To understand and apply microbial degradation	

Name of the Course		Industrial and Environmental Biotechnology
Course Code		BT633A P
CO1	To appraise wine quality by analysis and milk adulteration by MBRT.	

Name of the Course	Fermentation Technology
Course Code	SE633
CO1	The students develop the skill of wine production.
CO2	The students interpret the alcohol content in the wine produced by alcohol estimation

Course Outcomes (Genetics)

Name of the Course	Inbreeding, Breeding techniques and Genome Evolution
Course Code	GT632
CO1	Interpret the effects of inbreeding in populations through inbreeding coefficient.
CO2	To discuss conventional and modern breeding methods in the progress of agriculture.
CO3	To appreciate the techniques used in livestock improvement
CO4	To judge evolutionary relationships between/among organisms.

Name of the Course	Inbreeding, Breeding techniques and Genome Evolution
Course Code	GT632P
CO1	Students apply the concepts learnt in theory such as: calculation of inbreeding coefficient from pedigrees. They learn to calculate different types of Genetic load. They learn the bio-physical technique of native PAGE. They learn construction of phylogenetic trees using Bioinformatics software

Name of the Course	Human Genetics & Biostatistics
Course Code	GT632A
CO1	Distinguish the strategies used for the management of human genetic disorders.
CO2	Value gene therapy for various genetic disorders and the importance of genome projects & Bioinformatics.
CO3	Apply the concepts of genetic engineering for industrial products.
CO4	Relate to the importance of statistical methods used in Human Genetics.

Name of the Course	Human Genetics & Biostatistics
Course Code	GT632A P
CO1	The students learn statistical testing of hypothesis by using different tests like Chi-Square test, Z-test and t-test. Students develop their mathematical and analytical skills.

Name of the Course		Medicinal Plants
Course Code		SE632
CO1	The students learn the importance of medicinal plants.	
CO2	The students are able to identify the medicinally important plants.	
CO3	They learn the technique involved in the powder analysis of different crude drugs	
CO4	They learn to appreciate the significance of medicinal botany with reference to Siddha and Ayurveda.	

Name of the Course		Wine making
Course Code		GE632
CO1	Students learn the basic method of wine preparation.	
CO2	They learn the difference between wine and other alcoholic beverages.	
CO3	They learn to identify and taste the different kinds of wine.	
CO4	The present paper encourages them to be entrepreneurs.	

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.	
CO3	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.
CO3	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	
CO2	Utilise the technique of solvent extraction to separate different solutes in a compound or extract medicinal components from herbs.	

Name of the Course		Basic Analytical Chemistry
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 development using cheminformatics.	
CO3	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.	