B.B. College, Asansol

Department of Microbiology

(Program Outcomes, Program Specific Outcomes and Course Outcomes)

Program Outcome	Microbiology is the subject dedicated to the study of microorganisms including bacteria, virus, algae, fungi, protozoa present on the earth is in staggering proportion.. It is a broadly termed subject which includes virology, mycology, parasitology, bacteriology, immunology and various other branches. The aim of undergraduate degree in microbiology is to make students knowledgeable about the various basic concepts in wide ranging contexts which involves the use of various theoretical and practical knowledge and skills of microbiology. Students will learn about the basic concepts of prokaryotes, their taxonomy, cell structure, parameters affecting as well as hindering their growth, importance and their differentiation from eukaryotes. They will also acquire significant knowledge about routine and specialized microbiological skills applicable to clinical research with accurate observations and analysis. Students will further be knowledgeable about the hands-on applications of various skills related to the environment like biodegradation, bioremediation etc. Students will gather significant concepts about fermentation of food and beverages, production processing of various antibiotics, steroids, enzymes which they can apply in various industrial work fields. Students get equipped with significant knowledge about various techniques regarding molecular biology like RDT, DNA extraction and purification, tools and methods employed in genetic engineering etc. The course is reasoning and application based, making students eligible for higher studies, jobs in

	various sectors and entrepreneurship abilities. The science of microbiology has proven to have momentous effects on various aspects like health, agriculture, environment and industry and in the past two to three decades several valuable discoveries on these aspects have put microbiology on centre stage of teaching, research and development.	
ProgrammeSpecific Outcome	1. Students become acquainted with microorganisms and their distributions, morphology, metabolism, beneficial roles and as well as harmful aspects. 2. Students learn all aseptic techniques to isolate and culture microbes in pure form, and also observe them under microscope. 3. Students acquire knowledge about various hands on techniques useful in Environmental and Industrial Biotechnology. 4. Students also gain knowledge regarding Human genetics, Immunology, Human diseases and their treatments, Genetic Engineering which is useful in clinical and agricultural research. 5. Except these this program impart knowledge about virology, epidemiology, mycology and also some applied sciences like Food Technology.	
Semester	**Course**	**Outcome**
I	**Microbial World and Principles of Microbiology**	This course aims to develop knowledge about the contributions of different scientists, essential inventions and discoveries that ultimately form the building blocks of this branch of bioscience.Students will be able to understand the characteristics of different types of microorganisms and methods to organise these microorganisms into specific classes.They will be able to perform basic experiments to grow and study the different characteristics of microorganisms in the laboratory.

	Bacteriology and Systematics	On successful completion of this course the students will be able to describe characteristics of bacterial cells, differentiate a large number of common bacteria by their salient characteristics; classify bacteria into groups. They will be able to describe the nutritional requirements of bacteria for growth, develop knowledge and understanding that besides common bacteria there are several other microbes which grow under extreme environments. They will be able to perform basic laboratory experiments to study microorganisms and methods to preserve bacteria in the laboratory.
II	**Biochemistry**	This course deals with the chaThis racteristics, properties and biological significance of life,Students will acquire knowledge in about ionic product of water,concept of pH and its ability in biological system.This course also covers the basic idea about he general structure,functions and properties of carbohydrate,protein,lipids,vitamins and nucleic acid.Students will be to know the advanced knowledge about principle,structures,classification enzyme inhibition and effect of pH and temperature.
	Biophysics & Virology	This course aims to develop an understanding of several microbiological techniques and instruments which are commonly used in a microbiology laboratory. The students will acquire knowledge about thermodynamic laws and their applicability. They will be able to understand the chemical nature of viruses, different types of viruses infecting animals, plants and bacteria and role of viruses in the development of cancer.
III	**Microbial physiology and metabolism**	On successful completion of this course the students will able to understand the bacterial growth and the different environmental effects on bacterial growth.This course aims to enlighten the students about the sources of energy and its utilization by microorganisms.

	Cell Biology	On the successful completion course of this the students will be able to understand the history of cytology and structure of different cell organelles and its functions.
	Molecular Biology	This course aims to enlighten the students about basic structures ,evolution,diversity and replication of microorganisms.Students will be able to make comprehensive assessment of transcription,post transcriptional modification and describe the gene expression in prokaryotes and eukaryotes.
IV	**Environmental Microbiology**	On successful completion of this course the students will be able to understand the fundamental concepts concerning the interactions between microorganisms and their environment.They will be able to acquire the knowledge about the different biogeochemical cycles and waste water treatment and bioremediation.
	Food and Dairy Microbiology	On successful completion of this course the student will be able to get sufficient knowledge in relationship between food and microbes,techniques used in food processing and describe the characteristics of different spoilage microorganisms.
	Industrial Microbiology	This course aims to enlighten the students about the theoretical and practical skills in industrial microbiology.The students will be able to discuss the role of microorganisms in industry.
V	**Immunology**	This course aims to enlighten the students about the protective role of the immune system of the host and helps to develop an understanding of the basic components as well as the mechanisms underlying the immune system and its response to pathogenic microorganisms. This course will enable the students to conduct experiments using different immunological techniques.
	Medical Microbiology	On successful completion of this course the students will be able to understand the basic and general concepts of causation of disease by the pathogenic microorganisms and the various parameters of assessment of their severity including the broad categorization of the methods of

		diagnosis.
	Biostatistics and Bioinformatics	On successful completion of this course the students will be able to develop basic concepts of statistics and their importance to analyse biological data. They will be able to acquire skills to use computers for analysis of biological data, use important biological databases, use tools to retrieve data, and compare the data of the biological macromolecules. They will be able to develop basic skills for data retrieval, representation, analysis and interpretation
	Advances in Virology	On successful completion of this course the students will be able to acquire a sound knowledge of viral transmission, salient features of viralnucleic acids and replication, carcinogenic viruses. They will be familiar with the processes of how a virus can be used in research for future research applications.
VI	**Microbial Genetics**	This course aims to develop an understanding of genome organization, mutation and plasmid. They will be familiar with different mechanisms of genetic exchanges and transposable elements or 'jumping genes. They will be able to develop an initial understanding of recent developments of phage genetics.
	Recombinant DNA Technology	This course aims to develop an understanding of the tools and the methods of genetic engineering. The students will be able to acquire a fairly good understanding of how these tools and methods are employed in the laboratory for manipulation of DNA so as to make it relevant for biotechnological uses. It will make the students familiar with different processes of DNA amplification and DNA sequencing. This knowledge is indispensable for various biological researches.
	Inheritance Biology	This course aims to develop an understanding of evolution taking

		examples from well-studied model organisms of bacteria, fungi and other organisms. It will provide good understanding of concepts of Mendelian genetics and structural organizations of chromosomes. They will be familiar with non-Mendelian pattern of inheritance or cytoplasmic inheritance also.
	Microbial Biotechnology	On successful completion of this course the students will be able to develop an understanding of how microbiology is relevant to technological developments for agriculture and environment. They willdevelop a sound knowledge about how developments in recombinant DNA technology is juxtaposed with microbially-based technological developments for agriculture, industry and environment.