

Course outcomes of programs of 2020

Curriculum School of Basic and Applied Sciences

Undergraduate (BSc) Course Outcomes		
Course code	Title of the course	Course outcome
20AU0003	CONSTITUTION OF INDIA AND HUMAN RIGHTS	<ul style="list-style-type: none"> • Outline the fundamental law of the land Prediction of the government the country will have • Outline the rules to govern the country Compile the rights and also the duties of its citizens
20AU0020	KANNADA KALI - I	<ul style="list-style-type: none"> • Should be able to read Kannada • Should be able to write in Kannada • Should be able to communicate in Kannada • Should be able to use words for numbers, feelings, time etc., in Kannada
20AU0022	KANNADA MANASU - I	<ul style="list-style-type: none"> • Should be able to improve speaking of Kannada • Should be able to enhance writing skills in Kannada • Should be able to improve on communication in Kannada • Should be able to use interpret Kannada literature
20BC1101	BASIC BIOCHEMISTRY	<ul style="list-style-type: none"> • "Will be able to comprehend the role pH, buffers, and concentration of ions in biological systems. • Will be able to solve the problems on the molarity, normality, concentrations, pH and prepare the buffers. • Will be able to demonstrate

		<p>the composition, structure and geometry of different bio-molecules like carbohydrates, lipids, proteins and nucleic acids.</p> <ul style="list-style-type: none"> • Will be able to demonstrate structure and functional relationships between the biomolecules like carbohydrates, lipids, proteins and nucleic acids.
20BC1171	BASIC BIOCHEMISTRY PRACTICAL	<ul style="list-style-type: none"> • Should be able to use weighing balance • Should be able to use potentiometer • Should be able to utilize the pH concept and pH meter • Should be able to analyze the biomolecule composition of edible materials
20BC1201	BIO ANALYTICAL TECHNIQUES	<ul style="list-style-type: none"> • Should be able to outline and perform basic techniques like Potentiometry & Chromatography • Should be able to use high end biotechniques like Mass spectroscopy & NMR • Will know how to use biomedical equipments. • Will be able to assess the working and analysis of CAT, PET scanner used in hospitals.
20BC1271	BIO ANALYTICAL SEPARATIONS	<ul style="list-style-type: none"> • "Should be able to use weighing balance • Should be able to use potentiometer • Should be able to utilize the pH concept and pH meter • Should be able to analyze the biomolecule composition of edible materials
20BC2301	HUMAN PHYSIOLOGY	<ul style="list-style-type: none"> • Should be able to demonstrate the nutritional value with the human body functioning.

		<ul style="list-style-type: none"> • Should compile the functioning of vital organs in human. • Should assess the pathophysiology under diseases condition. • Should compare and evaluate a diagnostic report for abnormal functioning of the vitals.
20BC2371	CLINICAL BIOCHEMISTRY	<ul style="list-style-type: none"> • Should differentiate between normal and abnormal physiology in humans. • Should be able to analyse the various normal and abnormal urine and blood constituents. • Should demonstrate report writing skills which can assist clinicians for therapy. • Should evaluate the qualitative and quantitative parameters in urine and blood samples for diseases.
20BC2401	ENZYMOLGY AND PROTEIN CHEMISTRY	<ul style="list-style-type: none"> • Will be able to comprehend the classification and function of various proteins along with their structural hierarchy • Will be able to comprehend the active site of the enzyme and how it helps in reactions. • Will be able to draw various plots /graphs to understand the nature of enzyme and inhibitor. • Will be able to analyze the results obtained after protein characterization.
20BC2471	ENZYMOLGY-PRACTICAL	<ul style="list-style-type: none"> • Will be able to perform basic calculations required to determine enzyme activity • Able to solve the numerical problems, calculate the total activity, specific activity and Kcat of enzymes • Will be able to handle the biological samples and design,

		<p>execute and interpret the enzymatic assays</p> <ul style="list-style-type: none"> • will be able to design and execute method for enzyme immobilization and purification and will be able to interpret the results of enzyme purification "
20BS1101	BASIC CHEMISTRY	<ul style="list-style-type: none"> • Student will acquire a foundation of chemistry of sufficient breadth and depth to enable them to understand and critically interpret the primary concepts in chemistry. Students will be familiarized with the basic concepts related to chemical bonding, electrochemistry, thermodynamics, chemical kinetics and apply them various biological molecules and interpret their properties • Students acquire foundation in stereochemistry, reaction mechanism and their interdisciplinary role in thorough understanding of higher biological courses
20BS1102	COMMUNICATIVE ENGLISH	<ul style="list-style-type: none"> • Demonstrate ability to comprehend English Ability to write and communicate effectively ability to speak
20BS1201	BIOINFORMATICS AND BIOSTATISTICS	<ul style="list-style-type: none"> • Should demonstrate the usage of biological databases for protein and gene analysis. • Should prepare a protein/gene and analyze for structure predictions. • Should apply various tools of statistics in biology for a better mathematical approach. • Should compute biostatistics using packages such as MS Excel, SPSS and Prism Graph Pad.
20BS1202	COMPUTER APPLICATIONS AND INFORMATION TECHNOLOGY	<ul style="list-style-type: none"> • To demonstrate basic skills in computers and better assessment of data • To demonstrate, process and analyze information related to biology

		<ul style="list-style-type: none"> • To critically evaluate the applications of softwares and their packages • To get hands-on training to analyze data and to design basic databases
20BS2301	MOLECULAR BIOLOGY	<ul style="list-style-type: none"> • To demonstrate the fundamental understanding of central dogma of molecular biology • To compile the steps involved in DNA replication and display experimental evidence that indicates that it is semi conservative in nature • To demonstrate the fundamentals of steps involved in transcription and translation • To compile the regulatory aspects of DNA replication, transcription and translation
20BS2302	ENVIRONMENTAL SCIENCE	<ul style="list-style-type: none"> • To demonstrate the fundamental knowledge of biosphere and various nutrient cycles • To compile principles of biogeochemistry and display understanding of weather patterns • To display the concepts of environmental pollutions : causes and effects • To demonstrate the fundamental understanding of control measures that help to control and mitigate environmental pollution
20BS2401	GENOMICS AND PROTEOMICS	<ul style="list-style-type: none"> • Should demonstrate the usage of biological databases for protein and gene analysis. • Should prepare a protein and gene to analyse for structure predictions. • Should apply protein/gene for cross-utility databases in various formats.

		<ul style="list-style-type: none"> • Should compute active sites and domains for molecular docking studies depending on binding studies.
20BS2402	BIOETHICS AND IPR	<ul style="list-style-type: none"> • Demonstrate basic understanding of the concepts of Biosafety, bioregulatory framework and GMOs in India • Display basic understanding of the International Bioregulatory frameworks • To compile Bioethics and its role in Biotechnology • To demonstrate basic knowledge of the elements of patent laws and intellectual property rights
20BS3571	COMBINED PRACTICAL 1 (APPLIED MICROBIOLOGY + FERMENTATION TECHNIQUES)	<ul style="list-style-type: none"> • Should be able to analyse the role of microbes in agriculture • Outline the isolation techniques from environmental samples • Should be able to employ microorganisms for industrial procedures • Should be able to optimize conditions for microbial production
20BS3573	COMBINED PRACTICAL 1 (ESTIMATION OF BIOMOLECULES + FERMENTATION TECHNIQUES)	<ul style="list-style-type: none"> • Quantitate different biomolecules (Carbohydrates, Proteins, Lipids, etc) • Detect and perform assay techniques for various biomolecules (DNA, RNA). Should be able to analyse and detect the unsaturation in lipids. • Detect the composition of inorganic molecules. Identify the different isolation, screening and identification methods for industrial production. • Outline the fermentation process of industrially important product like alcohol, lactic acid, citric acid and antibiotics.

20BS3575	COMBINED PRACTICAL 1 (ADVANCED MICROBIOLOGY + POPULATION STATISTICS)	<ul style="list-style-type: none"> ▪ Should be able to demonstrate analytical skills used in quality control assays ▪ Should be able to compile necessary parameter checks required to operate industrial bioprocesses ▪ Should be able to design statistical models to compare epidemiological impacts of diseases ▪ Should be able to analyse distribution of disease traits statistically
20BS3576	COMBINED PRACTICAL 2 (ESTIMATION OF BIOMOLECULES + POPULATION STATISTICS)	<ul style="list-style-type: none"> • Quantitate different biomolecules (Carbohydrates, Proteins, Lipids, etc) • Detect and perform assay techniques for various biomolecules (DNA, RNA). • Should be able to analyse and detect the unsaturation in lipids. • Detect the composition of inorganic molecules.
20BS3601	RESEARCH METHODOLOGY	<ul style="list-style-type: none"> • Should be able to compile research findings with structured scientific writing. • To critically evaluate the scientific data with statistical evidence and correlation. • To build hypothesis, work plan and design feasible experimental methods.

		<ul style="list-style-type: none"> To compile the data and draft for various formats of manuscript and presentations.
20BS3602	PROJECT	<ul style="list-style-type: none"> Should be able to collect, read and manage research information. Should be able to hypothesize research question, plan experiments, conduct and observe results. Should be able to interpret and demonstrate results effectively Should be able to compile, present and publish research findings.
20BT1101	FUNDAMENTALS OF CELL BIOLOGY	<ul style="list-style-type: none"> Should be able to identify different organelles of the cell Should be able to demonstrate/identify the different parts of cell cycle and their function Should be able to identify the regulatory steps and their significance in cell cycle control. Identify the steps involved in mitosis and meiosis Know the difference between and significance or relevance of meiosis and mitosis Be able to apply the concepts in cell cycle to cell growth
20BT1171	TECHNIQUES IN CELL BIOLOGY	<ul style="list-style-type: none"> Demonstrate the ability to use student microscope Demonstrate the simple staining procedures to identify cells and microorganisms Demonstrate the mitotic stages cells of onion root tip Demonstrate the preparation of blood smears and differential staining using Leishmans stain

		<ul style="list-style-type: none"> • Demonstrate the use of hemocytometer and count the given cells
20BT1271	IMMUNO-TECHNIQUES – PRACTICAL	<ul style="list-style-type: none"> • Demonstrate the working principles of blood grouping • Demonstrate the dot ELISA technique • Compile the working principles of immunodiffusion techniques • Demonstrate the principles behind soluble Vs particulate antigens and selection of the immunoassay
20BT2301	PRINCIPLES OF RECOMBINANT DNA TECHNOLOGY	<ul style="list-style-type: none"> • Compile the various enzymatic tools and their functions in the field of genetic engineering • Demonstrate the fundamentals of various vectors used in rDNA technology • Compile various techniques that aid in cloning and expression of desired genes • Demonstrate the fundamentals of the applications of genetic engineering in Biotechnology
20BT2371	TECHNIQUES IN RECOMBINANT DNA TECHNOLOGY – LAB	<ul style="list-style-type: none"> • identify the basic instruments used in rDNA lab • prepare reagents required, prepare the competent cells and carry out transformation of E coli cells with the given plasmid • Purify plasmid using alkaline lysis method and analyze its quality • estimate the quantity of the given DNA using spectrophotometric method and determine the purity
20BT2401	PRINCIPLES OF ANIMAL AND PLANT BIOTECHNOLOGY	<ul style="list-style-type: none"> • Revise the basic concepts of Biotechnology and demonstrate fundamental cellular events during the

		<p>process of plant cell culture development</p> <ul style="list-style-type: none"> • Assess the factors influencing plant cell differentiation and thereby execute proper techniques/ procedures for the maintenance of sterile condition and proper plant growth • Apply learned techniques in new or similar situations • Translate the concepts in future studies and debate on the issue related to GMOs and evaluate its significances • Express the concerns over modern plant biotechnology and analyse them according to the regulatory frame works • Illustrate the techniques, procedure and growth patterns of animal cell culture. • Describe the invitro applications of animal cell culture.
20BT2471	TECHNIQUES IN ANIMAL AND PLANT BIOTECHNOLOGY – LAB	<ul style="list-style-type: none"> • Utilize the basic concepts of tissue culture and know the basic working of the tissue culture lab set up • demonstrate the ability to handle aseptic procedures essential to the tissue culture • demonstrate the fundamentals of major and minor components of tissue culture media and preparation of stock solutions
20BT3501	FERMENTATION BIOTECHNOLOGY	<ul style="list-style-type: none"> • outline the current methods of fermentation process and modern fermenters. L-1 • identify the strategies for isolation, screening and identification of industrially important strains. L-2

		<ul style="list-style-type: none"> • demonstrate the sterilization process involved in fermentation. L-2 • identify the design any fermenter for production process. L-2 • identify the upstream and downstream processing. L-3 • outline the production of important microbial products.
20CY1101	ADVANCED CHEMISTRY I	<ul style="list-style-type: none"> • Students are infused with the recapitulation of fundamentals of organic chemistry and the introduction of a new concept of visualizing the organic molecules in a three-dimensional space. • Formulate the mechanism of organic reactions by recalling and correlating the fundamental properties of the reactants involved. • Apply the concepts of gas equations, pH and electrolytes while studying other chemistry courses and everyday life.
20CY1171	VOLUMETRIC ESTIMATIONS PRACTICAL	<ul style="list-style-type: none"> • Students be able calibrate various basic glassware used in the chemical laboratory • Students demonstrate skills of assembling the glassware required for different reactions • Students able to estimate concentration of various chemicals based on titration principles.
20CY1201	ADVANCED CHEMISTRY II	<ul style="list-style-type: none"> • Students will recognize the descriptive chemistry of representative elements of s- and p-block elements and recognize the differences in their reactivity, chemical and physical properties • Students able to classify ideal & non-ideal solutions and also able recognize various properties of liquids and methods to compute

		<p>them.</p> <ul style="list-style-type: none"> • Students able to derive various expressions related to first and second law of thermodynamics and use them to solve numerical problems. • Students be able to describe aromatic hydrocarbons, their properties & reactions and also able to distinguish between SN1 & SN2 and E1 & E2 reactions.
20CY1271	SYNTHESIS & ANALYSIS OF ORGANIC COMPOUNDS – LAB	<ul style="list-style-type: none"> • Students be able estimate density, surface tension and viscosity of various liquids. • Students able to compute molar mass, distribution coefficient and transition temperature of given chemical compounds. • Students able to separate different organic compounds using chromatographic techniques.
20CY2301	ADVANCED CHEMISTRY III	<ul style="list-style-type: none"> • Students be able understand phase rule apply it to various equilibrium systems. • Students recognize different properties of solids and be able to solve problems related to Bragg's expression. • Students be able derive expressions related different thermodynamic concepts and use them solve numerical problems. • Students able describe alcohols, phenols, aldehyde and ketone, their properties, synthesis and reactions.
20CY2371	SEMI-MICRO QUALITATIVE ANALYSIS OF BINARY SALT MIXTURES	<ul style="list-style-type: none"> • Students will be able analyze salt mixture qualitatively and recognize the radicals present in the mixture. • Students will be able to separate different ions through paper chromatographic technique. • Students be able to separate

		ions through solvent extraction technique.
20CY2401	ELECTROCHEMISTRY AND ADVANCED SPECTROSCOPY	<ul style="list-style-type: none"> • Students come across various concepts and derivations related to concepts of electrochemistry and able apply them to solve numerical problems associate with that. • Students be able describe various spectroscopic techniques, their theories, principles and instrumentation. • Students able to recognize various organic molecules based on their spectroscopic data.
20CY2471	PHYSICO-ELECTROCHEMICAL TECHNIQUES - LAB	<ul style="list-style-type: none"> • Students be able to perform experiments to determine velocity constant of esters • Students be able to determine equivalent conductivity and dissociation constant using conductivity instrument. • Students be able to find out pKa of a weak acid by pH metric method
20GN1101	BASIC GENETICS	<ul style="list-style-type: none"> • Should be able to apply concepts of genetics in comprehending factors affecting inheritance • Should be able to compare mendelian genetics from non mendelian genetics • Should be able gain the ability to analyze and relate phenotype to genotype. • Should be able to identify, and predict non mendelian cross outcomes.
20GN1171	BASIC GENETICS PRACTICAL	<ul style="list-style-type: none"> • Should be able to demonstrate slide preparation processes to differentiate cell division stages • Should be able to analyze and identify gene interactions, predict crosses and understand its role in inheritance.

		<ul style="list-style-type: none"> • Identify key differences between different stages of meiosis and mitosis • Analyze the results of multiple allelism and how it impacts inheritance
20GN1201	FUNDAMENTALS OF CYTOGENETICS	<ul style="list-style-type: none"> • Should be able to critique on chromosomes, its conformations to bring about genetic variability. • Should be able to compare different chromosomal abnormalities, and assess disease symptoms • Should be able to identify and compare differences between several Drosophila mutants. • Should be able to apply concepts of recombination in evaluating genetic variation and linkage
20GN1271	FUNDAMENTALS OF CYTOGENETICS PRACTICAL	<ul style="list-style-type: none"> • Should gain skill to prepare and visualize chromosomal slides from various sources. • Should be able to compute and solve genetic linkage analysis by construction of cytogenetic maps on linkage. • Should become skilled in handling and maintaining Drosophila cultures. • Should be able to assess gene interactions, predict crosses and demonstrate its role in inheritance.
20GN2301	BASIC HUMAN GENETICS AND GENETIC ENGINEERING	<ul style="list-style-type: none"> • Should demonstrate the ability to use of tools and strategies used in genetic engineering. • Assess applications of recombinant DNA technology in genetics • Outline strategies that can be adopted to modify genes. • Compare different vectors used in cloning and their relevance

20GN2371	BASIC HUMAN GENETICS AND GENETIC ENGINEERING PRACTICAL	<ul style="list-style-type: none"> • Proficient in preparing human chromosomes for karyotyping analysis. • Describe gene cloning, restriction endonucleases, use modern gene technologies are used to elucidate genetic issues • Critically analyse, evaluate and compile results from cloning experiments • Should be able to outline parameters necessary to design molecular cloning experiments
20GN2401	APPLIED GENETICS	<ul style="list-style-type: none"> • Identify applications of Genetics in Molecular Biology, Developmental Biology, Medicine, Pharmaceutical Industries, Medical Sciences, Agriculture and Horticulture based industries etc. • Demonstrate the ability to relate different facets of applied genetics to design experiments. • Compare different methods used in genetic improvement of plants and animals and explain their advantages and disadvantages • Assess logical arguments to analyze ethical conundrums pertaining to genetic diversity.
20GN2471	APPLIED GENETIC PRACTICAL	<ul style="list-style-type: none"> • Should be able to compile methods necessary for creation of GMOs. • Should be able to critique the role of precise genome modification in crops, role of vectors and markers in gene expressions. • Should be able to revise different techniques that are crucial to maintain gene banks. • Should be able to design

		experiments for plant tissue culture by identifying varying genome architecture in plants.
20GN3501	POPULATION AND EVOLUTIONARY GENETICS	<ul style="list-style-type: none"> • Should be able to conceptualize mechanisms governing DNA evolution. • Should be able to apply principles of population genetics in describing patterns of genetic variation within populations. • Assess how genotype correlates with phenotype, and how natural selection impacts this interaction. • Apply how quantification of heritable traits in populations provides insight into cellular and molecular mechanisms.
20MB1101	BASIC MICROBIOLOGY	<ul style="list-style-type: none"> • Demonstrate microbial diversity and compare different types • Outline the microbial structure and function Assess the economic importance of microorganisms • Analyse the microbial growth patterns and kinetic studies enabling to apply the same in various allied fields.
20MB1171	BASIC TECHNIQUES IN MICROBIOLOGY-LAB	<ul style="list-style-type: none"> • Demonstrate microbial diversity and compare different types • Demonstrate the isolation techniques Outline the microbial growth patterns • Evaluate microbial kinetics
20MB1201	MICROBIAL PHYSIOLOGY	<ul style="list-style-type: none"> • Outline the complexity of microbial structures Evaluate the microbial metabolism Compiling the mechanisms of energy conservation in microbes Outline the microbial transport systems.
20MB1271	MICROBIAL PHYSIOLOGY PRACTICAL	<ul style="list-style-type: none"> • Outline the enzymatic reactions of microbes Compare the biochemical tests reflecting microbial physiology

		<ul style="list-style-type: none"> • Application of metabolic tests for identification • Application of physiological tests for selective isolation of microbes
20MB2301	IMMUNOLOGY AND MEDICAL MICROBIOLOGY	<ul style="list-style-type: none"> • Outline the classification of human pathogens • Compare the structure and physiology of bacteria that infect humans • Apply the basic and molecular techniques to diagnostic bacteriology laboratories. • Should be able to use the antibiotics and evaluate resistant mechanisms encoded in bacteria to neutralise these chemical agents
20MB2371	IMMUNOLOGY AND MEDICAL MICROBIOLOGY PRACTICAL	<ul style="list-style-type: none"> • Compare the basic immunological tests Should be able to perform blood grouping test • Should be able to apply the immunological tests for disease diagnosis • Outline the molecular techniques employed in diagnostic bacteriology laboratories
20MB2401	INDUSTRIAL AND FOOD MICROBIOLOGY	<ul style="list-style-type: none"> • Analyse the designs of fermenters • Should be able to demonstrate the fermentation technology • Apply microbiological techniques for dairy industry • Outline the protocols for food industry
20MB2471	INDUSTRIAL AND FOOD MICROBIOLOGY PRACTICAL	<ul style="list-style-type: none"> • Should be able to outline basic fermentation techniques employed in Microbial industries. • Should be able to design the fermentation procedure for the production of microbial metabolites

		<ul style="list-style-type: none"> • Apply basic microbiological techniques for microbial isolation and characterization for industries • Evaluate the preservation techniques for industrially important microbes
20MB3501	AGRICULTURE AND ENVIRONMENTAL MICROBIOLOGY	<ul style="list-style-type: none"> • Outline the concepts and techniques in soil and microbiology, soil and air microbial diversity, basic and applied concepts. • Outline the microbiology of water and water systems, also to analyse the waste water management • Compare the biocontrol agents and biofertilisers with chemical agents Should be able to outline the plant-pathogen-disease relationship

Post Graduate M.Sc. Course Outcomes		
20MHG5201	FUNDAMENTALS OF HUMAN GENETICS	<ul style="list-style-type: none"> • Will be able to demonstrate the pattern of inheritance and genetic cause for the disease • Should be able to correlate the chromosomal aberrations and disorders of structural aberrations. • Should be able to demonstrate the techniques in human chromosome analysis, Human karyotype: banding and nomenclature of banding. • Should be able to demonstrate the characteristics and structure of genes, Single gene disorders, Multifactorial disorders
20MHG5202	HUMAN BIOCHEMICAL AND IMMUNOGENETICS	<ul style="list-style-type: none"> • Will be able to demonstrate how the genetically inherited diseases are associated with biochemical pathways. • Should be able to assess importance of genes in gaining immunity • Should be able to demonstrate disorders of aminoacid, carbohydrate and lipid metabolism disorders.

		<ul style="list-style-type: none"> • Will be able to analyse innate and adaptive immunity.
20MHG5271	PRACTICALS IN HUMAN CYTOGENETICS, BIOCHEMICAL AND IMMUNOGENETICS	<ul style="list-style-type: none"> • Will be able to demonstrate setting up of Human leukocyte culture, harvesting and metaphase plate preparations. • Should be able to conduct sickling test to identify sickle shaped RBC's • Able to solve the problems on patterns of Inheritance in Human: Pedigree analysis; Autosomal patterns, X and Y linked patterns. • Will be able to handle the Red Blood Cell (RBC) and White Blood Cell (WBC) count by using hemocytometer.
20MHG5301	MEDICAL AND CANCER GENETICS	<ul style="list-style-type: none"> • Will be able to demonstrate different types of genetic disorders, mapping of disease genes to specific locations on chromosomes. • Should be able to analyze the molecular mechanisms through which genes cause disease. • Should be able to assess the inherited and sporadic cancers. • Will be able to identify normal and cancer cells.
20MHG5302	GENETIC SCREENING, COUNSELING AND DISEASE MANAGEMENT	<ul style="list-style-type: none"> • Will be able to construct the pedigrees and medical genetic evaluation. • Should be able to evaluate patterns of inheritance, risk assessment, reproductive failures and consanguinity • Will be able to demonstrate the prenatal and post natal screening, population screening for genetic diseases. • Should be able to analyze the genetic markers for disease diagnosis and prognosis.
20MHG5321	HUMAN POPULATION GENETICS	<ul style="list-style-type: none"> • Will be able to classify the Non-random matings, inbreeding and assortative matings and inbreeding coefficient. • Should be able to evaluate the factors responsible for stable genetic polymorphisms. • Will be able to demonstrate the two-point mapping- LOD score analysis, Multipoint mapping and Homozygosity map • Should be able to compile the data of genetic origin and evolution of human races.
20MHG5322	DEVELOPMENTAL AND REPRODUCTIVE GENETICS	<ul style="list-style-type: none"> • Will be able to demonstrate process of oogenesis and spermatogenesis • Will be able to assess the molecular events of fertilization, activation of sperm motility.

		<ul style="list-style-type: none"> • Will be able to advocate the role of calcium during egg activation. • Should be able to analyze the genetic basis of male and female infertility;
20MHG5323	CLINICAL GENETICS	<ul style="list-style-type: none"> • Will be able to demonstrate the congenital abnormalities and dysmorphic syndromes. • Should be able to assess the disorders of haemopoietin systems, muscle and eye. • Will be able to analyze the mitochondrial disorders. • Should be able to demonstrate genetic basis of syndromes and disorders.
20MHG5324	APPLIED HUMAN GENETICS	<ul style="list-style-type: none"> • Will be able to demonstrate the production of recombinant Insulin, interferon and human Growth hormone. • Should be able to correlate the genetic polymorphisms and associated disorders. • Should be able to demonstrate DNA Fingerprinting with RFLP & RAPD, Micro satellite, SNPs and STR markers <p>Should be able to demonstrate genetic variation and nutrient response to assess consumer genetics and personalized nutrition</p>
20MHG5325	GENETICS IN TOXICOLOGY AND FORENSIC SCIENCE	<ul style="list-style-type: none"> • Will be able to comprehend the classification of Paternity/Maternity index, Sibling index, Probability of match. • Should be able to evaluate the mechanism of induction of chromosomal alterations and sister chromatid. • Will be able to demonstrate the mechanisms of gene mutations; germinal mutations and human genetic diseases. • Should be able to compile the chemical, physical, biological and environmental mutagens to assess the Geno-toxicity.
20MHG5371	LABORATORY EXERCISES IN MEDICAL AND CANCER GENETICS	<ul style="list-style-type: none"> • Will be able to demonstrate the isolation of DNA and RNA from peripheral Blood. • Should be able to perform PCR amplification of gene fragments by using specific primers. • Able to solve the the issues with quantity and quality of genomic DNA and RNA by using agarose gel electrophoresis and spectrophotometric method. • Will be able to handle the sanger method of sequencing and analysis of mutations by using exon sequences of the gene.

20MHG5372	LABORATORY EXERCISES IN GENETIC SCREENING AND ANALYSIS	<ul style="list-style-type: none"> • Will be able to demonstrate the comet assay to detect DNA damage. • Should be able to perform case based genetic counseling, problems on Genetic counseling and risk assessment. • Able to solve the genetic cases with case studies in clinically relevant databases and SNP databases. • Will be able to handle maternal serum testing for prenatal diagnosis.
20MSC5101	FUNDAMENTALS OF CHEMISTRY	<ul style="list-style-type: none"> • Student will acquire a foundation of chemistry of sufficient breadth and depth to enable them to understand and critically interpret the primary concepts in chemistry. • Students will be familiarized with the basic concepts related to chemical bonding, electrochemistry, thermodynamics, chemical kinetics and apply them various biological molecules and interpret their properties • Students acquire foundation in stereochemistry, reaction mechanism and their interdisciplinary role in thorough understanding of higher biological courses
20MSC5102	BIOMOLECULES	<ul style="list-style-type: none"> • Will be able to demonstrate the composition and structure of various bio-molecules molecules in the living systems • Should be able to correlate the structure and functions of bio-molecules, like carbohydrates, lipids, proteins and nucleic acids in biological systems • Should be able to demonstrate the mechanism of interaction and functions various bio-molecules in living systems. • Should be able to demonstrate the normal and abnormal structure of various bio-molecules in the context of various medical conditions
20MSC5103	MOLECULAR GENETICS	<ul style="list-style-type: none"> • Should be able to outline gene structure and chromosome organization • Should be able to demonstrate the molecular mechanism by which the exchange of genetic material takes place between chromosome • Should be able to identify the genetic factors contributing to genetic diseases. • Should be able to describe the different genetic methods/tests for molecular diagnosis
20MSC5105	BIOINFORMATICS – I (PROTEOMICS)	<ul style="list-style-type: none"> • Should demonstrate the usage of biological databases for protein analysis.

		<ul style="list-style-type: none"> • Should prepare a protein and analyse for structure predictions. • Should apply protein for cross-utility databases in various formats. • : Should compute active sites and domains for molecular docking studies.
20MSC5106	BIOSTATISTICS	<ul style="list-style-type: none"> • Compile the importance of statistics in Biology. • Compile the normal distribution and its importance • Identify convenient sample by using sampling theory. • Define the principal concepts of probability • Apply appropriate statistical tests based on an understanding of study question, type of study and type of data • Interpret results of statistical tests and application in biological systems.
20MSC5171	ANALYSIS OF BIOMOLECULES – LAB	<ul style="list-style-type: none"> • Quantitate different biomolecules (Carbohydrates, Proteins, Lipids, etc) • Detect and perform assay techniques for various biomolecules (DNA, RNA). • Should be able to analyse and detect the unsaturation in lipids. Detect the composition of inorganic molecules.
20MSC5172	TECHNIQUES IN MICROBIOLOGY AND GENETICS – LAB	<ul style="list-style-type: none"> • Should be able to demonstrate the basic techniques of isolation, culturing the microorganisms from environmental samples • Able to identify the microorganisms based on their cultural and microscopic characteristics • Outline genetic interactions and their effect on phenotype • Demonstrate the role of allele frequency in evolution and genetic diversity
20MSC5201	MOLECULAR BIOLOGY	<ul style="list-style-type: none"> • Should be able to identify the fundamental molecular events involved in flow of information inside the cell from DNA to RNA to protein. • Should identify the components and mechanism of gene expression in prokaryotic and eukaryotic organisms • Should know how gene expression is regulated and how gene silencing occurs. • Should be able to apply the molecular biology concepts for different agendas in biological system.

20MSC5202	ANALYTICAL TECHNIQUES	<ul style="list-style-type: none"> • Should be able to outline and perform basic techniques like Potentiometry & Chromatography • Should be able to use high end biotechniques like Mass spectroscopy & NMR • Will know how to use biomedical equipments. • Outline the principles of SDS PAGE Immunoblot as analytical techniques
20MSC5203	BIONFORMATICS-II (GENOMICS)	<ul style="list-style-type: none"> • Should demonstrate the usage of biological databases for genome analysis and their interactions. • Should prepare a gene and analyse for structure predictions and mutations. • Should apply gene/genome for cross-utility databases in various formats. • Should compute active sites and domains for molecular docking studies depending on binding studies.
20MSC5204	EVOLUTION AND DEVELOPMENTAL BIOLOGY	<ul style="list-style-type: none"> • Will be able to demonstrate the evolutionary history of complex multicellular life forms. • Will be able to assess the molecular and genetic background of animal and plant development. • Will be able to analyse and interpret the present experimental results and conclusions in a scientific manner. • Should be able to analyze the evolutionary history of complex multicellular life forms.
20MSC5271	BIO-ANALYTICAL TECHNIQUES - LAB	<ul style="list-style-type: none"> • Should demonstrate the principle and application of the analytical method in correlation to biomolecules. • To critique of the advantages and disadvantage of the method employed. • To plan the most suitable qualitative and quantitative method for analysis. • To interconnect and compare the tools used for the biomolecular identification and characterization.
20MSC5301	CLINICAL RESEARCH	<ul style="list-style-type: none"> • should demonstrate sound knowledge in basics of preclinical evaluation of drug molecules • Should demonstrate fundamentals of PK PD concepts. • Demonstrate basic regulatory aspects of clinical trials • Demonstrate the knowledge of different types of clinical trials
20MSC5302	SCIENTIFIC WRITING AND IPR	<ul style="list-style-type: none"> • Should be able to demonstrate the concept of

		<p>scientific writing. Outline the terminologies of a research paper, proposal etc. Design a scientific report Should be able to draft effective articles for scientific journals</p>
20MSC5303	RESEARCH METHODOLOGY	<ul style="list-style-type: none"> • Should be able to compile research findings with structured scientific writing. • To critically evaluate the scientific data with statistical evidence and correlation. • To build hypothesis, work plan and design feasible experimental methods. • To compile the data and draft for various formats of manuscript and presentations.
20MSC5401	PROJECT WORK	<ul style="list-style-type: none"> • Should be able to collect, read and manage research information. Should be able to hypothesize research question, plan experiments, conduct and observe results. Should be able to interpret and demonstrate results effectively Should be able to compile, present and publish research findings.
20MSC5104	GENERAL MICROBIOLOGY	<ul style="list-style-type: none"> • Know the basics of microbiology Outline the diversity of microbe Compare the structure, function in their environment Application of microbial diversity in various fields
20MMB5201	PROKARYOTIC AND EUKARYOTIC MICROBIOLOGY	<ul style="list-style-type: none"> • Enable students to relate the principles in classifying microbes • Apply the knowledge in identifying different microorganisms and to study their life cycles • Elucidate the role of beneficial and harmful effects • The course helps them to apply knowledge in employing microbes in various fields.
20MMB5202	MICROBIAL PHYSIOLOGY	<ul style="list-style-type: none"> • Identify the complexity of microbial structures, genetics and metabolism. • Outline the mechanisms of various interactions that exist between the microbes, microbes and higher forms of life/environment • Should be able to structures of biomolecules and comprehend their properties based on the structures. • To apply the importance of biomolecules and various metabolites in different fields.
20MMB5271	PROKARYOTIC, EUKARYOTIC AND MICROBIAL PHYSIOLOGY -	<ul style="list-style-type: none"> • Outline the microbial isolation and identification techniques

	LAB	<ul style="list-style-type: none"> • Estimate the biomolecules and assess enzyme kinetics • Compile the complexity of microbial structures, genetics and metabolism. • Demonstrate the mechanisms of various interactions that exist between the microbes, microbes and higher forms of life/environment
20MMB5301	IMMUNOLOGY AND MEDICAL MICROBIOLOGY	<ul style="list-style-type: none"> • Should be able to outline the classification, structure, classification and physiology of bacteria that infect humans. • Evaluate different classes of antibiotics and the resistant mechanisms encoded in bacteria and to neutralise these antimicrobial agents. • Apply basic and molecular techniques in diagnostic bacteriology laboratories. • Compare the immune response for various microbial infections.
20MMB5302	INDUSTRIAL, FOOD AND DAIRY MICROBIOLOGY	<ul style="list-style-type: none"> • Should be able to critique on fermentation technology, modern microbial techniques and analysis relating to industrial, food and dairy microbiology • Demonstrate problem solving capabilities in practical working in teams in laboratory-based virtual experiments • Evaluate microbial data using a range of current analysis techniques relating to productions, food sciences and dairy products • Apply microbiology knowledge for the production of different industrial products
20MMB5321	ENVIRONMENTAL MICROBIOLOGY	<ul style="list-style-type: none"> • Evaluate the distribution and habitat of microorganisms in nature. • Apply the knowledge in studying microbial diversity in various environmental niches and their role • Compare the positive and negative aspects of microorganisms and their interaction with other organisms • To apply knowledge in employing microbes in various related fields
20MMB5322	AGRICULTURAL MICROBIOLOGY AND PLANT PATHOLOGY	<ul style="list-style-type: none"> • Should be able to outline the importance of microorganisms in agricultural field. • Application of microorganisms to enhance agricultural productivity.

		<ul style="list-style-type: none"> Analyse microbial role in plant diseases and to apply the same for predictions and the prevention measures. Outline the factors influencing on agricultural productivity
20MMB5323	GENETIC ENGINEERING	<ul style="list-style-type: none"> Know to use the techniques for DNA manipulation. Outline the protocol to amplify, propagate and express proteins in different host systems. Know to detect the engineered DNA, RNA and protein Apply genetic engineering technique for different industries.
20MMB5324	AQUATIC MICROBIOLOGY	<ul style="list-style-type: none"> Should be able to know microbial diversity in aquatic environments. Outline the role of aquatic microorganisms in biogeochemical cycles Analyze the interaction of microbes with other aquatic organisms Apply the aquatic microorganisms in various fields like medicine, bioremediation etc.
20MMB5325	SOIL MICROBIOLOGY	<ul style="list-style-type: none"> Outline the fundamental concepts and techniques in knowing soil microbial diversity Know the microbial interactions in soil Compare the soil for microbial activity and quality Evaluate the role of microbes in soil
20MMB5326	PHARMACEUTICAL MICROBIOLOGY	<ul style="list-style-type: none"> Should be able to identify different antimicrobial agents. Know the antibiotics produced by microbes and its mode of action. Outline clinical problems and available solutions towards them. Know the process involved in drug discovery and development and regulatory guidelines in pharmaceuticals product production.
20MMB5371	IMMUNOLOGY, MEDICAL AND INDUSTRIAL MICROBIOLOGY – LAB	<ul style="list-style-type: none"> Compare the basic immunological tests Should be able to perform blood grouping test Should be able to apply the immunological tests for disease diagnosis

		<ul style="list-style-type: none"> Outline the molecular techniques employed in diagnostic bacteriology laboratories
20MMB5372	PRACTICAL BASED ON ELECTIVES (I To III)	<ul style="list-style-type: none"> Know the microbial interactions Outline microbial role in environment. Apply the microbial techniques in different fields Demonstrate problem solving skills for environmental sampling, isolation and culturing
PG		<ul style="list-style-type: none">
		<ul style="list-style-type: none">
20MBC5201	METABOLISM – I	<ul style="list-style-type: none"> Should compile the different stages of biomolecular metabolism. Should identify the various rate determining steps in metabolism. Should be able to interconnect and compare the carbohydrate and protein metabolic pathways. Should demonstrate the overall pathway using KEGG databases with their respective enzymes.
20MBC5202	HUMAN PHYSIOLOGY	<ul style="list-style-type: none"> Should be able to demonstrate the nutritional value with the human body functioning. Should compile the functioning of vital organs in human. Should assess the pathophysiology under diseases condition. Should compare and evaluate a diagnostic report for abnormal functioning of the vitals.
20MBC5271	CLINICAL BIOCHEMISTRY - LAB	<ul style="list-style-type: none"> Should differentiate between normal and abnormal physiology in humans. Should be able to analyse the various normal and abnormal urine and blood constituents. Should demonstrate report writing skills which can assist clinicians for therapy. Should evaluate the qualitative and quantitative parameters in urine and blood samples for diseases.
20MBC5301	METABOLISM – II	<ul style="list-style-type: none"> Will be able to identify the metabolic, enzyme assisted reactions of nitrogen bases and fat to fuel living systems. Should be able to demonstrate the role of lipids play in energy storage and usage. Will be able to analyze the metabolic pathways including oxidative phosphorylation and mechanism of ATP production Should be able to integrate and assess the whole

		metabolic processes in living systems particularly human beings.
20MBC5302	ENZYMOLGY	<ul style="list-style-type: none"> • Will be able to comprehend the classification, nomenclature and functions of different enzymes involved in the biological reactions. • Should be able to evaluate the active site groups and mechanism of catalysis of enzymes of various classes • Will be able to demonstrate the regulation of enzyme activity along with mechanism of enzyme Inhibition. • Should be able to compile the biological and industrial application of various classes of enzymes in the context of academic and industrial research
20MBC5321	IMMUNOLOGY	<ul style="list-style-type: none"> • Will be able to demonstrate the basic principles and functioning of immune system • Will be able to assess the consequences of immune system failure • Will be able to advocate the role of immune system at onset of cancer and demonstrate the cancer progression and therapeutics • Should be able to analyze the role of immune systems in disease diagnosis and control in the context of industrial research.
20MBC5322	MOLECULAR PHYSIOLOGY	<ul style="list-style-type: none"> • Outline the principles of how hormones control the physiology of an organism via signalling mechanisms. • Identify the neurotransmitters and nerve signalling mechanisms. • Compile the signalling mechanisms involved in cell cycle and cell death. • Assimilate and assess how the body maintains homeostasis and how a slight change in the system could tip the balance and lead to disease.
20MBC5323	GENETIC ENGINEERING	<ul style="list-style-type: none"> • Enable students to learn techniques used to manipulate DNA (Amplify, cut, ligate DNA). • Outline the vectors used to propagate gene of interest and express recombinant proteins in different host systems. • Detect the DNA, RNA and protein in disease and drug development. • Evaluate and apply the genetic engineering concepts in various fields
20MBC5324	MEMBRANE BIOCHEMISTRY & NANOSCIENCE	<ul style="list-style-type: none"> • Will be able to demonstrate the composition, structure and functions of plasma membranes • Should be able to isolate the plasma

		<p>membranes/membrane proteins in the laboratories.</p> <ul style="list-style-type: none"> • Will be able to analyze the multiple role of plasma membranes/receptors in cell signalling events. • Should be able to demonstrate the application of nanoparticles in medical biology and industry.
20MBC5325	PHYTOCHEMICALS AND MICROBIAL SECONDARY METABOLITES	<ul style="list-style-type: none"> • Outline and identify the techniques used to isolate phytochemicals and microbial metabolites. • Analyse and characterize phytochemicals. • Enable to draw conclusions about the multitude role played by phytobioactives. • Apply solutions using phytochemical and microbial metabolites to treat industrial and health related problems
20MBC5371	ENZYMOLGY AND PROTEIN PURIFICATION - LAB	<ul style="list-style-type: none"> • Will be able to demonstrate the isolation of acid phosphatases from different biological sources like germinated green gram and garden peas • Should be able to purify enzymes to homogeneity and calculate the fold purifications. • Able to solve the numerical problems, calculate the total activity, specific activity and K_{cat} of enzymes particularly the acid phosphatases • Will be able to handle the biological samples and design, execute and interpret the enzymatic assays
20MBC5372	GENETIC ENGINEERING AND IMMUNOTECHNIQUES - LAB	<ul style="list-style-type: none"> • Demonstrate the techniques used to clone the DNA and transform DNA in host organism. • Perform recombinant protein purification. • Should be able to apply the techniques in identifying blood groups and diagnose diseases. • Evaluate molecular techniques employed in diagnostic laboratories.
20MBT5201	GENETIC ENGINEERING	<ul style="list-style-type: none"> • Should be able to select the prokaryotic or eukaryotic vectors and the purification system for the expression of proteins. • Should know the different steps and types of PCR. • Should be able to demonstrate the various nucleic acid sequencing methodologies. • Should apply the techniques of recombinant DNA technology to clone a particular gene.
20MBT5202	ADVANCED CELL BIOLOGY	<ul style="list-style-type: none"> • Should be able to identify the different stages of cell division, cell cycle, cell cycle control.

		<ul style="list-style-type: none"> • Should be able to outline membrane structure, cellular junctions and cytoskeleton structure and transport mechanisms. • Students should be able to identify the different types of membrane transport across the plasma membrane. • Should be able demonstrate major processes that occur within cells, including: mechanisms of cell signaling.
20MBT5271	CELL BIOLOGY & RECOMBINANT DNA TECHNOLOGY-LAB	<ul style="list-style-type: none"> • Should be able to measure size of the given biological sample. • Should count the number cells present in a given biological sample. • Should identify the steps involved in meiosis • Should be able to utilise the techniques of recombinant DNA technology to clone a particular gene.
20MBT5301	IMMUNOLOGY	<ul style="list-style-type: none"> • Should be able to compile Innate and adaptive immune recognition • Demonstrate basic structure and functional aspects of antibodies • Demonstrate the fundamental principles behind positive and negative selection and clonal selection • Should be able to state the principles behind antigen presentation and primary and secondary immune responses • Should demonstrate basic knowledge in immunological assays, different types of vaccines and concepts of autoimmunity
20MBT5302	INDUSTRIAL BIOTECHNOLOGY	<ul style="list-style-type: none"> • Students should be able to outline the current methods of fermentation process and modern fermenters. • Should be able identify the strategies for isolation, screening and identification of industrially important strains. • Should be able to demonstrate the sterilization process involved in fermentation. • Should be able to identify the design any fermenter for production process. • Should be able to identify the upstream and downstream processing. • Should be able to outline the production of important microbial products.
20MBT5321	PLANT BIOTECHNOLOGY [E]	<ul style="list-style-type: none"> • Should be able to select a plant tissue culture

		<p>media for a particular purpose.</p> <ul style="list-style-type: none"> • Should compare the various molecular markers. • Should demonstrate and apply the plant cells transformation methods. • Should able to utilise various recombinant DNA techniques involved in trait improvement in plant.
20MBT5322	ANIMAL BIOTECHNOLOGY [E]	<ul style="list-style-type: none"> • Should be able to identify the basic requirements for establishing animal cell culture. • Identify the techniques and biomaterials used for tissue engineering and organ transplantation • Should be able to demonstrate good lab practices and good manufacturing practices with biosafety. • Should be able to apply the concepts of animal biotechnology in development of vaccines and biopharmaceuticals
20MBT5323	PRINCIPLES OF ENZYMOLOGY & METABOLISM [E]	<ul style="list-style-type: none"> • Identify key aspects of enzyme properties • Demonstrate fundamentals of enzyme kinetics and Michaelis Menten equation • Demonstrate fundamental knowledge of enzyme inhibition in terms of effect on Km and Vmax • Identify the key roles of enzymes in terms of metabolism and Industrial use of enzymes • Demonstrate basic knowledge of intermediary metabolism, substrate level and oxidative phosphorylation , energetics and regulation
20MBT5324	HEALTH & ENVIRONMENTAL BIOTECHNOLOGY [E]	<ul style="list-style-type: none"> • outline and apply information resources pertaining to health and environmental Biotechnology • Identify the pros and cons of various approaches to monitoring environment • Outline the necessary steps to Improve ethical conduct whilst undertaking field research • Identify key hazards in workplace • Identify importance of health and safety rules • Design safe practices and procedures • Implement best-in-class standards in health and safety management.
20MBT5325	GENOMICS & PROTEOMICS [E]	<ul style="list-style-type: none"> • Should demonstrate the usage of biological databases for genome analysis and their interactions. • Should prepare a gene and analyse for structure predictions and mutations.

		<ul style="list-style-type: none"> • Should apply gene/genome for cross-utility databases in various formats. • Should compute active sites and domains for molecular docking studies depending on binding studies. • Should demonstrate the usage of biological databases for protein analysis. • Should prepare a protein and analyse for structure predictions. • Should apply protein for cross-utility databases in various formats. • Should compute active sites and domains for molecular docking studies.
20MBT5326	HUMAN GENETIC DISEASES [E]	<ul style="list-style-type: none"> • Demonstrate fundamentals genetic basis to common diseases • Demonstrate basic paradigm knowledge on cause and consequences of inborn errors of metabolism • Compile the basics of pharmacogenomics, drug discovery , molecular detection of genetic diseases • Compile and demonstrate the fundamentals of cytogenetic techniques • Demonstrate the workings of the prenatal diagnostic tests for genetic diseases including hematopoietic disorders
20MBT5371	BIOPROCESS TECHNOLOGY AND IMMUNOTECHNIQUES [L]	<ul style="list-style-type: none"> • identify the different isolation, screening and identification methods for industrial production. • Outline the fermentation process of industrially important product like alcohol, lactic acid, citric acid and antibiotics. • Identify diagnostic immune techniques routinely used in medical laboratories.
20MBT5372	PRACTICAL BASED ON ELECTIVES- [L]	<ul style="list-style-type: none"> • Demonstrate the ability to carry out Enzyme assay • Demonstrate the ability to compute K_m and V_{max} for the given enzyme using a colorimetric assay and use MSXL in the preparation of the double reciprocal plot • Demonstrate the ability to calculate and prepare appropriate stock solutions required for preparation of tissue culture medium • Ability to understand how to evaluate the purity of an enzyme preparation using specific activity and SDS PAGE