

Department of Biotechnology

Programme Name- B.Sc Biotechnology

Programme outcomes

PO1: Students develop global competencies in the area of basic and applied biological sciences.

PO2: Enhancing the subject knowledge of students by using traditional and modern ICT based teaching methods and learning by doing.

PO3: To enrich students' knowledge and train them in various branches of Biotechnology such as genetics, molecular biology, biochemistry, immunology, fermentation technology, environmental biotechnology and tissue culture techniques.

PO4: To groom the students to meet futuristic challenges and national interests

Programme specific outcomes

PSO1: To bestow the students with all the research skills required to work independently

PSO2: To develop scientific temperament and social responsibilities in the students.

PSO3: To inculcate nature care by imparting knowledge of advance modern techniques

PSO4: As Biotechnology is an interdisciplinary course, empower the students to acquire technological knowhow by connecting disciplinary and interdisciplinary aspects of biotechnology.

PSO5: Acquire knowledge in students of biotechnology enabling their applications in industry and research.

Course outcomes

First Year B.Sc. Biotechnology

Course: BBt101—Fundamentals of Chemistry -I

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

CO1: Students should know and understand different functional groups and their application

CO2: Should understand different types of bonds in molecules

Course: BBt 102—Fundamental of Physics

- CO1: Students will learn how to convert quantities from standard system to metric System. Students will understand the importance of accuracy in measurement and methods of measurement.
- CO2- Understanding of dynamics of fluid. How to measure the pressure and pressure gauge of fluids. Different types of flow and Bernoulli's theorem. Applications of fluid dynamics in day to day life.
- CO3- Detailed study on different types of waves and its characteristics. Concept of beats and Doppler effect. Applications in life science point of view.
- CO4- A better understanding of examples of surface tension in nature and its applications in our day today life.
- CO5 – Basic concepts regarding optics and its applications. Different types of lenses and their basic. Different types of microscopes.

Course: BBt103- Biochemistry-I

- CO1: As Biochemistry is the branch of science concerned with the chemical and physico-chemical processes and substances that occur within living organisms, therefore students will be able to understand the relevance of biomolecules that play an important role in our body.
- CO2: Students will learn about the historical perspective of origin of biomolecules and hence life.
- CO3: Students will learn about various types of bonds, their strength and hence role in various biomolecules.
- CO4: At first year level students will be well acquainted with the knowledge of structures and functions of carbohydrates and lipids.

Course: BBt104- Biophysics

- CO1: Students will develop a conceptual understanding of connections between physics and biology.
- CO2: Students will be able to explain the behavior and interactions between, matter and energy at both the atomic and molecular levels by different atomic models.
- CO3: An understanding about different types of nuclear radiations, methods to measure radioactivity and safety measures in radioactivity.

CO4: Students will comprehend the molecular components which constitutes the cell membrane and give its different electrical and physicochemical properties. They will understand the importance of transport in the cells.

Course: BBt105-Animal Science- I

CO1: To gain knowledge of kingdom Animalia both invertebrates and vertebrates and their characteristics as well as classification criterion.

CO2: Understanding the concept of classification and construction of animal organization of chordates and non- chordates.

CO3: Understanding the different functional aspects of various system of animals vertebrates (frog) & invertebrates (honeybee)

CO4: Understanding the structural and functional aspects of animal tissues.

Course: BBt-106- Plant Sciences I

CO1: An understanding, deep knowledge of different groups of plants and their characteristic features as well as classification criterion of each plant group.

CO2: Students will also acquire a detail information of the plant kingdom as life form and economic importance in biotechnology field of each plant group.

CO3: Gaining knowledge about unique features plant structure and silent features, function and chemical compositions of cell wall.

CO4: Students will be able to recognize, differentiate morphological features and understand various modifications of vegetative and reproductive plant organ with functions in plant parts.

CO5: They would gain knowledge on the basic concepts of plant tissue system, anatomical features. Students will develop an understanding on the various components of stem and wood during its secondary growth.

Course: BBt107-Microbiology –I

CO1: To gain knowledge of different groups of microorganisms and their characteristics as well as classification criterion and detailed classification of each group of microorganism.

CO2: Students also understands about discovery of microbial life. Contribution of various scientists in the development of Microbiology. Path breaking discoveries which has carried major change in human life.

CO3: Acquire knowledge about ultrastructure of bacteria, their structure extracellular and intracellular components and their function.

CO4: Know about the different parts and working mechanisms of basic light microscope, deep knowledge on the sample preparation and different staining techniques to visualize parts of microbial cell.

Course: BBt108- Mathematics & BioStatistics- I

CO1: Students will understand the concept of population and sample. They will understand how to collect data using various statistical sampling methods and how to classify and represent that data graphically.

CO2: Students will learn through various statistical measures such as measures of central tendency, dispersion.

CO3: Students will be able to describe the correlation between interrelated variables

CO4: Students will be able to understand the concept of Regression between interrelated variables.

CO5: Students will be able to understand the concept of sampling.

CO6: Students will be able to apply algorithmic techniques to solve the problems and obtain valid solutions.

CO7: Students will be able to apply critical thinking and analytical skills to solve scientific data sets.

CO8: Students will be able to test hypotheses and draw correct inferences using quantitative analysis.

Course: BBt 109-Practicals in Chemistry and Biochemistry

CO1: Ability to understand fundamental concepts of biology, chemistry and biochemistry.

CO2: Ability to apply basic principles of chemistry to biological systems and molecular biology.

CO3: Ability to relate various interrelated physiological and metabolic events.

CO4: A general awareness of current developments at the forefront in biochemistry and allied subjects.

CO5: An understanding of Biochemical calculations.

CO6: Use of colorimeter to explain Lambert-Beer Law and hence qualitative and quantitative analysis of samples.

Course Code: BBt-110 Practical in Plant and Animal Science

CO1: Imparting practical knowledge on the importance of model system like *Drosophila*, *Hydra*, *Paramecium*.

CO2: Hands on training how to do culturing of paramecium and hydra.

CO3: To understand morphological parameters of angiosperm plants

CO4: To enhance the the knowledge about diverse plant group.

CO5: Hands on training how to make the slides to understand anatomical features.

Course: BBt111- Practicals in Microbiology and Biostatistics I

CO1: Students understands basic layout of microbiology lab, various instruments, construction, working and use in microbiology laboratory

CO2: Student gets hands on experience of various aseptic transfer technique used to handle microorganisms in laboratory

CO3: Learns various staining techniques used to study microorganisms.

CO4: Students will understand how to do analysis with the help of MS Excel.

CO5: Students will learn how to plot various graphs using MS Excel.

CO6: Students will able to perform correlation and regression to real life problems.

CO7: Students will be able to do t-test, z-test and chi-square test for analysis of data.

CO8: Students will be able to understand the concept of ANOVA (Analysis of variance).

Course: BBt112-Practicals in Physics and Biophysics

CO1: Students will be able to understand the working principle and working of different instruments.

CO2: Through hands on training, students are able solve the problems by understanding the principle of pH meter, centrifuge, microscopes, thermometers and their application in analyzing different biological samples.

CO3: Conceptual understanding of fundamental physics principles.

CO4: Enhance the logical thinking and analytical approach as well as experimental and computational skills.

Course: BBT201- Fundamentals of Chemistry II

CO1: Should know the basic concepts in chemistry and calculations of molarity, molality etc.

CO2: Should know different types of reaction, order and differentiate properly and concepts of thermodynamics

Course: BBT202- Biochemistry-II

CO1: Students will have an understanding of proteins, Amino acids and their structure, forces stabilizing the structures of proteins.

CO2: As coenzymes are important in enzymatic reactions therefore role of vitamins as coenzymes will be made clear to students.

CO3: As enzymes are integral part of Biochemistry therefore students will be well acquainted with about the role of enzymes, mechanism of action, types of inhibition at the end of the semester.

CO4: The structure of nucleic acids, their properties and forces stabilizing structure will be clear to students.

Course: BBT 203- Bioinstrumentation

CO1: Students will gain an understanding of interpreting spectra and will be able to explain how spectroscopic methods are used for quantitative analysis of biomolecules.

CO2: Students will understand and interpret the nuclear processes such as radioactivity, fission, and fusion and their use in medicine.

CO3: Students will be given an overview of chromatography as a tool in higher research.

CO4: The principle of basic instruments used in laboratory will be more clear to students and hence working of an instrument.

CO5: Students will become aware of the use of microscope as a tool in different fields and its principle and working.

Course Code: BBT-204-Animal Science-II

CO1: Students acquires knowledge about animal physiology and different physiological processes.

CO2: Understanding the importance of parasites in human health.

CO3: Understanding the concept of economic zoology and their applications in different fields.

Course Code: BBt-205 - Plant sciences II

- CO1: Students would be familiar with hypothesis, significance and mechanism of plant water relationship.
- CO2: Understanding of the concept of ascent of sap, its mechanism and different theories for absorption and transport of water.
- CO3: Students will gain the knowledge of photosynthesis, respiration & various different Plant Metabolic process involved in plant physiology.
- CO4: Students will learn different types of growth promoters & phytohormones and their role and importance in growth and development of plants.
- CO5: Understanding of economic services of plant biodiversity to human being as well as the economic importance of different crops.

Course Code: BBt-206 Microbiology-II

- CO1: Students acquires knowledge about basic composition of microbial cell and nutritional requirement of microorganism.
- CO2: Understands design of microbial culture media, its types and uses.
- CO3: Pure culture techniques for aerobic and anaerobic cultivation methods for bacteria.
- CO4: Acquire knowledge on sterilization techniques and various chemical and physical methods to control growth of microorganisms
- CO5: Understands various interactions between microorganisms and other form of life. Useful as well as detrimental.

Course Code: BBt-207: Biomathematics and Biostatistics –II

- CO1: Students will understand the concept of probability.
- CO2: Students will learn through various probability distributions such as normal distribution, binomial distribution and poisson distribution.
- CO3: Students will be able to describe the testing of hypothesis.
- CO4: Students will be able to understand t-test, z-test and chi-square test.

- CO5: Students will be able to understand the concept of ANOVA (Analysis of variance).
- CO6: Students will be able to test hypotheses and draw correct inferences using quantitative analysis.
- CO7: Students will be conversant for their potential studies of multivariate analysis, Regression analysis.
- CO8: Students learn to handle censored data, techniques and tools to obtain survival probability and knowledge of clinical drug trials. After completion they can work in health industry.

Course Code: BBT-208 Computers In Biology

- CO1: To understand the Basics of Computers.
- CO2: To study how to **use** the MS-Office Application.
- CO3: To study how to utilize the features of MS-Office for research perspective.
- CO4: Understanding of Computer Viruses and Antiviruses.
- CO5: To know about Internet Searches (Keyword and Advanced Search) and how to maintain Databases.

Course Code:BBt-209 Practicals in Chemistry and Biochemistry

- CO1: Ability to critically evaluate a problem and resolve to challenge blindly accepted concepts.
- CO2: Good experimental and quantitative skills encompassing preparation of laboratory reagents, conducting experiments, satisfactory analyses of data and interpretation of results.
- CO3: Qualitative and quantitative analysis of biomolecules
- CO4: Ability to think laterally and in an integrating manner and develop interdisciplinary approach.
- CO5: Overall knowledge of the avenues for research and higher academic achievements in the field of biochemistry and allied subjects.
- CO6: Should identify functional groups
- CO7: Able to perform analytical techniques with proper skills.

Course Code: BBT-210: Practical in Plant and Animal Science II

- CO1- Students will get hands on experience on various physiological process in plant system.

CO2- Imparting knowledge on growth and development of plants under the effect of plant growth regulators.

CO3- Get to know about the economic importance of plants and their applications. Understand and learns aseptic transfer techniques in microbiology.

CO4- Hands on training on dissecting and mounting of honey bees.

CO5- Imparting knowledge on parasitology.

CO6- To make the students aware of importance and how to preserve insects

Course Code: BBt-211: Practical in Microbiology II and Bioinstrumentation

CO1 Students learn how to prepare various nutritional media and sterilization technique

CO2 Understand and learns aseptic transfer techniques in microbiology.

CO3 Gets hands on experience of pure culture and enumeration technique of microorganisms.

CO4: Students will be able to understand the use of different instruments used in different courses.

Course Code: BBt 212 Practical in Computer and Biostatistics

CO1: To understand Dos Commands (Introduction of CUI Operating System)

CO2: How to create documentation by using Ms-Word.

CO3: How to create spreadsheets, how to apply formulas for rows and columns by using Ms-Excel.

CO4: How to create presentation with using Ms-Powerpoint.

CO5: Creation of databases with using Ms-Access.