



HOLY CROSS COLLEGE (AUTONOMOUS)
Affiliated to Bharathidasan University
Nationally Accredited (3rd Cycle) with 'A' grade by NAAC
College with Potential for Excellence.
Tiruchirappalli - 620002.

**PG AND RESEARCH DEPARTMENT OF BIOTECHNOLOGY &
BIOINFORMATICS**
Programme: B.Sc. Biotechnology

PO No.	Programme Outcomes <i>Upon completion of the B.Sc. Degree Programme, the graduate will be able to</i>
PO-1	Obtain hands-on experience in state of art laboratory techniques.
PO-2	Acquire basic and specific skills to full fill the manpower need of biotechnological industries.
PO-3	Gain knowledge in the scientific development and problems involved with the national and international community.
PO-4	Acquire self-confidence and determination to become entrepreneur and startup.
PO-5	List opportunities in reputed companies, research institutions for higher education towards teaching and research.

PSO No.	Programme Specific Outcomes <i>Upon completion of the courses the student would be able to</i>
PSO-1	Gain knowledge on basic tools and techniques learnt for designing and performing new experiments.
PSO-2	Decide and apply suitable tools and techniques in biotechnological manipulation (data analysis, soft skill, biotechnological manipulation, team work, laboratory documentation).
PSO-3	Understand and acquire knowledge on ethical legal issues, innovations in environment, health sector and agriculture; and there by implementation for finding sustainable solution to issues pertaining to environment upliftment.
PSO-4	Learn and identify the existing needs and narrow down their specific field of interest.
PSO-5	Able to equip her reading, presenting, oral, verbal and written scientific communication skills in focusing higher education.

Course Title	MAJOR CORE 1 – CELL BIOLOGY		
Code	U18BT1MCT01		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Differentiate between structural and functional details of prokaryotic and eukaryotic cells.	PSO-3	An
CO-2	Illustrate the detailed structural aspects of cell organelles.	PSO-1	R
CO-3	Exemplify the basic signal transduction and protein trafficking mechanism.	PSO-3	U
CO-4	Explain the ultrastructure and functions of the nucleus, mitochondria and chloroplast.	PSO-2	U
CO-5	Categorize chromosomes based on their structural organization and specialized functions.	PSO-3	Ap
CO-6	Relate to the different stages of mitosis and meiosis.	PSO-4	E
CO-7	Explore the basis of cell cycle control mechanism and programmed cell death.	PSO-4,5	Ap

Course Title	MAJOR CORE 2-PRACTICAL - I – CELL BIOLOGY		
Code	U18BT1MCP02		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Elaborate the basic principles of radioactive isotopes and nuclear fission and fusion reactions.	PSO-3	U
CO-2	Classify acids, bases and buffers and explain the basic concept of pH determination.	PSO-1	R
CO-3	Compare and contrast Ionic and Covalent bonds and explain hybridization in organic molecules and biomolecules.	PSO-3	An
CO-4	Differentiate between first, second and third order reactions and assess the influence of temperature on reaction rate.	PSO-2	E
CO-5	Derive the Arrhenius equation and estimate the Arrhenius parameters.	PSO-3	Ap
CO-6	Explain the principle of chirality, racemisation, resolution and geometrical isomerism of acids.	PSO-4	U

Course Title	ALLIED OPTIONAL I – PLANT SCIENCE AND PHYTOCHEMICAL TECHNIQUES		
Code	U18BT1AOT02		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Elaborate the basic principles of nutritional transport and storage.	PSO 1	U
CO-2	Illustrate the general classification and basic molecular structure of secondary metabolites.	PSO 2	E
CO-3	Compare and contrast the importance of medicinal and aromatic plants in India.	PSO 1	An
CO-4	Describe the isolation methods and structural elucidation of secondary metabolites.	PSO 2	R
CO-5	Elucidate the methods of processing plant drug and their application in cosmetics.	PSO 1	An
CO-6	Explain the principle and purification of raw drug.	PSO 4	U

Course Title	MAJOR CORE 3 – BIOCHEMISTRY		
Code	U18BT2MCT03		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Outline the chemical composition and properties of biomolecules.	PSO 1	R, U
CO-2	Demonstrate the structure, classification and metabolism of carbohydrates.	PSO 2	R
CO-3	Summarize and explain the structural conformations of proteins, their properties and metabolism.	PSO 2	U
CO-4	Illustrate nucleic acid metabolism and the classification and properties of vitamins and minerals.	PSO 3	R
CO-5	Classify lipids based on their structure, functions and properties and explain its metabolic pathways.	PSO 3	An
CO-6	Discuss the chemistry and functions of various vitamins and their sources.	PSO 4	U, An
CO-7	Discuss the deficiency conditions of various vitamins.	PSO 4	R, Ap

Course Title	MAJOR CORE 4 – BIOLOGICAL TECHNIQUES		
Code	U18BT2MCT04		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Identify the underlying working principle of various lab instruments with their specific applications.	PSO 1	U
CO-2	Interpret the role of centrifugal and frictional force and the biological applications of centrifugation.	PSO 2	E
CO-3	Integrate the use of centrifugation principle for developing new instruments.	PSO 2	U
CO-4	Compare the principles and applications of various electrophoretic techniques and invent new applications for electrophoresis.	PSO 1	An
CO-5	Integrate spectroscopic techniques in their research projects and utilize them to discover the structure of novel compounds.	PSO 4	An

Course Title	ALLIED OPTIONAL –III BIOINFORMATICS (THEORY CUM LAB)		
Code	U18BT2AOT05		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Understand the history and basic concepts in bioinformatics.	PSO 1	U
CO-2	Knowledge on the informative databases available for all the biological macromolecules.	PSO1	U
CO-3	The global and local sequence alignment tools and their importance were conceptualized.	PSO 2, 3	An
CO-4	Study of various protein structure prediction methods through computational approaches.	PSO 3	R
CO-5	Understanding the significance of gene prediction methods.	PSO 1	U
CO-6	Apply the tools and software in the analysis of nucleic acid and protein.	PSO 2	E

Course Title	ALLIED OPTIONAL –III BIOSTATISTICS& SPSS (THEORY CUM LAB)		
Code	U18BT2AOT06		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Study on data collection, analysis, interpretation and documentation.	PSO 1	U
CO-2	Investigate the SPSS software packages in data analysis and evaluations.	PSO 2	R
CO-3	Familiarize in the concepts of measures of central tendencies.	PSO 2	Ap
CO-4	Analysis of correlation and regression between two variables and perform hypothesis testing.	PSO 1	R
CO-5	Study the basic concepts and laws in probability distribution.	PSO 4	An
CO-6	Apply statistical hypothesis testing including Chi-square, F ^o test, ANOVA in identification of significant relationship between two or multiple variables.	PSO 4	U

M.Sc BIOTECHNOLOGY

PO No.	Programme Outcomes <i>Upon completion of the M.Sc. Degree Programme, the graduate will be able to</i>
PO-1	To upgrade their existing knowledge on scientific discoveries, laboratory techniques on biotechnology.
PO-2	Able to contribute and fulfill the needs of biotechnology industries with specific skills and provide solutions to develop product, process or technology.
PO-3	Familiarize with professional and ethical biotechnological practices for advancements in societal, environmental and medical upliftment.
PO-4	Acquire self-confidence to become entrepreneur, manager and Research scientist with strong ethical values. Understand the potentials, and impact of biotechnological innovations on environment and their implementation for finding sustainable solution to issues pertaining to environment, health sector and agriculture.
PO-5	Apply knowledge in the scientific development and able to compete their level to government scientist and reputed national institutions.

PSO No.	Programme Specific Outcomes <i>Upon completion of the courses the student would be able to</i>
PSO-1	Apply the tools and techniques learnt for designing and performing new experiments. Understand the operation mechanism of various bioinstruments employed in industrial companies and research labs.
PSO-2	Decide and apply suitable tools and techniques in biotechnological manipulation especially gene manipulation and bioinformatics.
PSO-3	Understand the fundamental concepts in core courses such as basic science, cell biology, plant and animal biotechnology, r-DNA technology, microbiology, molecular biology and basic bioinformatics tools.
PSO-4	Gain and apply knowledge to plan, analyze and find innovative solutions for existing biotechnological problems.
PSO-5	Able to enhance their skill in planning and designing projects and receive funds from government, Graduates will be able to acquire competence to work in research laboratories and R &D labs.

Course Title	MAJOR CORE 1 – CELL AND MOLECULAR BIOLOGY		
Code	P16BT1MCT01		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Predict the structural and functional details of various cell organelles and their properties.	PSO 3	R, U
CO-2	Construct a model depicting the cell cycle and its regulatory mechanism.	PSO 1, 3	U, Ap
CO-3	Illustrate the major components and pathways of cell signalling.	PSO 1,4	Ap, E
CO-4	Compare and contrast the signalling pathways of bacterial and plant systems.	PSO 4,5	U, An
CO-5	Differentiate the structure, function and numerical alterations of chromosomes in prokaryotes and eukaryotes.	PSO 3	An
CO-6	Reason out the mechanism of construction, damage and repair of DNA and interactions.	PSO 2, 4	U
CO-7	Examine in detail the factors affecting the regulation of RNA and protein synthesis and their properties.	PSO 3,5	R, An
CO-8	Present an elaborate account on operons, insertional elements and transposons involved in recombination and interpret the mechanism of tumour formation.	PSO 3, 5	U, C

Course Title	MAJOR CORE II – BIOINSTRUMENTATION		
Code	P16BT1MCT02		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Identify the underlying working principle of various lab instruments with their specific applications.	PSO 1	R, U
CO-2	Interpret the role of centrifugal and frictional force and the biological applications of centrifugation.	PSO 2	R
CO-3	Integrate the use of centrifugation principle for developing new instruments.	PSO 2	U
CO-4	Compare the principles and applications of various electrophoretic techniques and invent new applications for electrophoresis.	PSO 3	R
CO-5	Integrate spectroscopic techniques in their research projects and utilize them to discover the structure of novel compounds.	PSO 4	An
CO-6	Investigate the role of radiation in diagnostics and instrumentation and the detection and measurement of radioisotopes in cells and tissues.	PSO 4	U

Course Title	MAJOR CORE III – MICROBIOLOGY		
Code	P16BT1MCT03		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the concept of microbial taxa, species and strains.	PSO 1	U
CO-2	Classify viruses based on their genetic material and host.	PSO 2	R
CO-3	Organize different bacterial strains based on classical and modern taxonomical 16S R rna sequencing methods.	PSO 2	U
CO-4	Demonstrate the methods of measuring bacterial growth and gene transfer mechanisms in bacteria.	PSO 3	R
CO-5	Distinguish antimicrobial agents based on their characteristics and mode of action and investigate drug resistance.	PSO 4	An
CO-6	Experiment with the existing applications of microbes and devise novel applications.	PSO 4	U
CO-7	Produce industrial value added products using microbial fermentation at a commercial level.	PSO 5	An

Course Title	MAJOR CORE IV – BIOCHEMISTRY		
Code	P16BT1MCT04		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Outline the chemical composition and properties of biomolecules.	PSO 1	U
CO-2	Demonstrate the structure, classification and metabolism of carbohydrates.	PSO 2	R
CO-3	Summarize and explain the structural conformations of proteins, their properties and metabolism.	PSO 2	U
CO-4	Illustrate nucleic acid metabolism and the classification and properties of vitamins and minerals.	PSO 3	R
CO-5	Classify lipids based on their structure, functions and properties and explain its metabolic pathways.	PSO 4	An
CO-6	Discuss the chemistry and functions of various endocrine hormones and their associated disorders.	PSO 4	U
CO-7	Investigate the properties of enzymes and compare the characteristics and mechanism of action of different enzymes.	PSO 5	An
CO-8	Critically evaluate the Rapid-reaction, pre-steady state and relaxation kinetics of various enzymes.	PSO 5	U
CO-9	Elaborate the mechanisms underlying enzyme inhibition and regulation.	PSO3	U

Course Title	MAJOR ELECTIVE I – ORGANIC FARMING		
Code	P16BT1MET01		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Implement soil fertility and quality management initiatives for improving organic farming in India.	PSO 1, 3	R, U
CO-2	Produce organic manures and fertilizers and promote their usage in agricultural lands.	PSO 4, 5	R,An
CO-3	Develop and create awareness of novel weed management strategies to improve economic sustainability of rice lands.	PSO 1,2	U, C
CO-4	Investigate and educate others on the values of organic farming.	PSO 3	An, E
CO-5	Produce and distribute green manure and biofertilizers or commercial use.	PSO 4	An, C

Course Title	MAJOR ELECTIVE I – ECOLOGY		
Code	P16BT1MET02		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain the concept of habitat, niche and resources.	PSO 3	U
CO-2	Categorize the types and characteristics of inter-specific interactions and populations.	PSO 4	R
CO-3	Demonstrate ecological succession and energy flow and diversity in ecosystems.	PSO 2	U
CO-4	Identify the major terrestrial biomes in India.	PSO 3	R
CO-5	Investigate current ecological problems and propose suitable solutions.	PSO 3	An
CO-6	Design and practice conservation strategies involving in situ and ex-situ approaches.	PSO 3	Ap

Course Title	MAJOR CORE VII – RECOMBINANT DNA TECHNOLOGY		
Code	P16BT2MCT07		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Experiment with new molecular tools employed in rDNA technology.	PSO 1	R, U
CO-2	Differentiate various types of cloning and expression vectors and integrate them in research.	PSO 2	R
CO-3	Implement gene transfer techniques for producing transformants and select appropriate screening strategies.	PSO 2	U
CO-4	Integrate appropriate DNA profiling tools and techniques in their research projects.	PSO 3	R
CO-5	Design an experiment to produce recombinant proteins, vaccines and pharmaceutical compounds.	PSO 4	An
CO-6	Construct novel engineered proteins used in medicine and agriculture using transgenic animal models.	PSO 4	U

Course Title	MAJOR CORE VII- IMMUNOLOGY		
Code	P16BT2MCT08		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Outline and classify the types and major components involved in immune response at the cellular and molecular levels.	PSO 3	R, U
CO-2	Differentiate the mechanism of cell mediated and humoral immune response.	PSO 3, 5	R, Ap
CO-3	Examine the structure and function of complements and MHC molecules and investigate the role of HLA complex in human.	PSO 4,5	An
CO-4	Delineate the role of immunosuppression in organ transplantation and the importance of tissue typing tests.	PSO 3	R
CO-5	Outline the basic mechanism of immune tolerance and distinguish between autoimmunity and hypersensitivity reactions.	PSO 3,4	An
CO-6	Associate with the various players involved in immune response to viral, bacterial, parasitic and acquired infectious diseases.	PSO 5	U
CO-7	Discuss in detail the concept of immune surveillance and the pattern of response to tumours, their immunodiagnostic and therapy.	PSO 3, 5	R, An
CO-8	Formulate new diagnostic and therapeutic techniques by developing a thorough knowledge of antigen –antibody interactions and their applications.	PSO 1	U

Course Title	MAJOR CORE IX- DEVELOPMENTAL BIOLOGY		
Code	P16BT2MCT09		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Associate with the molecular perspective of fertilization and discuss the components involved.	PSO 3	R, U
CO-2	Relate to the concept and mechanism of cell-cell communication and development and the major pathways involved.	PSO 1, 5	R, Ap
CO-3	Explain about stem cells and their applications.	PSO 3	U, R
CO-4	Interpret the various stages of embryonic development and their underlying patterns.	PSO 3,4	R
CO-5	Demonstrate the method of post embryonic development and establish the role of chromosomes in sex determination.	PSO 5	An
CO-6	Deconstruct the principle and causative factors of aging and its genetic regulation.	PSO 3	U
CO-7	Research on the basic principles of cellular organization, induction and differentiation	PSO 5	R, Ap

Course Title	NON MAJOR ELECTIVE I – GENETIC COUNSELLING		
Code	P16BT2NMT01		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Relate to the basic concepts of genetics and discuss the patterns of inheritance of various human traits.	PSO 1	U
CO-2	Illustrate the basic classes of genetic disorders with specific reference to diabetes, cancer and hypothyroidism.	PSO4	R
CO-3	Appraise the basic underlying causes of genetic disorders at the molecular level.	PSO 2	U
CO-4	Categorize the different methods available for genetic testing and for the treatment and management of genetic disorders.	PSO 3	R
CO-5	Outline the basic principles of genetic counseling and investigate and propose new strategies for solving various ethical and legal issues involved in it.	PSO 5	An
CO-6	Discuss the role of pharmacogenomics in drug development	PSO 4	U

Course Title	MAJOR ELECTIVE II – GENOMICS AND PROTEOMICS		
Code	P16BT2MET03		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Simplify the basic concepts of genomics involving structure and organization of genes in human and appraise the concept of genetic and physical mapping.	PSO 1	U
CO-2	Construct genome maps using genome databases and predict gene functions by structural and functional gene annotations.	PSO 2	R
CO-3	Compare genomes by employing various tools and predict gene regulatory patterns.	PSO 2	U
CO-4	Categorize the applications of functional genomics in determining the differential expression of genes under normal and diseased conditions.	PSO 4	R
CO-5	Experiment with the techniques involved in proteome analysis.	PSO 5	An
CO-6	Integrate the tools used in protein expression and functional analysis in their research.	PSO 4	U

Course Title	MAJOR ELECTIVE II – EVOLUTION		
Code	P16BT2MET034		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Interpret the origin of evolution and the emergence of evolutionary theories.	PSO 4	U
CO-2	Estimate the time scales, periods and epochs in evolutionary history and the stages of evolution.	PSO 2	R
CO-3	Examine the molecular basis of evolution using molecular tools.	PSO 4	U
CO-4	Investigate the concept of changes in gene frequencies among populations through natural selection, migration and genetic drift.	PSO 5	R
CO-5	Outline the concept of speciation, convergent and divergent evolution and sexual selection.	PSO 4	An
CO-6	Select the appropriate techniques for analyzing the cognitive, behavioural and communication patterns in evolution.	PSO 2	U

Course Title	MAJOR CORE XII – PLANT BIOTECHNOLOGY		
Code	P16BT3MCT12		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Explain in detail the organization of plant genome and demonstrate the basic practices and techniques of plant tissue culture.	PSO 2	R, U
CO-2	Experiment with the concept of somatic hybridization and investigate its applications.	PSO 2	R
CO-3	Outline the methodology and the wide applications of transgenic plants for various purposes.	PSO 4	U
CO-4	Produce transformants by employing the various gene transfer techniques and plant viral vectors.	PSO 3	R
CO-5	Generate stress and pathogen resistant varieties of plants for enhanced agricultural benefits.	PSO 5	An
CO-6	Appraise the industrial applications of plant biotechnology in the production of value added agroindustrial products.	PSO 4	U
CO-7	Critically evaluate the hazards of plant biotechnology and the threats to biosafety and propose strategies to address those issues.	PSO 5	E
CO-8	Relate to the various regulatory frameworks involved in marketing hybrids.	PSO5	An

Second Year - Semester – III

Course Title	MAJOR CORE XIII – ANIMAL BIOTECHNOLOGY		
Code	P16BT3MCT13		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Implement the basic tools and techniques of animal cell culture for the development and maintenance of lab based and large scale culture of animal cell lines.	PSO 1	R, U
CO-2	Identify the methods used for the construction of vectors and investigate the methods used for producing recombinant vaccines.	PSO 2	R
CO-3	Outline the basic gene transfer techniques and produce transgenic animals.	PSO 1, 5	U
CO-4	Examine the role of gene transfer techniques in artificial reproductive techniques.	PSO 4	R
CO-5	Compare and contrast the types, preparation and application of different types of stem cells and integrate them in research.	PSO 5	An
CO-6	Interpret the basic concept a key players involved in gene therapy and analyze the targeted gene knockout and delivery mechanisms for producing novel engineered genes.	PSO 3, 5	U

Course Title	MAJOR CORE XIV – BIOPROCESS TECHNOLOGY		
Code	P16BT3MCT14		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Examine the methods for the isolation, screening and preservation of industrially important microbial strains.	PSO 1	R, U
CO-2	Develop methods for improving increased yield and desirable characteristics of those strains.	PSO 4	R
CO-3	Explain the importance of fermentation and illustrate the various types of fermenters and their working principle.	PSO 2	U
CO-4	Investigate the mechanics involved in bioreactor design and operation and the role of computers in bioprocess control.	PSO 3	R
CO-5	Produce commercially valued fermentation products by manipulating and enhancing their recovery and purification methods.	PSO 5	An
CO-6	Demonstrate the process and applications of immobilized cells and enzymes	PSO 4	U
CO-7	Categorize the industrial scale production and therapeutic applications of enzymes and deconstruct the design of immobilized enzyme reactors.	PSO3	U
CO-8	Criticize the distinct forms of IPR and their applications.	PSO1	An

Course Title	NON MAJOR ELECTIVE II – RESEARCH METHODOLOGY AND BIOSTATISTICS		
Code	P16BT3NMT02		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Summarize and explain the methods of survey, collection, analysis and evaluation of data.	PSO 1	R
CO-2	Implement the basic principles and structure involved in writing a research paper.	PSO 2	R
CO-3	Extend the knowledge of the basic rules of journal publication for their research publications in national and international journals.	PSO 2	U
CO-4	Outline the methodology followed for dissertation and thesis writing and integrate it in their research projects	PSO 5	R
CO-5	Scrutinize the basic research design and method of writing a research proposal and finding sponsors for their research.	PSO 4	An
CO-6	Critically evaluate the role of biostatistics in research and experiment with the various tools and methods for their research.	PSO 4	U

Course Title	MAJOR ELECTIVE III– DRUG DESIGNING AND NANO BIOTECHNOLOGY		
Code	P16BT3MET05		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Classify drugs based on their source, nature, nomenclature and dosage and routes of administration.	PSO 5	R, U
CO-2	Identify and explain drug protein interactions and receptors involved at the molecular level.	PSO 2	R
CO-3	Investigate drug metabolism and kinetics patterns, toxicity and pharmacogenetic analysis.	PSO 2	U
CO-4	Discriminate the various stages of drug development and appraise the role of computer aided drug designing for developing novel customized drugs.	PSO 3	R
CO-5	Examine the basic principles and techniques of nanobiotechnology and categorize their functional principles.	PSO 4	An
CO-6	Develop strategies to produce and characterize novel nanoparticles for research purposes.	PSO 5	U
CO-7	Outline the applications of nanotechnology in medical diagnostics and therapeutic procedures.	PSO 2	U

Course Title	MAJOR ELECTIVE III – BIODIVERSITY		
Code	P16BT3MET06		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Outline the basic principles and methods of taxonomy and distinguish the various levels of structural organization of plants, animals and microbes.	PSO 1	U
CO-2	Organize the criteria involved in taxonomic classification of plants, animals and microbes.	PSO 2	R
CO-3	Compare and contrast the major types of habitats and species in the Indian subcontinent.	PSO 2	U
CO-4	Identify the common parasites and pathogens of humans, animals and plants.	PSO 3	R
CO-5	Develop novel strategies for identification and conservation of endangered species.	PSO 5	An
CO-6	Investigate the applications of biotechnology in environmental hazard management and conservation.	PSO 4	U
CO-7	Develop a thorough knowledge of existing biodiversity resources and laws to protect biodiversity.	PSO 2	U
CO-8	Generate new methods of biodiversity augmentation and conserved utilization of bioresources.	PSO 5	An

Course Title	EXTRA CREDIT – SELF STUDY PAPER - INTELLECTUAL PROPERTY RIGHTS		
Code	P17BT4SST01		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Classify and explain the distinctive forms of IPR and their enforcement measures.	PSO 1	R
CO-2	Discuss the basic concept of obtaining Patents and Copyrights and their underlying regulations.	PSO 2	R
CO-3	Explain the basic need and procedures involved in the application of trademarks and designs.	PSO 2	U
CO-4	Outline the basic methodology of patenting biotechnological inventions.	PSO 5	R
CO-5	Discuss the role of IPR in protection of software and computer related inventions.	PSO 4	An
CO-6	Appraise the need for IPR in social media and copyright issue in the digital environment.	PSO 4	U

M.Phil. BIOTECHNOLOGY

HOLY CROSS COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI-
620002PG AND RESEARCH DEPARTMENT OF BIOTECHNOLOGY
&BIOINFORMATICS

Programme: M.Phil., Biotechnology

PO No.	Programme Outcomes <i>Upon completion of the M.Phil. Degree Programme, the graduate will be able to</i>
PO-1	Obtain hands-on experience in state of art laboratory techniques.
PO-2	Practice the teaching-learning process by being the proponent in classroom and laboratory experience.
PO-3	Motivate themselves in developing an interest on designing and implementation of research.
PO-4	Be familiar with and think critically towards the science curricula with comprehensive knowledge and theoretical skills.
PO-5	List opportunities in reputed companies, research institutions for higher education towards teaching and research.

PSO No.	Programme Specific Outcomes <i>Upon completion of the courses the student would be able to</i>
PSO-1	Gain knowledge on basic tools and techniques learnt for designing and performing new experiments.
PSO-2	Acquire in-depth knowledge of the process of developing new materials as well as gain expertise of well-defined area of research in Biotechnology.
PSO-3	Decide and apply suitable teaching tools and techniques in biotechnological manipulation (data analysis, soft skill, biotechnological manipulation, team work, laboratory documentation).
PSO-4	Understand and acquire knowledge on ethical legal issues, innovations in environment, health sector and agriculture; and there by implementation for finding sustainable solution to issues pertaining to environment upliftment.
PSO-5	Able to enhance and equip her leadership quality, teaching skills, presenting scientific data's, oral, verbal and written scientific communication skills in focusing higher education.

Course Title	MAJOR CORE 1 – RESEARCH METHODOLOGY- TECHNIQUES & THEIR APPLICATION		
Code	MPH15BT1C01		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Identify the underlying working principle of various lab instruments with their specific applications in research.	PSO 3	E
CO-2	Integrate spectroscopic techniques in their research projects and utilize them to discover the structure of novel compounds.	PSO 4	Ap
CO-3	Interpret the role of centrifugal and frictional force and the biological applications of centrifugation.	PSO 3	An
CO-4	Integrate the use of centrifugation principle for developing new instruments.	PSO 5	E
CO-5	Compare the principles and applications of various electrophoretic techniques and invent new applications for electrophoresis.	PSO 3	E
CO-6	Interpret and determine the relationship between data's by correlation and regression analysis in application with biomedical research.	PSO 5	Ap

Course Title	MAJOR CORE 2 – APPLIED BIOTECHNOLOGY		
Code	MPH16BT1C02		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Produce industrial value added products using microbial fermentation at a commercial level.	PSO 3	E
CO-2	Implement the basic tools and techniques of animal cell culture for the development and maintenance of lab based and large scale culture of animal cell lines.	PSO 4	Ap
CO-3	Interpret and produce transformants by employing the various gene transfer techniques and plant viral vectors.	PSO 5	An
CO-4	Design an experiment to produce recombinant proteins, vaccines and pharmaceutical compounds.	PSO 4	C
CO-5	Investigate the mechanics involved in bioreactor design and operation, the role of computers in bioprocess control, fermentation technology and expand their industrial applications for the production of novel products	PSO 3	An
CO-6	Discuss the basic concept of obtaining Patents and Copyrights and their underlying regulations.	PSO 5	Ap

Course Title	MAJOR CORE 3 – PRINCIPLES AND PRACTICE OF TEACHING BIOTECHNOLOGY		
Code	MPH15BT1C03		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Evaluate and apply the verbal communication in the life science data content.	PSO 3	E
CO-2	Understand the teaching objectives and implement the teaching methods in the class	PSO 1	U
CO-3	Identify various presentation software, Recall principles of multimedia applications	PSO 5	An
CO-4	Knowledge on the informative databases available for all the biological macromolecules.	PSO 3	C
CO-5	The global and local sequence alignment tools and their importance were conceptualized.	PSO 4	Ap
CO-6	Critically evaluate the role of biostatistics in research and experiment with the various tools and methods for their research.	PSO 5	Ap

Course Title	MAJOR CORE 4 – MOLECULAR MODELING& COMPUTER AIDED DRUG DESIGN		
Code	MPH15BT1E04		
CO No.	Course Outcomes	PSOs Addressed	Cognitive Level
CO-1	Study the basic concepts in molecular modeling.	PSO 1	R
CO-2	Essentials of pharmacophore designing and valuation.	PSO 5	U
CO-3	Understand the concept of molecular mechanics and molecular dynamics.	PSO 1	U
CO-4	Apply the molecular docking tools in drug discovery process.	PSO 3	Ap
CO-5	Comprehend the necessary strategies in drug discovery such as QSAR, TASR and ADMET.	PSO 3, 4	An
CO-6	Emerge new ideas on Immunoinformatics and its role in personalized medicine.	PSO 5	An