

Session 2019-20

# Programme and Course Outcome

**B.SC (Honours)Biotechnology**



**Multani Mal Modi College,  
Patiala**

## **Program Outcomes (POs)**

**PO-1:** After completing three years Bachelors in honours biotechnology, students would gain a thorough grounding in the fundamentals of new technologies in biotechnology.

**PO-2:** Industry applications of better understanding of the key principles of biochemical functioning at an advanced level. Better awareness of the major issues at the forefront of the discipline, will possess an in-depth understanding of the area of biochemistry chosen for research emphasis.

**PO-3:** An ability to conduct experiments, as well as to analyze data, understood the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevancies in the day-to-day life.

**PO-4:** The knowledge of basics of biotechnology beyond fundamentals results in affective development of the students, hence will make them progress to valuing and organization levels.

**PO-5:** An ability to acquire the skills in handling scientific instruments, planning and performing in laboratory experiments to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability in biotechnology.

## Course Outcomes (COs)

### B. Sc (Honours) Biotechnology- I

#### Semester-1st

Code	Course
BHB5	PUNJABI-I
BHB3	COMMUNICATION SKILLS -I
BHB1	BIOCHEMISTRY & METABOLISM
BHB1	CELL BIOLOGY
BHB4	CHEMISTRY -1

#### Semester-2nd

Code	Course
BHB6	MAMMALIAN PHYSIOLOGY
BHB7	PLANT ANATOMY AND PHYSIOLOGY
BHB8	ENGLISH/COMMUNICATION SKILLS-II
BHB9	CHEMISTRY- 2
BHB-10	PUNJABI-II

#### BHB5: PUNJABI

ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ ਵਿਸ਼ੇ ਦੀ ਪੜ੍ਹਾਈ ਉਪਰੰਤ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਯੋਗਤਾ ਅਤੇ ਸਮਰਥਾ ਵਿਚ ਸਾਰਥਕ ਵਾਧਾ ਹੋਵੇਗਾ

- CO- :1ਸਾਹਿਤਕ ਰਚਨਾਵਾਂ ਦੇ ਮਾਧਿਅਮ ਨਾਲ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਸਾਹਿਤਕ ਰੁਚੀਆਂ ਦਾ ਵਿਕਾਸ ਹੋਵੇਗਾ
- CO- :2ਭਾਸ਼ਾ ਦੀ ਸਿਧਾਂਤਕ ਜਾਣਕਾਰੀ ਨਾਲ ਵਿਦਿਆਰਥੀ ਦੀ ਭਾਸ਼ਾਈ ਸਮਰੱਥਾ ਵਿਚ ਵਾਧਾ
- CO- :3ਸਮਾਜਿਕ ਵਾਤਾਵਰਣ ਤੇ ਸਭਿਆਚਾਰਕ ਵਿਸ਼ਿਆਂ ਸਬੰਧੀ ਗਿਆਨ ਦੀ ਪ੍ਰਾਪਤੀ
- CO- :4ਆਲੋਚਨਾਤਮਕ ਤੇ ਸਿਰਜਣਾਤਮਕ ਸੋਚ ਪਹੁੰਚਦਾ ਵਿਕਾਸ
- CO- :5ਮਨੁੱਖੀ ਹੋਂਦ ਦੇ ਸੰਕਟਾਂ ਦੀ ਨਿਸ਼ਾਨਦੇਹੀ ਅਤੇ ਉਹਨਾਂ ਦਾ ਯੋਗ ਹੱਲ ਲੱਭਣ ਦੇ ਸਮਰੱਥ ਹੋਣਾ
- CO- :6ਵਿਦਿਆਰਥੀ ਆਪਣੇ ਵਿਚਾਰਾਂ ਨੂੰ ਲਿਖਿਤ ਅਤੇ ਮੌਖਿਕ ਰੂਪ ਵਿਚ ਵਿਅਕਤਕਰਨ ਦਾ ਹੁਨਰ
- CO- :7ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੀ ਵਿਆਕਰਨਕ ਮੁਹਾਰਤ ਨਾਲ ਕਿਸੇ ਵੀ ਹੋਰ ਭਾਸ਼ਾ ਨੂੰ ਆਸਾਨੀ ਨਾਲ ਗ੍ਰਹਿਣ/ਸਮਝਣ ਦੀ ਯੋਗਤਾ

#### BHB3: COMMUNICATION SKILLS-I

After completion of this course student will be able to:

- CO-1: Develop clear and lucid writing skills.
- CO-2: Approach ideas with a creative bent of mind.
- CO-3: Draft business correspondence effectively with great brevity and clarity.
- CO-4: Develop overall linguistic competence and communication skills.
- CO-5: Show proficiency in soft skills required for national and global placements.

### **BHB1-BIOCHEMISTRY & METABOLISM**

After completion of this course the student will be able to:

- CO-1: The major objective of this subject is the complete understanding at the molecular level of all of the chemical processes associated with living cells.
- CO-2: The molecular architecture of cells and organelles, including membrane structure and dynamics will be discussed.
- CO-3: It will also focus on the principles of bioenergetics and enzyme catalysis.
- CO-4: The chemical nature of biological macromolecules, their three dimensional construction and the principles of molecular recognition is also included.
- CO-5: It helps student's understanding in the principles and basic mechanisms of metabolic control and molecular signaling.

### **BHB1 - CELL BIOLOGY**

After completion of this course the student will be able to:

- CO-1: This subject aims to give Students an overview of basic cell biology and its applications in and around the work place.
- CO-2: In particular, this subject focuses on identifying key components that constitute living cells.
- CO-3: The function and structure of each cell components (organelles and tissues) will also be discussed in this subject.
- CO-4: The cellular and sub cellular specializations, and characteristics of higher tissue assemblies, will be studied to understand how cells contribute to the overall functioning of the organisms.
- CO-5: As cell biology is primarily an experimental science, the working of cells will frequently be discussed in an experimental context to familiarize students with many of the common tools used by cell biologists.

### **BHB4 -CHEMISTRY -1**

After completion of this course the student will be able to:

- CO-1: Students will understand the different principles of inorganic chemistry.
- CO-2: Students will get knowledge of optical activity.
- CO-3: Students will be able to perform analysis of ions from Group I & II.

## **B.Sc (HONS.) BIOTECHNOLOGY PART I (2<sup>ND</sup>SEMESTER)**

### **BHB-10: PUNJABI**

**ਪੰਜਾਬੀ ਲਾਜ਼ਮੀ ਵਿਸ਼ੇ ਦੀ ਪੜ੍ਹਾਈ ਉਪਰੰਤ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਯੋਗਤਾ ਅਤੇ ਸਮਰਥਾ ਵਿਚ ਸਾਰਥਕ ਵਾਧਾ ਹੋਵੇਗਾ**

ਵਿਆਕਰਨਕ ਪੱਧਰ ਉੱਤੇ ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਨੂੰ ਸ਼ੁੱਧਰੂਪ ਵਿੱਚ ਉਚਾਰਨ, ਲਿਖਣ ਅਤੇ ਪੜ੍ਹਨ ਦਾ ਹੁਨਰ  
ਪੰਜਾਬੀ ਭਾਸ਼ਾ ਦੇ ਸ਼ਬਦ ਨਿਰਮਾਣ ਪ੍ਰਬੰਧ ਦਾ ਗਿਆਨ  
ਵੱਖ ਵੱਖ ਉਪਭਾਸ਼ਾਵਾਂ ਦੀ ਵੱਖਰਤਾ ਰਾਹੀਂ ਪੰਜਾਬ ਦੀ ਭਾਸ਼ਾਈ ਭਿੰਨਤਾ ਤੇ ਵਿਸ਼ਾਲਤਾ ਦਾ ਗਿਆਨ

## **Programme & Course Outcomes of B. Sc (Honours) Biotechnology (Session 2019-20)**

ਵਿਭਿੰਨ ਸਮਾਜਿਕ, ਰਾਜਨੀਤਕ, ਧਾਰਮਿਕ ਮੁੱਦਿਆਂ ਸਬੰਧੀ ਵਿਚਾਰਾਂ ਦੇ ਨਿਰਮਾਣ ਦੀ ਸਮਰੱਥਾ ਵਿਚਵਾਧਾ  
ਮੁਕਾਬਲੇ ਦੀਆਂ ਪ੍ਰੀਖਿਆਵਾਂ ਵਿਚ ਸਹਾਇਕ  
ਸਮਾਜਿਕ ਰਿਸ਼ਤਿਆਂ ਵਿਚ ਭਾਵਾਂ ਦੀ ਸਰਲ ਪੇਸ਼ਕਾਰੀ ਨਿਜੀ ਚਿੱਠੀ-ਪੱਤਰ ਰਾਹੀਂ ਕਰਨ ਦੀ ਯੋਗਤਾ  
ਵਪਾਰਕ ਪੱਤਰ ਵਿਹਾਰ ਰਾਹੀਂ ਵਪਾਰਕ ਪੱਧਰ 'ਤੇ ਸੰਚਾਰ ਸਮਰੱਥਾ ਦਾ ਵਿਕਾਸ  
ਭਾਸ਼ਾ ਦੇ ਵਿਭਿੰਨ ਰੂਪਾਂ ਨੂੰ ਸਮਝਕੇ ਸਮਾਜ ਵਿੱਚ ਪ੍ਰਭਾਵਸ਼ਾਲੀ ਰੂਪ ਵਿੱਚ ਵਿਚਰਨ ਦੀ ਯੋਗਤਾ  
ਭਾਸ਼ਾ ਦੀ ਸਮਰੱਥਾ ਪਛਾਣ ਕੇ ਅੰਦਰਲੀ ਯੋਗਤਾ ਦਾ ਸਹੀ ਪ੍ਰਯੋਗ ਕਰਨਾ  
ਸਾਹਿਤਕ ਰਚਨਾਵਾਂ ਦੇ ਮਾਧਿਅਮ ਨਾਲ ਵਿਦਿਆਰਥੀਆਂ ਅੰਦਰ ਸਾਹਿਤਕ ਰੁਚੀਆਂ ਦਾ ਵਿਕਾਸ ਹੋਵੇਗਾ

### **BHB6- MAMMALIAN PHYSIOLOGY**

After completion of this course the student will be able to:

- CO-1: Students will understand why cells need to communicate and to give examples of some of the processes involved in animals.
- CO-2: Students will be informed about definition and distinguish the roles of membrane bound, secreted and diffusible signaling molecules and relate this to their functions.
- CO-3: The subject will describe students the major components of the extracellular matrix and how cells adhere to it.
- CO-4: The subject will describe students other forms of cell-cell contact such as cadherin junctions and gap junctions and to appreciate the functions which these serve.
- CO-5: Students will understand the principles of immune recognition.
- CO-6: The subject will describe students the process of fertilization and reproduction.
- CO-7: Students will understand the principals of the mechanisms of action of drugs on tissues and some ways in which their effects might be tested in vitro and in vivo.
- CO-8: The subject will define the terms agonist and antagonist, competitive and non-competitive and partial agonist and antagonist.

### **BHB7-PLANT ANATOMY AND PHYSIOLOGY**

After completion of this course the student will be able to:

- CO-1: Students will have an understanding of basic plant chemistry and physiology.
- CO-2: Students will have an overview of photosynthesis, cellular respiration, and fermentation.
- CO-3: Students will understand the basic parts of a plant cell and the distinction between different tissue types in plants.
- CO-4: Students will be familiar with the anatomical features of leaves, stems, and roots as well as flowers and fruits.

### **BHB8 -ENGLISH/COMMUNICATION SKILLS-II**

After completion of this course the student will be able to:

- CO-1: The objective of this subject is to increase students's English communication skills by improving fluency through regular practice and speaking instructions.
- CO-2: It will help students in developing a core understanding of basic grammar structure like nouns, verbs and adjectives through class reading and speaking tasks.
- CO-3: It will also improve the ability of students to communicate effectively in English.
- CO-4: This subject also focuses to expand vocabulary through assignments and class work.

**BHB9 -CHEMISTRY 2**

After completion of this course the student will be able to:

- CO-1: The students will develop curiosity and interest in chemistry.
- CO-2: The student will acquire an ability to think rationally and critically.
- CO-3: The student will learn ionic solids, solutions and chemical kinetics.
- CO-4: The students will learn about Colligative properties.
- CO-5: The subject will provide details about benzene and its derivatives

M. M. Modi College

## Course Outcomes (COs)

### B. Sc (Honours) Biotechnology - II

#### Semester-3rd

Code	Course
BHB12	GENETICS
BHB13	GENERAL MICROBIOLOGY
BHB15	ENZYMولوجY
BHB16	ENVIRONMENTAL BIOTECHNOLOGY
BHB14	CHEMISTRY-3

#### Semester-4<sup>th</sup>

Code	Course
BHB17	MOLECULAR BIOLOGY
BHB18	IMMUNOLOGY
BHB 20	INDUSTRIAL FERMENTATIONS
BHB 21	IPR, ENTREPRENEURSHIP BIOETHICS & BIOSAFETY
BHB19	CHEMISTRY-4

#### **BHB12-GENETICS**

After completing this course, the students will be able to:

- CO-1: The main objective of this subject is to understand the significance of mitosis and meiosis.
- CO-2: Students will learn Mendelian Genetics which tells how to solve genetic problems that involves monohybrid and dihybrid crosses.
- CO-3: Students will understand the molecular genetics which describes the structure of DNA, DNA replication, transcription and translation processes.
- CO-4: It will help students to understand the causes and effects of mutation on molecular level.
- CO-5: This subject also describes the role of Genetic code, gene, mRNA, ribosomes etc.

#### **BHB13- GENERAL MICROBIOLOGY**

After completing this course, the students will be able to:

- CO-1: Understand the basic microbial structure and function and study the comparative characteristics of prokaryotes and eukaryotes and also Understand the structural similarities and differences among various physiological groups of bacteria/archaea.

## **Programme & Course Outcomes of B. Sc (Honours) Biotechnology (Session 2019-20)**

- CO-2: To know the structure, metabolism, genetics and ecology of prokaryotic microorganism, eukaryotic microorganism and viruses.
- CO-3: Students will understand the principles of physical and chemical methods in the control of microorganism.
- CO-4: Students will understand the prevention and control of infectious diseases.
- CO-5: This subjects gives the understanding of various laboratory techniques such as isolation, staining, identification for various microorganism.

### **BHB15-ENZYMولوجY**

After completing this course, the students will be able to:

- CO-1: Students will learn various theoretical and practical aspects of enzymology.
- CO-2: This subject will stimulates students's interest in learning the structure, function and kinetics of enzyme and their role as catalyst and regulator of cell metabolism.
- CO-3: This subject will serve as foundation for more advanced enzymology courses.
- CO-4: The student will understand the concept of immobilization and its relationship with various cells and enzymes.
- CO-5: A practical approach in the field of biosensors and immobilized systems.

### **BHB16-ENVIRONMENTAL BIOTECHNOLOGY**

After completing this course, the students will be able to:

- CO-1: Students will know the basic physiology of a microorganism and how their structure dictates their function in the environment.
- CO-2: To understand the conventional fuels, modern fuels and their environmental impact.
- CO-3: Students will understand the basics for microbial metabolism of environmental contaminants.
- CO-4: To know various techniques to modify and augment microorganisms in the laboratory and environment.
- CO-5: Students will understand the principles of bioremediation, phytoremediation, bioleaching and waste water treatment.

### **BHB14-CHEMISTRY**

After completing this course, the students will be able to:

- CO-1: To understand the various concepts about acids and bases.
- CO-2: To study the chemistry of some selected functional groups
- CO-3: To learn the chemistry of carboxylic acid derivatives and ethers.
- CO-4: To understand about the chemistry behind fats, oils and detergents.
- CO-5: To understand the Phase equilibrium concept of one and two component systems.
- CO-6: To understand the various terms involved in phase diagram and Gibb's phase rule.
- CO-7: To understand the basic principles electrochemistry.
- CO-8: To explain the concepts of electrolytic conduction and dilution.

### **BHB17-MOLECULAR BIOLOGY**

After completing this course, the students will be able to:

- CO-1: This subject will demonstrate knowledge and understanding of the molecular machinery of living cells.
- CO-2: This subject will demonstrate knowledge and understanding of the principles that govern the structures of DNA and their participation in replication, transcription and translation.
- CO-3: This subject will demonstrate knowledge and understanding of the principles and basic mechanisms of metabolic control and molecular signaling.
- CO-4: Students will learn the use of basic laboratory skills and apparatus to obtain reproducible data from biochemical experiments.
- CO-5: Students will learn how to implement experimental protocols, and adapt them to plan and carry out simple investigations.
- CO-6: Students will be able to analyse, interpret, and participate in reporting to their peers on the results of their laboratory experiments;
- CO-7: Students will build on their knowledge and understanding in tackling more advanced and specialised techniques of DNA and RNA purification and more widely to pursue independent, self-directed and critical learning.

### **BHB18-IMMUNOLOGY**

After completing this course, the students will be able to:

- CO-1: The students will be able to identify the cellular and molecular basis of immune responsiveness.
- CO-2: The students will be able to describe the roles of the immune system and overall organization of genes.
- CO-3: The students will be able to describe immunological response and how it is triggered and regulated.
- CO-4: The students will be able to demonstrate a capacity for problem-solving about immune responsiveness.
- CO-5: The students will be able to transfer knowledge of immunology into clinical decisionmaking through case studies presented in class. Learn about immunization and their preparation and its importance.
- CO-6: Demonstrate scientific quantitative skills, such as the ability to evaluate experimental design, read graphs, and understand and use information from scientific papers.

### **BHB 20-INDUSTRIAL FERMENTATIONS**

After completing this course, the students will be able to:

- CO-1: Industrial fermentation is an interdisciplinary science that applies principles associated with biology and engineering.
- CO-2: Students will learn microbiology and biochemistry from biological aspect.
- CO-3: Students will understand the commercial exploitation of microorganisms on a large scale.

## **Programme & Course Outcomes of B. Sc (Honours) Biotechnology (Session 2019-20)**

CO-4: This subject provides the knowledge of basic principle of fermentation process, which help students to design, develop and operate industrial level biofuels.

CO-5: This fundamental knowledge is essential for Students to make their career in industry based on bioprocess.

### **BHB 21-IPR, ENTREPRENEURSHIP BIOETHICS & BIOSAFETY**

After completing this course, the students will be able to:

CO-1: This subject will introduce basic concepts of ethics and safety that are essential for different disciplines of science and procedures involved and protection of intellectual property and related rights.

CO-2: Students will understand balanced integration of scientific and social knowledge in sustainable development.

CO-3: To understand the risks, ethics and safety of biotechnology based research and products related to various environmental factors.

CO-4: This subject will provide a basic layout on regulations for entrepreneurship.

### **BHB19-CHEMISTRY-4**

After completing this course, the students will be able to:

CO-1: The students will develop curiosity and interest in chemistry.

CO-2: The student will acquire knowledge of acid and bases, carboxylic acids and its derivatives.

CO-3: The student will learn concepts of phase equilibrium, fats & oils and electrochemistry.

CO-4: The students will learn applications of conductance measurement.

## Course Outcomes (COs)

### B. Com (Honours) Biotechnology- III

#### Semester- 5th

Code	Course
BHB23	BIOPROCESS TECHNOLOGY
BHB24	RECOMBINANT DNA TECHNOLOGY
BHB25	Animal Biotechnology
BHB26	PLANT BIOTECHNOLOGY
BHB27	CHEMISTRY-5

#### Semester- 6<sup>th</sup>

Code	Course
BHB28	BIOANALYTICAL TOOLS
BHB29	GENOMICS & PROTEOMICS
BHB30	MEDICAL MICROBIOLOGY
BHB31	BIOINFORMATICS
BHB32	FOOD BIOTECHNOLOGY
BHB32	CHEMISTRY-6

### BHB23-BIOPROCESS TECHNOLOGY

After completing this course, the students will be able to:

- CO-1: This course explains the processes and techniques used for extraction and purification of a product from culture medium. Also, bioprocess consideration in using animal and plant cell cultures will discuss using different techniques.
- CO-2: To instruct students with an in-depth understanding of the key process design concepts relating to the production of biomolecules of industrial importance, produced using isolated microbial and mammalian cells.
- CO-3: This will also provide students with an up-to-date knowledge of upstream and downstream processing technology.
- CO-4: Throughout this module, the emphasis will be on relating how market requirements influence the development and cost-effective optimization of biotechnology processes, stressing the multidisciplinary nature of this sector.
- CO-5: Students will be equipped with a knowledge and understanding of mainstream bioprocess design heuristics so that they may engage productively within multidisciplinary process development teams.

### BHB24-RECOMBINANT DNA TECHNOLOGY

After completing this course, the students will be able to:

## **Programme & Course Outcomes of B. Sc (Honours) Biotechnology (Session 2019-20)**

- CO-1: This subject covers both the principles and the applications of molecular biology methods with an emphasis on the application of recombinant DNA technology to animals, plants and microbial organisms.
- CO-2: To understand the application of recombinant technology to diagnostics and therapeutics.
- CO-3: It describes the use of genetically engineered products to solve environmental problems and cure human diseases.
- CO-4: It also covers the practical application of recombinant DNA technology in industry, food production, human and veterinary medicine, agriculture and bioengineering.
- CO-5: It will also discuss the use of recombinant DNA technology to identify, map and sequence genes and to determine their function.
- CO-6: Understanding of applications of recombinant DNA technology and genetic engineering, from academic and industrial perspective.

### **BHB25-ANIMAL BIOTECHNOLOGY**

After completing this course, the students will be able to:

- CO-1: This subject covers the topics for the identification and characterization of animal breeds.
- CO-2: Locate and critically evaluate scientific literature and experimental studies relating to animal biotechnology and be able to effectively communicate the findings in oral and written form.
- CO-3: Evaluate and discuss public and ethical concerns over the use of animal biotechnology.
- CO-4: Students will study the methods of developing DNA based diagnostics and genetically engineered vaccines for animals.
- CO-5: This subject also includes animal genomics studies and its varied applications.
- CO-6: Students will learn embryo-transfer technology, cloning, and transgenic animals.
- CO-7: This subject also covers the molecular diagnostics, wildlife conservation, stem cell research and bioprocessing technologies.

### **BHB26-PLANT BIOTECHNOLOGY**

After completing this course, the students will be able to:

- CO-1: The course will provide new knowledge and widening of the knowledge acquired in other course by handling of classical and modern plant biotechnology processes, including breeding of healthy plants, plants with improved characteristics and plants for biomolecule production.
- CO-2: Students will develop molecular strategies to support plant breeding programs, including molecular biodiversity analysis, quantitative genetics and molecular marker-trait associations.
- CO-3: Students will be able develop a model to introduce and to study the expression of genes related to plant adaptations.
- CO-4: Students will learn to apply biotechnology to the development of agriculture.
- CO-5: Students will learn to apply and develop strategies to produce bio-products (metabolites, enzymes, recombinant proteins)

## **Programme & Course Outcomes of B. Sc (Honours) Biotechnology (Session 2019-20)**

- CO-6: Students will understand biotechnological processes that have also applicative value in pharmaceutical and food industry, in agriculture and in ecology.

### **BHB27-CHEMISTRY**

After completing this course, the students will be able to:

- CO-1: Students will acquire an ability to observe accurately and objectively.  
CO-2: Students will acquire an ability to solve problem.  
CO-3: Students will acquire an ability to think scientifically, independently and to make rational discussion.  
CO-4: Students will be able to understand what it means to use spectroscopic methods for qualitative and quantitative analysis.  
CO-5: This subject will be able to describe the difference between a fluorescence excitation and emission spectrum.  
CO-6: This subject will determine the vibrations for atomic molecules and identify whether they are infrared active.

### **BHB28-BIO-ANALYTICAL TOOLS**

After completing this course, the students will be able to:

- CO-1: The primary objectives of this course are to develop the skills to understand the theory and practice of bio-analytical techniques.  
CO-2: The course contains bio analytical techniques along with their theory, working principal, common instrumentation and possible applications.  
CO-3: This subject will provide scientific understanding of analytical techniques and detail interpretation of results.  
CO-4: Students will be able to learn the theoretical principles of centrifugation techniques, electrophoresis, spectroscopy and some of their applications

### **BHB29-GENOMICS & PROTEOMICS**

After completing this course, the students will be able to:

- CO-1: The ultimate goal of this subject is to develop student's understanding towards the identification and characterization of proteins expressed in a genome.  
CO-2: Students will be able to browse whole genome databases.  
CO-3: Learn on assigning gene function through mutagenesis and genetic engineering and will be able to conduct gene expression profiling.  
CO-4: It includes study of the entire set of proteins in order to understand its structure and function.  
CO-5: This subject will cover recent developments in genetics, epigenetics, small RNAs, proteomics, gene expression, mutagenesis and mapping genes.  
CO-6: It aims to teach students advanced technologies, research methods with major emphasis on the applications of DNA sequencing and protein analysis techniques.  
CO-7: Acquire skills in the techniques of Site directed mutagenesis, Transposon tagging and targeted genome editing technologies.

### **BHB30-MEDICAL MICROBIOLOGY**

After completing this course, the students will be able to:

## **Programme & Course Outcomes of B. Sc (Honours) Biotechnology (Session 2019-20)**

- CO-1: Students will be able to identify common infectious agents and the diseases that they cause.
- CO-2: Students will be able to evaluate methods used to identify infectious agents in the clinical microbiology lab.
- CO-3: Students will be able to recall microbial physiology including metabolism, regulation and replication.
- CO-4: Students will be able to explain general and specific mechanisms by which an infectious agent causes disease.
- CO-5: Students will be able to recognize and diagnose common infectious diseases from the clinical presentation and microbiological lab findings.
- CO-6: Students will be able to describe the epidemiology of infectious agents including how infectious diseases are transmitted.
- CO-7: Students will be able to explain interventions employed to prevent infectious diseases including infection control measure and vaccines.

### **BHB31-BIOINFORMATICS**

After completing this course, the students will be able to:

- CO-1: To give students an introduction to the basic practical techniques of bioinformatics.
- CO-2: Describe the history, scope and importance of Bioinformatics and role of internet in Bioinformatics.
- CO-3: Describe about Multiple Sequence Alignment, BLAST, FASTA, SWISSPROT its significance, algorithms and tools used for MSA
- CO-4: Emphasis will be given to the application of bioinformatics and biological databases to problem solving in real research problems.
- CO-5: The students will become familiar with the use of a wide variety of internet applications, biological database and will be able to apply these methods to research problems.
- CO-6: The aim of practical subject is to provide practical training in bioinformatics methods including accessing the major public sequence databases, use of the different computational tools to find sequences, analysis of protein and nucleic acid sequences by various software packages.

### **BHB32-FOOD BIOTECHNOLOGY**

After completing this course, the students will be able to:

- CO-1: This subject discusses the technological principles and industrial applications of microorganisms and enzymes in food production and processing systems to provide useful products and services.
- CO-2: Demonstrate knowledge of major scientific concepts, social, economic and ethical implications in food sciences.
- CO-3: Analyse the importance of microorganisms in foods and understand the biotic and abiotic factors that affect their development in these substrates.
- CO-4: Recognise the importance of fermentation processes and appreciate the role of microorganisms in industrial processes.
- CO-5: This subject will cover basic properties, characteristics of microorganisms and enzymes, their metabolic pathways and how these are harnessed, manipulated and applied to increase productivity in food sector.

**Programme & Course Outcomes of B. Sc (Honours) Biotechnology (Session 2019-20)**

- CO-6: Major fermented food product technologies will also be discussed with specific references to alcoholic beverages, dairy products, organic acid, traditional fermented products.
- CO-7: The practical component of this subject will include food fermentation and processing concepts to help student's understanding in food technology and related processes.

**BHB32-CHEMISTRY**

After completing this course, the students will be able to:

- CO-1: Students will acquire an ability to communicate using the language of chemistry.
- CO-2: Students will develop an appreciation of chemistry and its application in daily life.
- CO-3: Students will develop an awareness of the social, economic, environmental and technological financial services.