

COURSE OUTCOMES BSC (BIO-TECHNOLOGY)

F. Y. B.Sc.	
SEM-I	
PAPER 1	Course Title: Basic Chemistry-I Course Code: USBT 101
CO1	The learner would be able to understand the basic concept of Chemistry
CO2	The learner would be able to comprehend the Nomenclature and Classification of Inorganic Compounds.
CO3	The learner would be able to understand Nomenclature and Classification of Organic Compounds
CO4	The learner would be able to comprehend the Nature of Ionic Bond, Structure of NaCl, KCl and CsCl, factors influencing the formation of Ionic Bond.
CO5	The learner would be able to understand Nature of Covalent Bond, Structure and Shapes of different molecules
CO6	The learner would be able to understand Nature of Coordinate Bond.
CO7	The learner would be able to understand Non- Covalent Bonds
CO8	The learner would be able to discuss Theory of Hydrogen Bonding and Types of Hydrogen Bonding.
CO9	The learner would be able to understand the Chemistry of Water and concept of Acids, Bases.
CO10	The learner would be able to develop skills in preparation of solution of different concentrations.
CO11	The learner would be able to impart hands on skill in Preparation of Buffers Solutions.
PAPER 2	Course Title: Basic Chemistry-II Course Code: USBT 102
CO1	The learner would be able to understand the concept of Types of Isomerism.
CO2	The learner would be able to comprehend the concept of Geometrical Isomerism and Optical Isomerism.
CO3	The learner would be able to discuss Difference between Configuration and Conformation.
CO4	The learner would be able to evaluate different Projection Formulae
CO5	The learner would be able to impart knowledge of Titrimetric Analysis.
CO6	The learner would be able to develop Titration Skills.
CO7	The learner would be able to understand different types of Titrations.
CO8	The learner would be able to comprehend the concept

	of Gravimetric Analysis.
CO9	The learner would be able to develop Skills in Separation Methods.
CO10	The learner would be able to understand the technique in handling Column Chromatography, TLC, Paper Chromatography.
CO11	The learner would be able to comprehend the fundamentals and applications of Colorimetry.
CO12	The learner would be able to understand the Applications of different analytical Techniques.
PAPER 3 Course Title: Basic Life Sciences-I : Biodiversity and Cell Biology Course Code: USBT 103	
CO1	The learner gains the knowledge of Chemical and Biological evolution.
CO2	The learner understands the diversity of Microbes, Plants and Animals
CO3	The learner acquires the knowledge of ultrastructure of prokaryotic cells and its organelles.
CO4	The learner understands about the ultrastructure of the Eukaryotic cell and its organelles and functions.
CO5	The learner would be able to identify different types of bacteria.
CO6	The learner understands the concept of growth kinetics and classification of viruses.
PAPER 4 Course Title: Basic Life Sciences-II : Microbial Techniques Course Code: USBT 104	
CO1	The learner would be able to understand functions and applications of Microscopes.
CO2	The learner would be able to impart the knowledge of basic staining techniques
CO3	The learner understands Sterilization techniques.
CO4	The learner acquires the knowledge of types of sterilization and disinfectants used.
CO5	The learner gains the knowledge of nutritional requirements for growth of Microorganisms.
CO6	The learner understands different types of media and concept of growth phases.
PAPER 5 Course Title: Basic Biotechnology-I : Introduction to Biotechnology Course Code: USBT 105	
CO1	The learner understands various branches in Biotechnology.
CO2	The learner acquires the knowledge of Traditional and Modern Biotechnology.
CO3	The learner gains the knowledge of Genetically modified Plants.
CO4	The learner understands Ethics in Biotechnology.
CO5	The learner would be able to learn Food technology and Food quality enhancement.
CO6	The learner acquires the knowledge of Fermentation technology and its applications.

PAPER 6 Course Title: Basic Biotechnology-II: Molecular Biology	
Course Code: USBT 106	
CO1	The learners would be able to understand Semi Conservative DNA replication.
CO2	The learner would analyze the difference between Prokaryotic replication and Eukaryotic replication.
CO3	The learner would analyze the difference between Physical Chemical and Biological Mutagens.
CO4	The learner would interpret DNA repair mechanisms.
CO5	The learner would be able to understand Experimental evidences for DNA and RNA as Genetic Material .
CO6	The learner would be able to understand the mechanism of identifying the recombinant clones.
CO7	To understand the different types of Cloning vectors.
PRACTICAL: 1 Course Code: USBTP 101	
CO1	The learner would be able to develop skills in preparation of solution of different concentrations.
CO2	The learner would be able to impart hands on skill in Preparation of Buffers Solutions
CO3	The learner would be able to develop skills in Characterization of Organic Compounds containing only C, H, O elements
PRACTICAL: 2. Course code: USBT102	
CO1	The learner would be able to understand components and working of different types of microscopes.
CO2	The learner would be able to understand special staining techniques.
PRACTICAL: 3 Course code: USBTP103	
CO1	The learner would be able to understand the process of lactic acid determination, analysis of milk and extraction of casein from milk.
CO2	The learner would be able to examine fermentative production of alcohol.
CO3	The learner would be able to perform agarose gel electrophoresis of the genomics & plasmid DNA
SEM-II	
PAPER 1 Course Title: Bioorganic Chemistry Course Code: USBT201	
CO1	The learner would be able to understand Structures, Classification and Characterisation of Carbohydrates and Lipids.
CO2	The learner would be able to comprehend the Chemical/Physical Properties of Carbohydrate.
CO3	The learner would be able to understand the Chemical Reactions for Detection of Mono., Di and Polysaccharides
CO4	The learner would be able to discuss the structure and functions of Cholesterol
CO5	The learner would be able to comprehend the Classification, Preparation and Properties of Amino Acids.
PAPER 2 Course Title: Physical Chemistry Course Code: USBT202	
CO1	The learner would be able to understand the basic

	concept of Thermodynamics.
CO2	The learner would be able to discuss the laws of thermodynamics
CO3	The learner would be able to understand the concept of Entropy
CO4	The learner would be able to discuss the Carnot cycle for Ideal Gas.
CO5	The learner would be able to understand the Rate of Reaction, Rate Constant.
Paper 3. Course Title: Physiology and Ecology. Course code: USBT203	
CO1	The learner will gain the knowledge of Physiological process in Plants
CO2	The learner will be able to understand different Plant hormones and Secondary metabolites in plants
CO3	The learner will gain the knowledge of Physiological process in Animals
CO4	The learner will understand the mechanism of respiration and structure, functions and constituents of blood
CO5	The learner would be able to understand Biotic and Abiotic Factors.
Paper 4. Course Title: Life Sciences-II. Course code:USBT204	
CO1	The learner will understand the Principle of Dominance and Segregation.
CO2	The learner will be able to explain the process of epistasis.
CO3	The learner will also differentiate between the incomplete Dominance and Co dominance.
CO4	The learner will be able to understand Bacteriophage Lytic and Lysogenic cycle
CO5	The learner will gain the knowledge of Mechanism of genetic exchange in bacteria
Paper 5. Course Title: Biotechnology-I Course code: USBT205	
CO1	The learner will understand the technique of Plant tissue culture.
CO2	The learner will also understand Culture Medium and Nutritional requirements for tissue culture.
CO3	The learner will acquire the knowledge of Nutritional and Physiological Growth Factors for cell culture.
CO4	The learner will acquire the knowledge of Communication Skills.
CO5	The learner will be able to understand Scientific Writing and Plagiarism.
Paper 6 Course Title: Biotechnology-II Course code: USBT206	
CO1	The learner will be able to explain the Definition, Classification, Nomenclature, Chemical Nature, Properties of Enzymes.
CO2	The learner will be able to differentiate between Competitive enzymes and Un Competitive enzymes and Non Competitive enzymes.
CO3	The learner will be able to understand antigen and antibody interactions
CO4	The learner will acquire the knowledge of

	Monoclonal Antibodies, Vaccines and Toxoid.
CO5	The learner would be able to impart knowledge of Importance of Statistics in Biology.
Practical 1. Course code: USBTP201	
CO1	The learner would be able to develop skills in estimation of Protein by Biuret method and Lowry method
CO2	The learner would be able to determine enthalpy of dissolution of salt like KNO ₃ .
CO3	The learner would be able to understand the Study the reaction between NaHSO ₃ and KMnO ₄ and balancing the reaction in acidic, alkaline and neutral medium
Practical 2. Course code: USBTP202	
CO1	The learner would be able to examine human blood groups.
CO2	The learner would be able to understand mitosis and meiosis
CO3	The learner would be able to examine problems in Mendelian genetics
PRACTICAL: 3 Course Code:USBTP203	
CO1	The learner would be able to understand the working and use of various instruments used in Biotechnology laboratories.
CO2	The learner would be able to understand aseptic transfer techniques, surface sterilisation and inoculation techniques for callus culture.
S.Y. B.Sc.	
SEM-III	
PAPER 1 Course Title: Biophysics Course Code:USBT301	
CO1	The learner would be able to understand the Properties of Light
CO2	The learner would be able to understand the Properties of Lasers and Applications of Laser.
CO3	The learner would be able to understand the concept of Electromagnetic Radiations.
CO4	The learner would be able to relate principles of Physics to applications and techniques in the field of Biology such as Spectroscopy
CO5	The learner would be able to discuss the types of Microscopy.
PAPER 2 Course Title: APPLIED CHEMISTRY –I Course Code:USBT302	
CO1	The learner would be able to develop an understanding of the different aspects of Organic Chemistry
CO2	The learner would be able to understand the different types of organic reactions.
CO3	The learner would be able to discuss the Role of Metal Ions in Biological Systems
CO4	The learner would be able to comprehend the Metal Coordination in Biological Systems
CO5	The learner would be able to discuss functions of Metal Complexes in Medicines

PAPER 3 Course Title: Immunology Course Code:USBT303	
CO1	The learner would be able to understand the role of different types of cells, effector molecules and effector mechanisms in immunology.
CO2	The learner would be able to understand cell receptors i.e T- cell and B- cell receptor.
CO3	The learner would be able to understand the Principles underlying various immunotechniques
CO4	The learner would be able to analyse the alternatives to Antigen-Antibody reactions
PAPER 4. Course Title: Cell biology & cytogenetics. Course code: USBT304	
CO1	The learners would be able to understand cytoskeleton And its major Functions
CO2	The learner would analyze the structure, assembly disassembly and composition of Cytoskeleton.
CO3	The learner would analyze the difference between active transport and passive transport
CO4	The learner would be able to examine the difference between change in chromosome number and chromosome structure.
CO5	The learner would be also to understand mechanism of sex determination
CO6	The learner would interpret the role of plasma membrane
PAPER 5. Course Title: Molecular Biology. Course code: USBT305	
CO1	The learner would be able to discuss the mechanisms associated with Gene expression at the level of Transcription.
CO2	The learner would be able to understand the mechanisms associated with Gene expression at the level of Translation
CO3	The learner would be able to understand the nature of genetic code.
CO4	The learner would be able to understand the mechanisms associated with Regulation of Gene Expression in Prokaryotes & Eukaryotes
PAPER 6. Course Title: Bioprocess Technology. Course code: USBT306	
CO1	The learner would be able to develop an understanding of the various aspects of Bioprocess Technology
CO2	The learner would be able to develop skills associated with screening of industrially important strains.
CO3	The learner would be able to understand principles underlying design of fermenter and fermentation process
CO4	The learner would be able to analyse In-vivo and In- vitro assay of industrial products
PAPER 7. Course Title: Research Methodology. Course code: USBT307	
CO1	The learner would be able to understand the basic principles of Research Methodology & identify Research Problems
CO2	The learner would be able to understand a general definition of Research Design.

CO3	The learner would be able to identify the overall process of designing a research study from its inception to its report
PRACTICAL:1 Course Code: USBTP301	
CO1	The learner would be able to develop the skills in Extraction of Plasmid DNA and Separation by Agarose Gel Electrophoresis
CO2	The learner would be able to comprehend the Verification of Beer-Lambert's Law
CO3	The learner would be able to develop the skills in Organic Estimation.
PRACTICAL: 2 Course code: USBTP302	
CO1	The learner would be able to understand the immunoelectrophoresis process.
	The learner would be able to examine western blotting technique
PRACTICAL: 3 Course code: USBTP303	
CO1	The learner would be able to understand lab scale production of penicillin (by static & shaker method)
CO2	The learner would be able to understand the process of estimation of alcohol by Dichromate method.
SEM-IV	
PAPER 1 Course Title: Biochemistry Course Code: USBT401	
CO1	The learner would be able to discuss the Metabolic Pathways of Carbohydrates.
CO2	The learner would be able to discuss Electron Transport System and Oxidative Phosphorylation.
CO3	The learner would be able to discuss the Metabolic Pathways of Amino Acids.
CO4	The learner would be able to understand the Urea Cycle and Breakdown of Glucogenic and Ketogenic Amino Acids.
CO5	The learner would be able to understand the Mobilization and Transport of Fatty Acids.
PAPER 2 Course Title: Applied Chemistry-II Course Code:(USBT402)	
CO1	The learner would be able to develop an understanding of the different aspects of Organic and Green Chemistry.
CO2	The learner would be able to understand the different types of organic reactions.
CO3	The learner would be able to understand the Criteria for Ideal Synthesis; Selectivity and Yield.
CO4	The learner would be able to develop Skills in Microwave Assisted Organic Synthesis.
CO5	The learner would be able to discuss the Need and Relevance of Green Chemistry.
PAPER 3 Course Title: Medical Microbiology Course Code:(USBT403)	
CO1	The learner will be able to gain insight into Disease Factors and Host Parasite Relationship.
CO2	The learner will be able to understand various patterns of infection and types of infections.
CO3	The learners will be able to list the factors playing a role in causing a disease.

CO4	The learner will acquire the knowledge of various aspects of Systemic Infections including Causative Agents, Symptoms and Prophylaxis.
CO5	The learner will be able to understand Characteristics, Virulence- Pathogenesis and Immunity of Gastrointestinal tract infections.
PAPER 4 Course Title: Environmental Biotechnology. Course code: (USBT404)	
CO1	The learner will be able to gain an understanding of the causes, types & control methods for environmental pollution.
CO2	The learner would be able to understand global environmental problems and issues.
CO3	The learner would be able to analyse the application of different life forms in environmental remediation
PAPER 5. Course Title: Bioinformatics and Biostatistics. Course code: (USBT405)	
CO1	The learner would be able to gain an understanding of the basic concepts of Bioinformatics.
CO2	The learner would be able to understand the tools used in Bioinformatics
CO3	The learner would be able to gain an understanding of the basic concepts of Biostatistics.
CO4	The learner would be able to apply the various statistical tools for analysis of biological data.
PAPER 6. Course Title : Molecular Diagnostics. Course code: (USBT406)	
CO1	The learners would be able to understand Extraction, Isolation and Detection of DNA, RNA and Proteins.
CO2	The learner would analyze the clinical applications of Southern, Northern, Western and FISH.
CO3	The learner would analyze the difference between PCR and RT- PCR.
CO4	The learner would interpret PCR - General Principle Components of a Typical PCR Reaction.
CO5	The learner would be able to understand the importance of RFLP in Understanding Sickle cell Anemia.
CO6	The learner would be able to understand mechanism of Ethical, Social and Legal Issues to Molecular- Genetic Testing
PAPER 7. Course Title : Entrepreneurship development. Course code: (USBT407)	
CO1	The learner will be develop an understanding of the systematic process and to select and screen a business idea.
CO2	The learner would be able to design strategies for successful implementation of ideas
CO3	The learner would be able to write a business plan.
CO4	The learner would be able to understand the marketing plans for an entrepreneurship.

	and Biological Synthesis of Silver Nanoparticles and its Characterisation by UV- VIS Spectrophotometer
T.Y.B.Sc	
SEM-V	
PAPER 1 Course Title: Biochemistry Course Code:USBT501	
CO1	The learner would be able to understand prokaryotic and eukaryotic cell cycles.
CO2	The learner would be able to understand cell signalling and the cell transduction process.
CO3	The learner would be able to analyse stages of cell development, mechanisms of cell differentiation and pattern formation in developmental biology.
CO4	The learner would be able to understand cancer as a microevolutionary process.
CO5	The learner would be able to analyse Cancer and virus cancer diagnosis and chemotherapy.
PAPER 2 Course Title: Medical Microbiology & instrumentation Course Code: USBT502	
CO1	The learner would be able to understand term virology i.e study of viruses.
CO2	The learner would be able to examine classification of antibacterial agents and discovery and designs of antimicrobial agents.
CO3	The learner would be able to understand the use and misuse of antimicrobial agents.
CO4	The learner would be able to understand principle, instrumentation, working and application of different spectroscopy.
CO5	The learner would be able to understand bio analytical techniques.
PAPER 3 Course Title: Genomes and molecular biology Course Code: USBT503	
CO1	The learner would be able to develop an understanding of the methodology of Genetic engineering of plants and its applications.
CO2	The learner would be able to develop an understanding of different methods of Transgenic animals and fish.
CO3	The learner would be able to understand tools of Molecular Biology which are used in recombination

	technology.	
CO4	The learner would be able to understand Gene sequencing and editing.	
PAPER 4 Course Title: Marine Biotechnology Course Code:USBT504		
CO1	The learner would be able to develop an understanding of the Marine ecosystem and its functioning and Bioprospecting.	
CO2	The learner would be able to develop an understanding of extraction of pharmaceutical compounds and enzymes from marine flora and fauna.	
CO3	The learner would be able to understand Marine Sources as Healthy Foods or Reservoirs of Functional Ingredients and Marine Bioactives as Potential Nutraceuticals.	
CO4	The learner would be able to understand Marine Bioresources, use of Marine Secondary Metabolites and production of Cosmetic from marine resources.	
Applied Component Course Title: Biosafety Course Code:USBT505		
CO1	The learner would be able to develop an understanding of Biological Risk Assessment and biosafety.	
CO2	The learner would be able to understand Good laboratory Practices.	
CO3	The learner would be able to understand methods of detection and testing of contaminants.	
CO4	The learner would be able to develop an understanding of concepts on biosafety in Biotechnology.	
PRACTICAL: 1 Course Code: USBT P 501-502		
CO1	The learner will be able to understand the principle, working and applications of Affinity chromatography, ion exchange chromatography, Size exclusion chromatography.	
CO2	The learner will acquire the knowledge of different antibiotic sensitivity test by using various microbial cultures.	
PRACTICAL: 2 Course Code: USBT P 503-504		
CO1	The learner will acquire the practical knowledge of Gene extraction technique.	
CO2	The learner will understand the technique of extracting alkaloids and carotenoids from marine organisms.	
PRACTICAL: 3 Course Code: USBT 505		
CO1	The learner will understand importance of validation and calibration of Micropipette and pH meter.	
CO2	The learner will develop the knowledge of performing food adulteration tests.	
SEM-VI		
PAPER 1 Course Title: Biochemistry Course Code: USBT 601		
CO1	The learner would be able to understand Protein structure, Protein Denaturation and Folding.	
CO2	The learner will acquires the knowledge of	

	Carbohydrate biosynthesis and its regulation.	
CO3	The learner would be able to develop an understanding of Mechanism of action of group I and II Hormones.	
CO4	Acquires the knowledge of Minerals and Vitamins.	
PAPER 2 Course Title: Industrial Microbiology Course Code: USBT 602		
CO1	The learner would be able to understand the different milk flora, processing and dairy technology.	
CO2	The learner would be able to develop an understanding skills of Down-stream processing.	
CO3	The learner would be able to develop an understanding techniques of Bacterial and fungal fermentation.	
CO4	The learner would be able to understand Quality control and Quality Assurance of GMP	
PAPER 3 Course Title: Basic pharmacology and Neurochemistry Course Code: USBT 603		
CO1	The learner would be able to develop an understanding Mechanism of drug action, Effective dose and Lethal dose.	
CO2	The learner would be able to develop an understanding mechanism of drug absorption and distribution.	
CO3	The learner would be able to understand toxins regulation of toxins and poison.	
CO4	The learner would be able to understand Anatomy and functioning of the brain and Neuronal pathways.	
PAPER 4 Course Title: Environmental Biotechnology Course Code: USBT 604		
CO1	The learner would be able to develop an understanding renewable energy source – solar energy, wind power, geothermal energy and hydropower, biomass energy and Biofuel.	
CO2	The learner would be able to develop an understanding biological process for industrial effluent treatment.	
CO3	The learner would be able to understand Wastewater treatment with help of biosorption by bacteria, fungi and algae.	
CO4	The learner would be able to understand biodegradation of waste from industry.	
Applied Component: Course Title: Agri-Biotechnology Course Code: USBT 605		
CO1	The learner would be able to develop the knowledge of Agriculture and Agriculture systems and technology.	
CO2	The learner would be able to understand Physiological and molecular responses of different types of plant stresses .	
CO3	The learner would be able to understand uses of Genetic markers in plant breeding.	
CO4	The learner would be able to develop an understanding of Biofertilizers and Biopesticides.	
PRACTICAL: 1 Course Title: Course Code: USBT P 601-602		
CO1	The learner will be able to understand technique of microbial analysis and identify normal microbial	

	flora.	
CO2	The learner will develop the knowledge of determining blood glucose and serum cholesterol.	
PRACTICAL: 2 Course Code: USBT P 603-604		
CO1	The learner will acquire the knowledge of effect of heavy metals on microorganisms.	
CO2	The learner will study physico-chemical parameters of water samples.	
PRACTICAL: 3 Course Code: USBT P 605		
CO1	The learner will be able to understand isolation technique for bacteria.	
CO2	The learner will acquire the knowledge of estimation of antioxidant enzymes.	