

Programme Objectives and Outcomes: Master of Science (M.Sc.)

Objectives	Outcomes
To provide fundamental and advanced knowledge to students in a chosen specialized area of science.	Students are acquainted with fundamental and advanced knowledge of science in their specialization area.
To develop and boost the research culture in young mind through short academic research projects, participating in conferences and research competitions.	The research culture is developed in students. They have understood the basics of research.
To promote independent and collaborative work, while demonstrating the professional and ethical responsibilities of science and technology in general.	Students are aware of professional and ethical responsibilities required for their work field.
To equip students with the skills and knowledge to produce competent, creative and imaginative Master's with a strong scientific intelligence.	Students gets basic skill and knowledge; they become good thinkers with imaginative mind.

Programme Specific Objectives and Outcomes: M.Sc. Biotechnology

Objectives	Outcomes
To provide an intensive and in-depth learning to the students in field of biotechnology.	Students understood the field biotechnology in depth.
Beyond simulating, learning, understanding the techniques, it also addresses the underlying recurring problems of disciplines in today scientific and changing business world.	Students become skilled one with techniques in biotechnology, they also able to identify the problems in scientific and changing business world and they can troubleshoot it.
To develop awareness & knowledge of different organization requirement and subject knowledge through varied subjects and training methodology in students.	Students acquired the knowledge different organization requirements. They are benefited with both practical and theoretical knowledge.
To train the students to take up wide variety of roles like researchers, scientists, consultants, entrepreneurs, academicians, industry leaders and policy.	Students are trained to coup the requirements of job sector also they are able to become entrepreneurs.

Course Objectives and Outcomes:**Semester – I**

Course Name: Microbiology Course Code: HCT1.1	
Objectives	Outcomes
To understand the classification, identification methods and evolutionary relationship of prokaryotic.	Students get the knowledge of microbial taxonomy.
To understand the omnivore nature of microbes, their habitat and adaptation.	Students understood the omnivore behavior of microorganism.
To understand the basic techniques of staining, sterilization, isolation, cultivation, preservation used in microbiology.	Students get the basic knowledge of techniques used in microbiology.
To study the fungal characters, properties and physiology, etc. in depth.	Students acquainted knowledge of mycology.
To study the structure, replication and properties of viruses.	Students acquainted knowledge of viruses.

Course Name: Biochemistry Course Code: HCT1.2	
Objectives	Outcomes
To understand the structure and role of biomolecules.	Students are aware of structure biomolecules and also role of different biomolecules in living organism.
To understand the energy relationship of biological system.	Students are known to bioenergetics concept, various energy forms in living cell.
To understand the metabolic reactions, regulation and their energetic concept of carbohydrates, lipids, amino acid, proteins and nucleic acids.	Students understood the metabolic process and their associated diseases.
To understand the ATP synthesis mechanism and photosynthesis process.	Students get the knowledge of ATP synthesis in cell as well as photosynthesis mechanism.
To study the animals and plant hormones are their mechanism of action.	Students are acquainted with knowledge of animal endocrinology, also gets understood plant growth hormone.

Course Name: Inheritance Biology Course Code: HCT1.3	
Objectives	Outcomes
To understand the Mendelian laws, gene concept, gene interaction.	Students get information of Mendelian genetics, gene and gene interaction.
To study the structure of chromosome, chromosomal aberrations and inheritance.	Students are acquainted with knowledge chromosome details.
To study the transduction, transformation and conjugation process of gene transfer.	Students get knowledge of methods of gene transfer in microbes.
To understand the polymorphism, Neo-Darwinism, gene frequency etc.	Students get knowledge of Population genetics.
To study the genetic basis of evolution and genome complexity.	Students are acquainted with knowledge of evolutionary genetics

Course Name: Biostatistics and Bioinformatics Course Code: SCT1.1	
Objectives	Outcomes
Understand the concept of population, sample, sampling method, measures of central tendency, measures of dispersion, probability distribution.	Do the calculations for univariate data. Can use sampling method for large population.
Studying the correlation, regression, hypothesis testing with different test statistics.	Can use test of significance to prove hypothesis during research.
Studying of genomics, proteomics and biological databases.	Can identify and describe the different biological databases.
To understand the methods alignment for sequence analysis, phylogenetics analysis of biological sequences.	Students can do biological sequence analysis. Can retrieve the information from sequence <i>In silico</i> .
To study the methods of structural prediction and analysis of biological structures <i>In silico</i> .	Students get knowledge homology modeling and molecular modeling.

Course Name: Clinical Bioinformatics Course Code: SCT1.2	
Objectives	Outcomes
To understand the Next Generation Sequencing (NGS) method used of genome sequencing.	Students can understand NGS approach of genome sequencing.

To understand the use of information science for both pathogenic and non-pathogenic diseases.	Students can understand medical bioinformatics.
To study the method of clinical data analysis and management.	Students can understand concept of medical coding.
To understand the concept of Pharmacogenomic, System Biology and Metabolomics.	Student can get knowledge of system and functional biology.
To study the Genome sequencing projects and their applications	Students are acquainted with knowledge of genome sequencing project.

Course Name: Practical in Microbiology Course Code: HCP 1.1	
Objectives	Outcomes
To understand the aseptic techniques in microbiology	Students can work in aseptic conditions in microbiology lab.
To understand the media preparation in microbiology	Students can prepare the different media for growth of microorganisms.
To understand the isolation method, staining techniques, morphological character, biochemical characters of bacteria.	Students can isolate and characterize the bacteria from different source
To study the antibiotic susceptibility of microorganisms.	Students can study the antibiotic effect on microorganisms
To study the isolation and cultivation of Bacteriophages.	Students can isolate and cultivate Bacteriophages

Course Name: Practical in Concepts of Biochemistry Course Code: HCP 1.2	
Objectives	Outcomes
To study the Qualitative and Quantitative analysis of biomolecules.	Students can identify the presence of particular biomolecule and can quantify it.
Study of isolation, extraction and assay method for lipids and proteins.	Students can extract and quantify lipid and protein content.
Study of isolation of chloroplast and study of Hill's reaction.	Students can isolate chloroplast and study the Hill's reaction.
To understand the basic techniques required for biochemistry	Students can get basic techniques required for the biochemistry work.

Course Name: Practical in Inheritance Biology Course Code: HCP 1.3	
Objectives	Outcomes
To Study Mendelian principles, gene interactions, linkages and gene mapping	Students can understand numerical examples of Mendelian laws, gene interaction, linkages and mapping.
To study the mutation effect in seed, pollen grain, bacteria and its effect on mitosis and meiosis.	Students can understand the effect of mutation of living organism and on cell division.
To Study the Karyotyping of cell	Students can understand the concept of karyotyping
To study the gene transfer mechanism in bacteria.	Students can understand transformation, conjugation and transduction
To study the strain improvement of bacteria by physical and biological agents.	Students can understand the strain improvement strategy for bacteria.

Course Name: Practical in Biostatistics and Bioinformatics Course Code: SCP 1.1	
Objectives	Outcomes
To study the use of MS-Excel for the statistical work	Students can use the MS-Excel for statistical work.
Study of literature database PubMed and PMC	Students can retrieve the literature from database
To retrieve the biological and sequences and its analysis by alignment method.	Students can retrieve protein and nucleic acid sequences from databases and can analyze it by alignment method.
To understand the prediction of secondary and tertiary structure from protein sequence.	Students can predict the secondary and tertiary structure from protein sequences
Study of phylogenetic analysis and phylogenetic tree construction.	Students can construct phylogenetic tree and analyze it.

Course Name: Practical in Clinical Bioinformatics Course Code: SCP 1.2	
Objectives	Outcomes
Performing the practicals based on R language	Students can use R language for clinical bioinformatics work.
Study of online Next Generation sequencing resources and databases	Students can use online NGS resources and databases
Study of Microarray Data Analysis tools and databases.	Students can understand the microarray concept
Study of International Classification of Disease-10 codes	Students can introduced to International Classification of Disease-10 codes

Semester – II

Course Name: Cell Biology Course Code: HCP 2.1	
Objectives	Outcomes
To understand the prokaryotic and eukaryotic cell structure.	Students can understand the basic structure of eukaryotic and prokaryotic cell.
To understand the cellular interaction, cell differentiation.	Students can get knowledge of cell-cell and cell-matrix interaction and cell differentiation property.
To study the organelles of cell and their role.	Students can study the different cell organelles
To understand the cytoskeleton of cell and its importance in cell.	Students can understand the importance of cytoskeleton in cell.
To study the cell cycle and cell division and their regulation.	Students can get knowledge and cell cycle, cell division and its regulation.
To study the signaling molecule, their receptor and signal transduction pathway.	Students can understand the cell signaling mechanism in cell.
To understand the development process in animals.	Students can get idea about animal development.

Course Name: Enzyme Technology Course Code: HCP 2.2	
Objectives	Outcomes
To understand the basic concept of enzyme, its classification and nomenclature, mechanism of work etc.	Students can get the knowledge of enzyme.
To study the kinetic properties of enzyme like Km, Vmax, etc.	Students can understand the enzyme kinetics.

To study the structure and function relationship of enzyme.	Students can understand function of enzyme and its relationship with structure.
To understand the concept of allosteric interaction and cooperativity of enzyme.	Students can understand allosteric enzymes and cooperativity in enzyme function.
Study of enzyme regulation mechanism.	Students can understand the regulatory mechanism of enzymes
To understand the metabolic engineering, enzyme engineering and enzyme immobilization.	Students can get knowledge of engineering techniques in enzymology.

Course Name: Molecular Cell Processing		Course Code: SCP 2.1	
Objectives		Outcomes	
To understand the genome complexity, genome organization, various forms of nucleic acids, gene structure.		Students can understand the details of genome and its organization	
To understand the process of prokaryotic and eukaryotic replication process.		Students can understand the replication mechanism in prokaryotes and eukaryotes.	
To understand the process of prokaryotic and eukaryotic transcription process.		Students can understand the transcription mechanism in prokaryotes and eukaryotes with differences in both.	
To understand the process of prokaryotic and eukaryotic translation process.		Students can understand the translation mechanism in prokaryotes and eukaryotes.	
To understand the DNA damages and its repair system		Students can get knowledge of the DNA repair system	

Course Name: Molecular Medicine		Course Code: SCP 2.2	
Objectives		Outcomes	
To study the use of molecular techniques for human genome.		Students get the knowledge of human molecular genetics.	
To understand the genetic cause of various diseases associated with human.		Students can understand the genetic diseases in human being.	
To study the use regenerative medicine by using stems cell therapy.		Students can get idea about stem cell therapy.	
To understand the gene therapy types and methods.		Students can acquaint with knowledge of gene therapy.	
To understand the discovery, nature, source, administration, absorption and bioavailability of drugs.		Students can get knowledge of pharmacogenetics	

Course Name: Immunology and Immune Techniques		Course Code: OET 2.1	
Objectives		Outcomes	
To provide students with a foundation in immunological processes.		Students can understand immunological process	
To make the students able to clearly state the role of the immune system		Students get the knowledge of immune system and its role.	
To make the students able to compare and contrast the innate versus adaptive immune systems		Students can distinguish innate and adaptive immune system.	
To get understand the concept of Antigen, antibody, their interactions etc.		Students are aware of antigen and antibody function in immune system.	
To understand the significance the MHC molecule in terms of immune response and transplantation		Students are acquainted with the knowledge of MHC and its significance.	

Course Name: Agriculture Science and Seed Technology Course Code: OET 2.2	
Objectives	Outcomes
To understand the physiological process and its response to environment.	Students can get the knowledge of plant physiology.
To study the soil, its types and composition as well as to understand the fertility of soil.	Students can able to identify the fertility factor of soil.
To study the stress response of plant to both biotic and abiotic factors.	Students can understand the plant's stress response to environmental factor.
To understand the mechanism of improvement in seed and its storage.	Students can get knowledge of seed technology.
To study the relationship between plant and animal husbandry	Students can understand the importance of livestock in agriculture

Course Name: Practicals in Cell Biology Course Code: HCP 2.1	
Objectives	Outcomes
To study the isolation method, and comparison of different cells.	Students can be able to study different morphology of cell.
To understand the phases of cell division (during mitosis and meiosis).	Students can study the phases of cell division.
To understand the permeability concept of cell membrane and factor affecting it.	Students can demonstrate cell membrane permeability.
To isolate and observation of chloroplast and mitochondria.	Students can be able to study mitochondria and chloroplast by their isolation from cell.
To study Micrometry concept and Measurement of cell.	Students can be able to measure the microscopic size in microscope.

Course Name: Practicals in Enzyme Technology Course Code: HCP 2.2	
Objectives	Outcomes
Study of isolation and quantification techniques for enzymes.	Students can be able to isolate and quantify the enzyme.
To study the specific activity of enzymes.	Students can be able determine the specific activity of enzymes.
To study the factors affecting enzyme activity (such as pH, temperature, activator and inhibitors)	Students can demonstrate the effect of different factors on enzyme activity.
To understand the kinetic properties of enzymes like Km and Vmax.	Students can determine the Km and Vmax of enzyme.
To study the concept of immobilization of enzyme to carrier.	Students can be able to immobilize the enzyme.

Course Name: Practicals in Molecular Cell Processing Course Code: SCP 2.1	
Objectives	Outcomes
To study the effect of protein synthesis inhibitors on gene expression.	Students can be able to demonstrate the effect of protein synthesis inhibitor.
To study the DNA damage repair system in bacterial system.	Students can demonstrate the photoreversal mechanism over effect of UV damage.
To demonstrate silver nitrate staining of DNA	Students can visualize DNA band electrophoresis

To study the methods of isolation of DNA from bacteria, plant, animal, yeast.	Students can be able to isolate the DNA from different cells.
To study the isolation plasmid DNA, chloroplast DNA and mitochondria DNA.	Students can be able to isolate extrachromosomal DNA.

Course Name: Practicals in Molecular Medicine		Course Code: SCP 2.2	
Objectives		Outcomes	
To study the isolation of genomic DNA from dried blood spot and hair.		Students can get skill to isolate genomic DNA from dried blood spot and hair	
To study the Sickle cell anemia RBC.		Students can able to identify the sickle celled RBC.	
To demonstrate the phosphatase activity of serum.		Students can able to study the serum phosphatase activity.	
To study the genetic diseases.		Students can understand the cause and inheritance pattern of genetic diseases.	

Course Name: Practicals in Immunology and Immune Techniques		Course Code: OEP 2.1	
Objectives		Outcomes	
To study the immune-techniques used for disease diagnosis.		Students can demonstrate the immune-techniques	
Study of diagnostic tests like ELISA, Widal etc.		Students can demonstrate the disease diagnosis by Widal, ELISA etc.	
To study the method for the preparation of bacterial antigens.		Students can prepare the bacterial antigen.	

Course Name: Practicals in Agriculture Science and Seed Technology		Course Code: OEP 2.2	
Objectives		Outcomes	
To understand the nutrient and water uptake property of plants.		Students can use laboratory techniques to measure water and nutrient uptake in plants	
To isolate DNA and RNA from plants and its verification.		Students can isolate the DNA and RNA from plant cells.	
To study the effect of industrial effluent on seed germination and plant growth.		Students can demonstrate the effect of industrial effluent on seed germination and plant growth	

Semester – III

Course Name: Industrial and Environmental Biotechnology		Course Code: HCT3.1
Objectives	Outcomes	
To get Introduction to bioprocess engineering	Students get the knowledge of bioprocess engineering.	
To understand the Upstream Process involved in Industrial production of chemicals.	Students understood the Upstream Process involved in Industrial production of chemicals.	
To understand the Downstream Process involved in Industrial production of chemicals.	Students understood the Downstream Process involved in Industrial production of chemicals.	
To study Scope of Biotechnology in Environmental protection.	Students acquainted knowledge of Scope of Biotechnology in Environmental protection.	
To study Bioremediation for clean environment	Students acquainted with Bioremediation for clean environment.	

Course Name: Genetic Engineering		Course Code: HCT3.2
Objectives	Outcomes	
To understand Tools for Genetic Engineering	Students get the knowledge of Tools for Genetic Engineering.	
To understand the Expression strategies.	Students understood the Expression strategies.	
To understand the In Vitro construction, screening and Isolation of recombinant DNA Molecules.	Students understood the In Vitro construction, screening and Isolation of recombinant DNA Molecules.	
To study Analytical techniques used in Genetic manipulation.	Students acquainted knowledge of Analytical techniques used in Genetic manipulation.	
To study Applications of rDNA technology.	Students acquainted with Applications of rDNA technology.	

Course Name: Plant Biotechnology		Course Code: SCT3.1
Objectives	Outcomes	
To understand Plant Physiology and Basic Techniques in Plant Tissue Culture	Students get the knowledge of Plant Physiology and Basic Techniques in Plant Tissue Culture	
To understand concepts of Micro propagation, Organogenesis, Somatic Embryogenesis.	Students understood the concepts of Micro propagation, Organogenesis, Somatic Embryogenesis.	
To understand Protoplast Culture, Anther Culture and Cryopreservation.	Students understood Protoplast Culture, Anther Culture and Cryopreservation.	
To study Plant Transformation Technology.	Students acquainted Plant Transformation Technology.	
To study Applications of Plant Biotechnology.	Students acquainted with Applications of Plant Biotechnology.	

Course Name: Cancer Genetics and Animal Cell Culture		Course Code: SCT3.2
Objectives	Outcomes	
To get Introduction to Cancer Biology	Students get Introduction to Cancer Biology	
To understand mechanisms in Cancer Progression.	Students understood the mechanisms in Cancer Progression.	
To understand Diagnosis and Treatment of cancer.	Students understood Diagnosis and Treatment of cancer.	
To study Introduction of Animal Tissue Culture.	Students acquainted Plant Transformation Technology.	
To study Viability and Micromanipulation in ATC.	Students acquainted Viability and Micromanipulation in ATC.	

Course Name: Computational Structure Biology and Drug Designing		Course Code: OET3.1
Objectives	Outcomes	
To get Introduction to Structural and Pathway Databases	Students get Introduction to Structural and Pathway Databases	
To study Structure Prediction Methods.	Students studied Structure Prediction Methods.	
To understand Homology Modeling.	Students understood Homology Modeling.	
To study Molecular interaction.	Students acquainted Molecular interaction.	
To study Drug Discovery and Drug designing.	Students acquainted Drug Discovery and Drug designing.	

Course Name: Advance Pharmaceuticals		Course Code: OET3.2
Objectives	Outcomes	
To study Physical pharmaceutics	Students studied Physical pharmaceutics	
To understand the concepts of Dissolution.	Students understood concepts of Dissolution.	
To study Surfactant System.	Students studied Surfactant System.	
To study Polymer science.	Students acquainted Polymer science.	
To be aware of Stability studies.	Students acquainted with Stability studies.	

Course Name: Practicals in Industrial & Environmental Biotechnology		Course Code: HCP 3.1
Objectives	Outcomes	
To understand Fermentative production of Organic solvents	Students understood Fermentative production of Organic solvents like Ethanol/Acetone/ Butanol	
To understand Production of Alcoholic beverages	Students understood Production of Alcoholic beverages like Beer/ Wine	
To study Fermentative production of Amino Acid and vitamins	Students studied Fermentative production of Amino Acid and vitamins like L-glutamic acid/Phenylalanine/ L-lysine and vitamin B12	
To study the BOD and COD levels of different water systems	Students acquainted with BOD and COD levels of different water systems	
To understand Bacteriological analysis of water by presumptive, confirmatory and completed tests	Students acquainted with Bacteriological analysis of water by presumptive, confirmatory and completed tests	
To Isolate xenobiotic degrading microorganisms	Students isolated xenobiotic degrading microorganisms	

Course Name: Practicals in Genetic Engineering		Course Code: HCP 3.2
Objectives	Outcomes	
To understand Isolation of Genomic DNA from bacteria	Students understood Isolation of Genomic DNA from bacteria	
To understand Isolation of plasmid DNA	Students understood Isolation of plasmid DNA	
To study <i>In vitro</i> DNA ligation	Students studied <i>In vitro</i> DNA ligation	
To understand Transformation of <i>E. coli</i>	Students acquainted with Transformation of <i>E. coli</i>	
To understand Southern blotting and hybridization	Students acquainted with Southern blotting and hybridization	
To understand Restriction Fragment Length Polymorphism (RFLP)	Students understood Restriction Fragment Length Polymorphism (RFLP)	
To understand DNA amplification by PCR	Students understood DNA amplification by PCR	
To study Isolation of Bacteriophage and purification of phage lysate	Students studied Isolation of Bacteriophage and purification of phage lysate	

Course Name: Practicals in Plant Biotechnology Course Code: SCP 3.1	
Objectives	Outcomes
To study Preparation of Media.	Students can prepare media for PTC
To study Ex-plant Surface Sterilization	Students can understand Ex-plant Surface Sterilization
To study Callus Culture and Organ Culture	Students can do Callus Culture and Organ Culture
To study <i>In vitro</i> rooting and acclimatization	Students acquainted with <i>In vitro</i> rooting and acclimatization
To study Protoplast isolation and culture	Students acquainted with Protoplast isolation and culture
To study Anther Culture/ Production of haploids	Students can understand Anther Culture for Production of haploids
To study Synthetic seed preparation	Students can understand Synthetic seed preparation

Course Name: Practicals in Cancer Genetics and Animal Cell Culture Course Code: SCP 3.2	
Objectives	Outcomes
To study DNA amplification by PCR	Students studied DNA amplification by PCR
To study Reporter gene assay (b- Gal)	Students understood Reporter gene assay (b- Gal)
To study DNA Fingerprinting: Using RAPD techniques	Students studied DNA Fingerprinting: Using RAPD techniques
To study Aseptic Transfer technique in animal Cell Culture	Students acquainted with Aseptic Transfer technique in animal Cell Culture
To study Preparation of Balanced Salt Solution and pH	Students acquainted with Preparation of Balanced Salt Solution and pH
To study standards for animal cell culture	Students studied standards for animal cell culture
To study Trypsinization methods in animal cell culture	Students understood Trypsinization methods in animal cell culture
To study Chick Embryo Culture / Lymphocyte Culture	Students understood Chick Embryo Culture / Lymphocyte Culture

Course Name: Practicals in Computational Structure Biology and Drug Designing Course Code: OEP 3.1	
Objectives	Outcomes
To understand Accessing to Structural Databases and Data retrieval using RCSB PDB, CSA PDBe, PDBeChem, PDBeFold, PDBeMotif, PdbSum.	Students understood Accessing to Structural Databases and Data retrieval using RCSB PDB, CSA PDBe, PDBeChem, PDBeFold, PDBeMotif, PdbSum.
To understand Structural classification using CATH, SCOP resources	Students understood Structural classification using CATH, SCOP resources
To study Secondary structure prediction using SOPMA and GOR	Students studied Secondary structure prediction using SOPMA and GOR
To study Homology modeling by SWISSMODEL, and Modeller 9V2 and Model Validation using RAMPAGE or PROCHECK,	Students acquainted with Homology modeling by SWISSMODEL, and Modeller 9V2 and Model Validation using RAMPAGE or PROCHECK
To comprehend Prediction of protein-protein, protein-DNA, protein-ligand interactions and Drugbank database and ChEMBL database	Students acquainted with Prediction of protein-protein, protein-DNA, protein-ligand interactions and Drugbank database and ChEMBL database
To understand Design of ligands using ACD lab and ChEMSKETCH and Development of lead library and high throughput screening using <i>In silico</i> ADMET Properties	Students understood Design of ligands using ACD lab and ChEMSKETCH and Development of lead library and high throughput screening using <i>In silico</i> ADMET Properties
To understand Docking using AUTODOCK and HEX	Students understood Docking studies using AUTODOCK and HEX

Course Name: Practicals in Advanced Pharmaceuticals		Course Code: OEP 3.2	
Objectives		Outcomes	
To understand Powder characterization: Microscopy – Particle size analysis, calculation of shape factors. Compression and compaction – Huckel plot studies, tensile strength.		Students understood Powder characterization by Microscopy Students understood Compression and compaction – Huckel plot studies, tensile strength	
To understand Solubilization : • Effect of dielectric constant on solubility • Complexation • Ternary phase diagram. • Solid dispersion		Students understood Solubilization and Effects of some parameters on solubility like dielectric constant, Complexation, Ternary phase diagram, Solid dispersion	
To study Stability of multiple emulsions		Students studied Stability of multiple emulsions	
To comprehend Polymer science: Rheological and thermal characterization of polymers		Students acquainted with Polymer science: Rheological and thermal characterization of polymers.	
To comprehend Degradation kinetic study of a drug in a solution		Students acquainted with Degradation kinetic study of a drug in a solution	
To understand Accelerated stability studies of a formulation		Students understood Accelerated stability studies of a formulation	
To study Dissolution of various dosage forms		Students studied Dissolution of various dosage forms	

Semester – IV

Course Name: Animal Biotechnology and Stem Cell Technology		Course Code: HCT 4.1	
Objectives		Outcomes	
To get Introduction of animal cell culture and cell culture media.		Students got Introduction of animal cell culture and cell culture media.	
To understand the Characters of cells and behavior.		Students understood the Characters of cells and behavior.	
To understand the Concept of cell line and transgenic animal.		Students understood the Concept of cell line and transgenic animal.	
To understand Basics, Properties and Classification of Stem Cells.		Students understood Basics, Properties and Classification of Stem Cells.	
To study Tissue Engineering and Transplantation Techniques.		Students got knowledge of Tissue Engineering and Transplantation Techniques.	

Course Name: Advanced Analytical Techniques		Course Code: HCT 4.2	
Objectives		Outcomes	
To study Microscopy and Centrifugation techniques.		Students studied Microscopy and Centrifugation techniques.	
To understand the Chromatographic techniques.		Students understood the Chromatographic techniques.	
To study the Electrophoresis technique.		Students studied Electrophoresis technique.	
To understand Electrochemical technique and Spectroscopy.		Students understood Electrochemical technique and Spectroscopy.	
To study Radio isotope techniques.		Students studied Radio isotope techniques.	

Course Name: Research Methodology and Intellectual Property Right (IPR) Course Code: HCT 4.3	
Objectives	Outcomes
To understand How to perform Research.	Students understood steps in, formulation of reseach.
To understand Sampling Techniques and Parametric Tests.	Students understood Sampling Techniques and Parametric Tests for statistical analysis.
To understand how to write Thesis and Manuscript.	Students understood how to write Thesis and Manuscript.
To get Introduction to IPR and Patents.	Students understood Intellectual property rights and its Protection and patenting.
To study Plant breeder's right.	Students studied Plant breeder's right.

Course Name: Medical Biotechnology and Bio-Nanotechnology Course Code: SCT 4.1	
Objectives	Outcomes
To study Medical biotechnology.	Students studied Medical biotechnology.
To understand Laboratory diagnosis.	Students understood Laboratory diagnosis.
To study Chemotherapy.	Students studied Chemotherapy for some diseases.
To understand concepts in and applications of Bio-Nanotechnology.	Students understood concepts in and applications of Bio-Nanotechnology.
To study Synthesis of nanostructures.	Students studied Synthesis of nanostructures.

Course Name: Advanced Pharmacognosy Course Code: SCT 4.2	
Objectives	Outcomes
To study General Research Methodology for Pharmacognosy.	Students studied General Research Methodology for Pharmacognosy.
To understand Herbal drug Industry for Entrepreneurship Development.	Students understood Herbal drug Industry for Entrepreneurship Development.
To study Herbal drug regulatory affair.	Students studied Herbal drug regulatory with respect to affairStability, Safety and toxicology, Regulation and dispensing of herbal drugs.
To understand Information Retrieval systems of Herbal Drugs and Literature survey.	Students understood Information Retrieval systems of Herbal Drugs and Literature survey.
To study Volatile oils and Dyes of commercial value.	Students studied Volatile oils and Dyes of commercial value.

Course Name: Project Dissertation and Viva Voce Course Code: MP 4.1	
Objectives	Outcomes
To work on a project from Biotechnology subject.	Students understand concepts in detail of their projects and develop practical skills. Students understand report writing and develop their presentation skills.

M.Sc. II (Theory) Semester-III (w.e.f. 2021-22)

Course Name: Industrial and Environmental Biotechnology Course Code: HCT3.1	
Objectives	Outcomes
To obtain knowledge on wide-ranging topics related to applications of biotechnology in industries.	After the completion of the course the student will have overall knowledge of Scientific industrial biotechnology and applications of microbes and enzymes used in industry.
To learn about bioprocess technology and its applications and get familiar with enzymes and microbes used for industrial purposes.	Environment protection regulations and source of environmental pollutions.
To learn the environment protection Act and Law related to environmental biotechnology	Environmental pollution and its remediation measure The capability to apply avalanched discipline in waste water management.
To understand the basic principles involved in waste water management, Bioremediation & microbial leaching	

Course Name: GENETIC ENGINEERING Course Course Code: HCT 3.2	
Objectives	Outcomes
The objective of the course is to familiarize the students with the basic concepts in genetic engineering To acquaint the students.	The students will have knowledge of tools and strategies used in genetic engineering.
To versatile tools and techniques employed in genetic engineering and recombinant DNA technology	Understanding of applications of recombinant DNA technology and genetic engineering. from academic and industrial perspective.
To appraise them about applications genetic engineering.	Can use and apply the knowledge of genetic engineering in problem solving and in practice

Course Name: PLANT BIOTECHNOLOGY Course Code: SCT 3.1	
Objectives	Outcomes
To learn about basic techniques in plant tissue culture, Micro propagation and other type of hybridization techniques	On the completion of course student will be able to understand different hybridization techniques and basics of embryogenesis.
To know about genetic transformation in plant and techniques about gene delivery.	They will be able to learn about different gene delivery techniques.
To know about applications of plant biotechnology in molecular farming.	

Course Name: CANCER GENETICS AND ANIMAL CELL CULTURE Course Code: SCT 3.2	
Objectives	Outcomes
To study the stem cell and its use as regenerative medicine.	After completion of this course students understand basic aspects of Cancer pathology, epigenetic and somatic genetic changes in tumors.
To study the molecular level of cancer development and progression.	Students become familiar with basic principles and applications of cell culture.
To study the diagnosis and treatment for cancer.	Students will also learn about the different types of stem cells.

Course Name: COMPUTATIONAL STRUCTURE BIOLOGY AND DRUG DESIGNING Course Code: OET 3.1	
Objectives	Outcomes
The objective of the course is to familiarize the students with the basic concepts structural and pathway Databases.	Upon successfully completing this course the students could be able to explain which type of data is available from the most common public databases like (UniProt, Protein Data Bank, CATH, SCOPE, PDBe servers).
Students will understand the basics of molecular interaction in various diseases.	Acquiring theoretical and practical knowledge of drug development.
To understand the principles of drug discovery and drug development	

Course Name: ADVANCE PHARMACEUTICALS Course Code: OET 3.2	
Objectives	Outcomes
To study Physical pharmaceutics	After completion of this course students understand basic aspects of Students can understand Physical pharmaceutics.
To understand the concepts of Dissolution.	Students will understood concepts of Dissolution
To study Surfactant System.	Students can enriched with knowledge of Surfactant System.
To study Polymer science.	Students can acquainted Polymer science and Stability studies.
To be aware of Stability studies.	

Course Name: ANIMAL BIOTECHNOLOGY AND STEM CELL TECHNOLOGY Course Code: HCT 4.1	
Objectives	Outcomes
The objectives of this course are to introduce students To the principles, practices and applications of animal culture and stem cell technology.	Be able to gain fundamental knowledge in animal cell culture and cell culture media and their applications
Animal tissue culture, animal genomics, genetic transformation and molecular breeding of animals.	Be able to describe gene transfer technologies for animals and animal cell lines.
Providing students with a theoretical and practical understanding of production of transgenic animals.	Be able to describe Tissue Transplantation Techniques.

Course Name: ADVANCED ANALYTICAL TECHNIQUES Course Code: HCT 4.2	
Objectives	Outcomes
To provide an adequate knowledge of the principles, instrumentation and applications of common analytical techniques.	Upon successful completion, students will have the knowledge and skills To Explain the theoretical aspects of key analytical techniques and instruments used in different biological areas.
To provide scientific understanding of analytical techniques and detail interpretation of results.	To understand the strength and limitations of techniques and creative use of techniques for problem solving

Course Name: RESEARCH METHODOLOGY AND INTELLECTUAL PROPERTY RIGHTS Course Code: HCT 4.3	
Objectives	Outcomes
Identify an appropriate research problem in their interesting domain.	After completing this paper students will learn following knowledge: Students will get useful information about Steps in Research and Sampling Techniques.
Understand the Preparation of a research project report	Students will be able to learn about Thesis and Manuscript writing.
Understand the law of patent and copyrights.	Students will know the importance of patents and IPR in processing their innovations.
Understand the Adequate knowledge on IPR	

Course Name: MEDICAL BIOTECHNOLOGY AND BIO-NANOTECHNOLOGY Course Code: SCT 4.1	
Objectives	Outcomes
To understand the molecular basis of microbial Diseases.	By the end of the course, the student should be able to Understanding the overview of bacterial, fungal and viral infections.
To integrate knowledge of biology, physics, and chemistry associated with nanotechnology.	Getting the knowledge for the diagnostics and treatment of various infectious agents.
To provide key concept of theoretical & practical aspects regarding nanotechnology.	Studying the basics of nanotechnology, synthesis, characterization and applications of various nanoparticles in medicine, agriculture and the environment.

Course Name: Advanced Pharmacognosy Course Code: SCT 4.2	
Objectives	Outcomes
To study General Research Methodology for Pharmacognosy.	Students can acquainted with knowledge of general research methodology for Pharmacognosy as well as Information Retrieval systems of Herbal Drugs and Literature survey
To understand Herbal drug Industry for Entrepreneurship Development.	Gets knowledge about opportunities as entrepreneurship in Herbal drug Industry, Volatile oils and Dyes of commercial value
To study Herbal drug regulatory affair.	Students can understand Regulation and dispensing of herbal drugs.
To understand Information Retrieval systems of Herbal Drugs and Literature survey.	
To study Volatile oils and Dyes of commercial value.	