Course code	Course name	Course	Course Outcome
		credit	
MCBPCOR01T	Biomolecules and Enzymology	4	Course objectives:- The objective of this course is to gain an insight into the Structure and Functions of Carbohydrates, Proteins, Lipds, Nucleic acids and a detailed discussion into the fundamentals of enzyme structure and function and kinetics of soluble and immobilized enzymes. Also it deals with current applications and future potential of enzymes. Learning outcomes:- By the end of the course the student will be able to discuss the Structure and function of Carbohydrates e.g. glycogen, cellulose etc. Describe structure, functions and the mechanisms of action of enzymes. The student will learn kinetics of enzyme catalyzed reactions and enzyme inhibitory and regulatory process. The student will be able to perform immobilization of enzymes. The student will get exposure of wide applications of enzymes and their future potential.
MCBPCOR02T	Basic Microbiology and Microbial Diversity	4	Student is able to describe the molecular structure of DNA and RNA Student is able to describe the organization of microbial genomes and eukaryotic genomes Student is able to describe chromatin arrangement and nucleosome formation Student is able to describe arrangement of replicons in genome Student is able to describe various modes of DNA replication Learns about sustainable development and Biosafety and IPR rules.
MCBPCOR03T	Basic Cell Biology	4	Students will be taught about different types of cells in brief followed by emphasis on Eukaryotic cells. Also the course colntent includes structure and functions of plasma membrane and cytoplasmic organelles such as Mitochondria, Endoplasmic reticulum, Golgi complex, peroxisomes, Lysosomes and nucleus. Cytoskeletal component giving shape to the cell is also included. In addition, the students will be taught about Cell Division and its regulation as well as cell signalling.
MCBPCOR04T	Biomolecules and Enzymology	4	By the end of the course the student will be able to discuss the Structure and function of Carbohydrates e.g. glycogen, cellulose etc. Describe structure, functions and the mechanisms of action of enzymes. The student will learn kinetics of enzyme catalyzed reactions and enzyme inhibitory and regulatory processes. The student will be able to perform immobilization of enzymes. The student will get exposure of wide applications of enzymes and their future potential.
MCBPCOR05P	Microbiology and Molecular Biology	4	Microbiology:Learns about microbial Diversity and their outcomes.Learns about the techniques for studying and identifying microbes and environmentpathogen nteractions.Studies the microbes associated with various habitats and their metabolism.Molecular identification of the microbes.Knows the classification of microbes associated with environment.Can identify environment associated molds, yeasts, yeast-like fungi and bacteria by

			phenotypic and biochemical methods.
			Is aware of microbial habitat of specific microbes
			Molecular Biology:
			Molecular Biology gives in-depth knowledge of biological and/or medicinal processes
			through the investigation of the underlying molecular mechanisms
MCBPAFC01M	Laboratory Safety	2	Laboratory safety involves the development of skills and responsibility and must be
MCDIALCOIM	Mossures	-	an integral part of every biological science curriculum. This means that safety
	weasures		awareness must be integrated into each laboratory course including research with
			increasingly broader scope at more advanced levels. The creation of a culture of
			laboratory safety requires a broad commitment from all levels of the educational
			institution At the department level faculty need to assume responsibility for
			continuing review of safety issues with students in teaching and research
			laboratories, especially the persons responsible for undergraduate instruction, often
			graduate students or instructors. Faculty must lead by example in a coordinated
			departmental safety effort. At the administrative level, this will involve implementation
			of a biological as well as biochemical hygiene plan that is in agreement with any
			campus biological, human, animal and environmental hygiene/safety efforts and
			must address the safe handling, storage, and disposal of wastes. Eye wash and
			showers must be in operating condition, and fume hoods with proper sashes are
			essential. Anyone working or visiting in the lab must be wearing goggles, and
			consumption of food or drinks must not be permitted. A clean, uncluttered laboratory
			is more likely to encourage careful work.
MCBPCOR06T	Metabolism and	4	By the end of the course the student will be able to:
	Bioenergetics		• describe the principles of metabolism and the differences between anabolism and
	Dioeneigenes		catabolism;
			• demonstrate an ability to handle simple mathematical treatments of biological
			processes.
			• discuss the role of coenzymes, such as NAD+, FAD and ATP, in metabolism;
			• outline the metabolic pathways involving glucose, fatty acids and amino acids;
			• show how the energy released by catabolism is recouped by substrate level and
			oxidative phosphorylation;
			describe the various types of genetic mutation and inborn errors of metabolism
			describe the methods for detecting and correcting inborn errors of metabolism
			• outline the hormonal regulation of metabolism and discuss the role of protein
			phosphorylation in this context;
			• describe the regulation of metabolism in physiological and pathological situations
			(e.g. exercise, starvation and diabetes);
MCBPCOR07T	Biophysical Techniques	4	By the end of the course the student will be able to: • Gain an understanding of the
			basic principles of Atomic force, Fluorescence, Confocal and Electron Microcopy. •
			Understand the principles and analysis using Spectrocopy including, fluorescence,

			CD, ORD, NMR and ESR. Also gaining insights in the applications of
			chromatography and immunotechniques such as FISH, CISH etc.
MCBPCOR08T	Fundamentals of Molecular	4	Having completed a master's degree, students will be able to:
	Biology		Conduct independent work in a laboratory.
	5101087		 Read scientific articles and gain a critical understanding of their contents.
			• Give a spoken and written presentation of scientific topics and research results.
			Present hypotheses and select, adapt and conduct molecular and cell-based
			experiments to either confirm or reject the hypotheses.
MCBPCOR09T	Biophysical Techniques and	4	By the end of the course the student will be able to: • Understand the role of different
	Immunology		types of Cells, Effector Molecules and Effector Mechanisms in Immunology
	initiationogy		particularly role of T and B cells, Cytokines and Mucosal immunity. • Understand the
			experimental immunology regarding vaccine development and significance of
			antigen antibody interactions in diagnostics. • Gain an understanding of the basic
			concepts of mechanisms of autoimmunity. Transplantation immunology, animal
			models in immunological studies and cell imaging • Understand the role of immune
			system in cancer, their causes and cure, also psychological modulation of immune
			system.
MCBPCOR10T	Environmental	4	Students will be able to know about the diversity of microorganisms inhabiting a
	Microbiology		multitude of habitats and occupying a wide range of ecological habitats.
	0,		 To explain various aspects of a microbial ecology and to become familiar with
			current research in environmental microbiology.
			 Comprehend various biogeochemical cycles – Carbon, Nitrogen, Phosphorus
			cycles etc. and microbes involved biofertilizers and biopesticides production.
			 Comprehend the various methods to determin the Sanitary quality of water and
			sewage treatment methods employed in waste water treatment.
MCBPSEC01M	Diagnostic Microbiology	2	After completing the Applied Medical Microbiology course, students will be able to:
			1. Understand and practice the principle of prevention and control of health care
			associated infections and rational antibiotic policy.
			2. State the recent advances in the field of Medical Microbiology and apply this
			knowledge in understanding actionathogenesis and diagnosis of diseases caused by
			micro-organisms.
			3. Carry out fundamental or applied research involving microbiological work.
			4. Undertake teaching assignments in the subject of Medical Microbiology
MCBPCORIIT	Immunology	4	After completing the immunology course, students will be able to:
			 Understand the salient features of antigen antibody reaction & Its uses in disgnastics and various other studies
			diagnostics and various other studies.
			Learn about immunization and their preparation and its importance Demonstrate existing quantitative skille, such as the shill that available
			• Demonstrate scientific quantitative skills, such as the ability to evaluate
			experimental design, read graphs, and understand and use information from scientific
1			papers.

			Demonstrate skill in communication of scientific data in standard format.
			Undertake teaching assignments in the subject of Medical Microbiology
MCBPCOR12T	Microbial Genetics	4	After completing the Microbial Genetics course, students will be able to:
			1. Handle and independently work on lab protocols involving molecular and genetic
			techniques.
			2. Demonstrate scientific quantitative skills, such as the ability to evaluate
			experimental design, read graphs, and understand and use information from
			scientific papers.
			3. Demonstrate skill in communication of scientific data in standard format.
MCBPCOR13T	Recombinant DNA	4	At the end of the course, the students should be able to:
	Technology		• isolate and purify nucleic acids for routine laboratory procedures.
	Technology		• explain the underlying mechanisms of gene cloning.
			discuss the practical aspects of applying recombinant DNA technology.
			• explain the significance of model organisms in recombinant DNA technology.
			describe recombinant gene expression systems
			• To describe various tools and techniques of RDT, different enzymes and vectors
MCBPDSE01T	Bioethics and Intellectual	4	• On the completion of the above objectives student will be able to know about IPR
	Property Rights		and also the importance of protecting their innovation.
	Toperty Rights		• They will be familiar with international and national law practiced and also recent
			issues on it.
			• They will develop a thought about the importance of good laboratory practice in
			high quality research.
			• They will also grow awareness about the basic fundamental safety measures that a
			researcher should follow in laboratory.
MCBPDSE01T	Bioprocess Technology	4	• Students will be able to comprehend and apply the inoculum development and
			strain improvement techniques for a desired fermentation process.
			• Apply the ideas of select a fermenter and formulate suitable media for a desired
			fermentation process.
			Apply regulatory downstream techniques for product isolation, separation and
			purification. Techniques in real time scenarios.
			Conduct experiments for production, isolation and recovery of bio-products.
MCBPCOR14P	Biostatistics and	4	For the Biostatistics course:
	Bioinformatics		• be able to discuss and explain what biostatistics is and how it is used in the field of
			public health
			• be able to understand the common statistical techniques and terminology used in
			studies that are
			presented in the popular press and health related journals
			• be able to use and understand the principal numeric and graphical techniques to
			display and
			summarize medical and health related data

			 be able to understand the basic principles of probability and how they relate to biostatistics be familiar with the common probability distributions that are used in statistical inference be able to know what drawing a random sample from a population means and why it is important be familiar with the most common sampling distributions used in biostatistics be familiar with the concept of statistical inference be able to estimate the value of various population parameters from a sample of data be able to test the hypothesis that the value of a population parameter equals a certain value be familiar with the sources of vital statistics data, how to interpret such data and how to perform basic tests to evaluate them By the end of the course in Bioinformatics the student will be able to: • Gain an understanding of the basic concepts of Bioinformatics. • Understand the tools used in Bioinformatics.
MCBPGEC01T	Microbes in Sustainable Development	4	 To understand the role of Environment in human Health. The students will learn the principles for using complex microbial communities for environmental applications in the light of the Microbial Resource Management. To understand the basics of Environmental Economics systems and acquire skills to manage them sustainably. To equip students with the knowledge, attitudes and skills necessary for Environmental Entrepreneurship and to motivate them to venture into entrepreneurship as an alternative career option.
MCBPCOR16T	Medical Microbiology	4	 After completing the Medical Microbiology course, students will be able to: 5. State the recent advances in the field of Medical Microbiology and apply this knowledge in understanding aetiopathogenesis and diagnosis of diseases caused by micro-organisms. 6. Carry out fundamental or applied research involving microbiological work. 7. Undertake teaching assignments in the subject of Medical Microbiology
MCBPCOR17T	Food and Industrial Microbiology	4	 After completing the Industrial Microbiology course, students will be able to: Practice various methods for their isolation, detection and identification of microorganisms in food and employ in industries. Apply the theories and principles of food microbiology in practical, real-world situations and problems. Food Microbiology
MCBPCOR18T	Virology	4	 Knowledge and Understanding fundamentals of viral biology; the structure of viruses and their genomes; virus gene expression, modes of replication and transmission, the interaction of

			viruses with cells and pathogenesis of virus-induced diseases, the detection, treatment and prevention of virus infections; virus epidemiology and the genetics and evolution of viruses. 2) Intellectual Skills and other Attributes to understand the nature of viruses and their role in disease pathogenesis; integrate and evaluate information and data from a variety of sources; Lytic and lysogenic cycles of bacteriophage λ - marvels of transcriptional control; spite-specific recombination in lambda (generalized and specialized transduction); problems in replication of the ends of linear DNA and how viruses circumvent the problem with examples of T-4 (terminal redundancy and circular permutation), λ (rolling circle model of replication, concatemers, site-specific cleavage), adenovirus and retrovirus; viruses as vectors for recombinant DNA technology – M13, fd, TMV, Ti, Baculovirus, Adenovirus, Retrovirus; oncogenic
			vectors for recombinant DNA technology – M13, fd, TMV, Ti, Baculovirus, Adenovirus, Retrovirus; oncogenic viruses; oncolysis - VSV. Incidence and etiology of cancer, genetics of cancer, hallmarks of cancer, metastasis, molecular and cellular events, such as regulation of gene expression, genome maintenance, cell
			growth and death, differentiation, cell-cell recognition, signaling, and homeostasis
MCBPDSE02T	Agricultural Microbiology	4	 Students will get knowledge about the various biotechnology tools involved in increasing plant production. This will help in field based research. Study the use of genetics in predicting and maintaining production and control pathogens by using various biotechnology tools. To maintain gene banks and related studies
MCBPDSE02T	Application of Microbial Technology	4	
MCBPCOR17M	Project Work and Review Work	8	Students go for an intensive project of 2 months in various laboratories and research institutes to get hands on experience on various techniques and also learn to use various sophisticated instruments used in research. They get a flavor of research which motivates them to pursue their doctoral program. They also join icrobiological R&D industries. Students participate in journal clubs where they are encouraged to read scientific articles and present their review work. They enlighten themselves on a scientific topic of their interest and its recent advancements which keeps them updated with the ever changing science and technology.