

**DEPARTMENT OF BIOTECHNOLOGY**  
**PROGRAMME OFFERED: BSc BIOTECHNOLOGY**

**PROGRAMME OUTCOMES (PO):**

After completing graduation in Bachelor of Science, students will be able to:

**PO1:** Develop a deeper understanding of the laws of nature that govern all natural processes, develop a sense of inquisitiveness that would lead them to explore the reasons and logic behind scientific phenomena/principles through established methods of observation, modelling, experimentation and calculations.

**PO2:** Apply the scientific method to design, execute and analyze an experiment and also explain the scientific procedures, experimental observation and inferences derived from collected practical data.

**PO3:** Understand the significance of basic sciences like Physics, Chemistry and mathematics, and the central roles they play in our understanding in the fields of energy, health, medicine and the environment.

**PO4:** Elevate the student's awareness about conservation and sustainable use of natural resources.

**PO5:** Classify all life forms within a phylogenetic framework and describe the key characteristics of each group.

**PO6:** Develop state-of-the-art laboratory skills like proper handling of scientific instruments, knowledge of SOPs on laboratory protocols, planning and execution.

**PO7:** Inculcate critical thinking abilities, problem-solving through accuracy and validity of practical knowledge, and to validate their assumptions and ideas based on accurate results from careful research and observations

**PO8:** Demonstrate the ability to explain and justify their ideas coherently both oral and written and thus develop professional communication skills.

**PO9:** Apply their knowledge to develop innovate ideas that will help them in addressing social, economic and environmental issues in their surrounding locality as well as larger society.

**PO10:** Expand their learning avenues through use of multiple learning resources to keep themselves abreast of the scientific developments worldwide; take up advanced studies in the fields of Life sciences and Applied Sciences.

### **PROGRAMME SPECIFIC OUTCOMES (PSO):**

After successfully completing graduation in BSc Biotechnology, the students should be able to:

**PSO1:** Classify all living forms and enumerate the characteristics of each taxon, the roles each play in the biosphere

**PSO2:** Possess theoretical as well as practical knowledge of the state-of-the art instruments and hands on experience of basic techniques like Gel electrophoresis, immunological techniques etc.

**PSO3:** Understand the microbial world and their significance

**PSO4:** Have a deeper understanding of the foundations of biotechnology, that is, Biochemistry, Molecular biology and Genetics

**PSO5:** Follow proper laboratory protocols which will prime them for research activities in the future

**PSO6:** Understand the principles, purpose and relevance of genetic engineering and the ethical aspects.

**PSO7:** Carry out basic plant, animal and bacterial cultures and apply this knowledge to enhance their future research prospects

**PSO8:** Understand the applications of Biotechnology and advances in different areas like medical, microbial, environmental, agricultural, plant, animal and forensic sciences.

### **FIRST SEMESTER**

**Course Name: Fundamentals of Chemistry**

**Course code: BTT101**

**Course Outcomes:**

After completion of Fundamentals of chemistry course the student is expected to –

CO1: Understand the gas laws, colligative properties of dilute solutions, electromotive force and entropy and enthalpy changes for cell reactions.

CO2: Understand concept of acids and bases, Arrhenius theory and Faraday's laws of electrolysis.

CO3: Learn the basics of thermodynamic parameters such as internal energy, entropy, enthalpy, Gibb's free energy and Helmholtz free energy.

CO4: Know the concept of rate of change of chemical reactions and how temperature affects the rate of reaction.

CO5: Understand the difference between different kinds of isomers. Concept of enantiomers and diastereomers.

CO6: Learn different types of colloidal system and understand the various ways organic structures are depicted.

CO7: Able to prepare Molar and normal solutions and determination of the rate constant and quantitative analysis for carbohydrates, proteins and lipids.

**Course Name: Fundamentals of Biochemistry**

**Paper code: BTT102**

**Course Outcomes (CO):**

On completion of this course:

**CO1:** The students will acquire knowledge about various biomolecules which constitute the living organisms.

**CO2:** Students will understand the significance of chemical bonding in various biomolecules, strong and weak interactions with reference to biological systems.

**CO3:** Students will be able to understand structure and function of carbohydrates, lipids, proteins and nucleic acids and their importance for living systems.

**Course Name: Elements of Biosciences and Physiology**

**Paper code: BTT103**

**Course Outcomes (CO):**

After completion of Elements of Biosciences and Physiology course the student is expected to –

**CO1:** Classify plant groups- Algae, Fungi, Bryophytes, Pteridophytes and Gymnosperm

**CO2:** Know the parasites and pathogens of human, animals and plants.

**CO3:** Know the economically important plants which are used in the production of beverages, wood, rubber, spices, medicine etc.

**CO4:** Understand the concept in plant physiology and physiological mechanisms of controlling plant growth and development.

**CO5:** Know the breakdown and movement of water and solutes in plants and learn the concept of nitrogen fixation in plants.

**CO6:** Understand the function of important physiological system of animals like digestion, respiration, circulation of body fluid and blood flow.

**CO7:** Learn the role of kidney in regulation of water and salt.

**Course Name: BASIC CELL BIOLOGY**

**Course Code: BTT104**

**Course outcomes:**

After successful completion of this course, students should be able to:

**CO1:** Describe the cell theory and the various hypotheses that attempt to describe how living cells came into being.

**CO2:** Distinguish between prokaryotes and eukaryotes; classify the broadly the different cell types that make up a multicellular organism

**CO3:** Describe the biochemical molecules that make up a living cell, their properties and significance

**CO4:** Elucidate membrane structure and function, the endomembrane system within the cell and roles each organelle play in the smooth function of the cell

**CO5:** Describe cell cycle, cell division and understand their biological significance, cell differentiation, aging and cell death and how understanding these underlying

**Course Name: *Basic Chemistry (Laboratory course- I)***

**Course Code: BTP105**

**Course Outcomes:**

After successful completion of this course, students should be able to:

**CO1:** Prepare Molar & Normal solution

**CO2:** Prepare buffers of different pH

**CO3:** Understand the working principles pH meter, conductometer, colorimeter, spectrophotometer, microscopes etc and use them for biochemical analyses.

**CO4:** Perform qualitative and quantitative analysis of carbohydrates, proteins and lipids

**Course Name: Biochemistry- I & Cell Biology (Laboratory course-II)**

**Course Code: BTP106**

**Course Outcomes:**

**BTP 106: Laboratory course-II: Biochemistry- I & Cell Biology**

After successful completion of this course, students should be able to:

**CO1:** The students will gain experimental skill for preparation of solutions of different strengths and buffers.

**CO2:** Acquire practical skill to handle  $p^H$  meter

**CO3:** Perform various experiments related to precipitation of proteins, analysis of carbohydrates, proteins and lipids in known and unknown samples.

**CO4:** Perform Cytological preparations, describe mitotic and meiotic stages from prepared slides using microscope.

**CO5:** Perform differential staining of blood and identify blood cell types using the microscope

### **SECOND SEMESTER**

**Course Name: Fundamentals of Physics**

**Course Code: BTT201**

**Course outcomes:**

After completion of Fundamentals of physics course the student is expected to –

**CO1:** Understand the concept of measurement of physical quantity using International units and know the basic principles of refrigeration.

**CO2:** Understand pressure and Pascal's principle of fluids and fluids behaviour.

**CO3:** Able to develop the idea of reflection, refraction, dispersion, interference and polarization.

**CO4:** Know the concept of temperature and thermal equilibrium.

**CO5:** Understand the idea of physics as it applies to Gauss law, magnetism of earth, nuclear magnetism and the application of biomagnetism to medicine.

**Course Name: Biophysics and Bio-instrumentation**

**Course Code: BTT202**

**Course Outcomes**

After completion of Biophysics and Bio-instrumentation course the student is expected to –

**CO1:** Understand the application of the laws of thermodynamics in the human biological system.

**CO2:** Know Atomic absorption spectrophotometer (AAS), Atomic emission spectrophotometer (AES), NMR for finding molecular structures and X-ray, CAT scan, ECG and MRI for imaging intact biological structures.

**CO3:** Demonstrate the different types of chromatographic techniques.

**CO4:** Understand the principle, techniques and application of centrifugation and electrophoresis.

**CO5:** Learn different types of microscopy like light microscope, phase contrast microscope, dark-field microscope, electron microscope (SEM and TEM), Scanning probe microscope, Atomic force microscope (AFM), Scanning Tunneling microscope (STM)

**Course Name: Microbiology**

**Course Code: BTT203**

**Course Outcomes:**

After the successful completion of microbiology course the students would be able to –

**CO1:** Understand microbial structure and comparative characteristics of eukaryotes and prokaryotes

**CO2:** Know the various nutritional types of bacteria and understand the reproduction and growth of bacteria.

**CO3:** Know the different types of culture media and also understand the various techniques to control microorganisms.

**CO4:** Demonstrate the theoretical and practical skills of handling microscope and various staining procedures.

**Course Name: Molecular Genetics**

**Course Code: BTT204**

**Course Outcomes:**

After successfully completing this course, the student is expected to

**CO1:** Understand and enumerate the structure, function and composition of chromosomes; genetic transfer mechanisms in bacteria and their applications

**CO2:** State Mendelian Laws of Inheritance and their application in solving genetic problems; enumerate the different types of gene interactions and non-Mendelian Inheritance with examples

**CO3:** Explain chromosomal variation in structure and number with examples and applications;

**CO4:** Define mutation, enumerate the types of mutagens, mechanism of mutagenesis and significance of mutations; cite examples of inborn errors of metabolism in humans with their causes

**CO5:** Explain Hardy Weinberg's Law, natural selection, the process of evolution;

**CO6:** Understand and describe the principles and objectives of plant breeding

**Course Name:** *Laboratory course- III: Physics & Bioinstrumentations*

**Course Code:** BTT205

**Course Outcomes**

After completion of the course, a student will be able to achieve these outcomes

**CO1:** The students will be able to determine “g” by bar pendulum.

**CO2:** The students will be able to determine the viscosity of liquid.

**CO3:** The students will learn to find out the surface tension by capillary rise method

**CO4:** The students will be able to determine the focal lengths of convex lenses.

**CO5:** The students will be able to determine the horizontal component of Earth’s magnetic field.

**CO6:** The students will be able to determine the radius of curvature of a convex lens by Newton’s ring method

**CO7:** Develop understanding of working principle of - UV-Visible spectrophotometer, IR – spectrophotometer, Atomic Absorption Spectrophotometer (AAS), Chromatography, XRD, Centrifuge, Fluorescence

**CO8:** The students will learn to perform Paper Chromatography of amino acids, sugars, and purine and pyrimidine bases.

**CO9:** The students will learn to perform colorimetric determination of any one amino acids.

**CO10:** The students will be able to perform separation of pigments by adsorption chromatography.

**CO11:** The students will be able to perform Thin Layer chromatography separation of sugars & lipids.

**Course Name:** *Laboratory course- IV: Microbiology & Human genetics*

**Course Code:** BTT206

**Course Outcomes:**

**After successfully completing the course, students should be able to**

**CO1:** Perform various sterilization techniques; Carry out aseptic transfer of culture in different medium

**CO2:** Prepare various culture media and Perform culture techniques such as streak plate, pour plate and spread plate

**CO3:** Isolate microorganisms in pure culture; Measure turbidity of bacterial growth; Perform various staining techniques for observation of microorganisms

**CO4:** Carry out serial dilution and pour plating

**CO5:** Isolate microorganisms from soil, air and water

**CO6:** Perform antibiotic sensitivity test

**CO7:** Undergo water quality testing

**CO8:** Solve genetic problems on interaction of genes (non-Mendelian) and also demonstrate– Complementary factors, Supplementary factors, Inhibitory factors, duplicate

**CO9:** Identify the chromosomal abnormalities in Human - Down's syndrome, Klinefelter Syndrome, Turner Syndrome and describe the traits associated with these disorders.

**CO10:** Read pedigree charts and solve problems.

### **THIRD SEMESTER**

**Course Name: Metabolic pathways**

**Course Code: BTT 301**

**Course Outcomes:**

On completion of this course,

**CO1:** Students will acquire the concept of anabolism, catabolism and role of high energy compounds in the cell.

**CO2:** Understand the role of various metabolic pathways such as glycolysis, fatty acid oxidation, amino acid metabolism, pentose phosphate pathways, gluconeogenesis and TCA cycle.

**CO3:** They will acquire knowledge related to regulation of various metabolic pathways.

**CO4:** Understand the basic concepts of bioenergetics, electron transport chain, mechanism of oxidative phosphorylation and photophosphorylation.

**Course Name: Enzymology**

**Course Code: BTT302**

**Course Outcomes**

After completion of the course, a student will be able to achieve these outcomes

**CO1:** The students will learn about the nomenclature and classification of enzymes.

Describe the basics of enzymes and its kinetics and enzyme inhibition.



**CO2:** The students will understand about factors affecting catalytic efficiency of enzymes, methods of fast reactions, chemical modification of enzymes, multiple forms of enzymes and multi enzyme complexes.

**CO3:** The students will learn about protein-ligand binding, kinetics of allosteric enzymes, enzyme regulation and enzyme reaction mechanism.

**CO4:** The course will aid in learning the commercial applications of enzymes, various methods of enzyme immobilization and different biosensors.

**Course Name: Elements of Molecular Biology**

**Course Code: BTT303**

**Course Outcomes:**

After the successful completion of molecular biology course the students will be able to

**CO1:** Learn the molecular basis of life, structure and functions of DNA and RNA.

**CO2:** Understand the mechanism of DNA replication and DNA repair in prokaryotes and eukaryotes.

**CO3:** Learn the structure of prokaryotic and eukaryotic gene and understand the process of transcription and translation.

**CO4:** Learn the various types of regulation of gene expression in prokaryotes and eukaryotes and also the transposable genetic element.

**Course Name: Basic Immunology**

**Course Code: BTT304**

**Course Outcomes:**

**On successful completion of this course, students should be able to**

**CO1:** Explain immune system and its components, types of immunity, know the concept of antigen, antigenic determinants, haptens, factors affecting antigenicity foreign substances.

**CO2:** Illustrate immunoglobulin structure and types; explain the immune function of different classes of antibodies; understand immunoglobulin gene families and the concept of antibody diversity

**CO3:** Understand Major histocompatibility complexes and their immune function and their gene organization

**CO4:** Enumerate the humoral and cell-mediated immunity, the complement pathways.

**Course Name: LABORATORY COURSE V: BIOCHEMISTRY II**

**Course code: BTT 305**

**Course Outcomes:**

After successful completion of laboratory course in biochemistry II student will be able to

**CO1:** Determine the absorption spectra of nucleic acid and protein and also the thermal denaturation of DNA.

**CO2:** Assay various microbial enzymes like amylase, protease etc.

**CO3:** Determine molecular weight of various enzymes and proteins and know certain techniques like gel filtration, SDS PAGE.

**CO4:** Isolate and assay microbial enzyme and determine enzyme kinetics.

**Course Name: LABORATORY COURSE VI: Molecular biology**

**Course Code: BTT 306**

**Course Outcomes:**

After successful completion of laboratory course in molecular biology student will be able to

**CO1:** Isolate DNA from plants, animals, microbes and human blood and also plasmid DNA.

**CO2:** Handle DNA, RNA cDNA and restriction enzymes

**CO3:** Know about the gel electrophoresis and gel documentation.

**CO4:** Perform blood grouping, differential counting of WBC, WIDAL and VDRL test

**CO5:** Know how to purify antigen and antibodies.

#### **FOURTH SEMESTER**

**Course Name: Microbial Biotechnology**

**Course Code: BTT401**

**Course Outcomes**

After the successful completion of microbial biotechnology course the students would be able to –

**CO1:** Know about the factors affecting growth, quantification of growth and thermodynamics of the growth of microbes of industrial importance.

**CO2:** Know the different types of fermentation and various techniques to control microbes.

**CO3:** Understand the different microbial flora in foods and know the spoilage mechanism and mode of preservation of food.

**CO4:** Understand industrial fermentation and know about the oxygen transfer and heat transfer during fermentation.

**CO5:** Know the underlying principle of downstream processing.

**COURSE NAME: Basic Mathematics and Biostatistics**

**COURSE CODE: BTT402**

**COURSE OUTCOMES:**

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

- CO1:** Describe set theory and its different types
- CO2:** Illustrate the real number system
- CO3:** Calculate continuity of a sequence or series by using mean value theorem
- CO4:** Calculate rank and determination of matrices
- CO5:** Understand the use of Statistics in biological sciences; collect, arrange and present data and calculate central tendency from the collected data
- CO6:** Measure Standard Deviation, standard error and their coefficients
- CO7:** Illustrate the relation between Poisson and Binomial distributions, use different methods to test the strength of a hypothesis.

**Course Name: GENETIC ENGINEERING**

**Course Code: BTT403**

**COURSE OUTCOMES:**

After successful completion of genetic engineering course the student will

- CO1:** Know how to handle DNA, RNA, RT enzymes and other reagents used in recombinant DNA technology.
- CO2:** Understand and follow proper SOPs required in doing a recombinant DNA work
- CO3:** Acquire the practical knowledge operate various tools and techniques employed in genetic engineering and recombinant DNA technology
- CO4:** Learn how to perform various techniques like PCR, cDNA cloning and genomic library construction and gene mapping techniques like RAPD, RFLP.
- CO5:** Understand how a transgenic organism is engineered to benefit the society and know the various gene delivery methods.
- CO6:** Enumerate the various roles and applications of genetically engineered organisms in various sectors.

**Course Name: Cell, Tissue & Organ Culture**

**Course Code: BTT404**

**COURSE OUTCOMES:**

**On successful completion of the course, the students should be able to**

- CO1:** Understand principles of plant and animal culture, laboratory lay-out, sterilisation procedures, media preparation and preparation steps of tissue culture
- CO2:** Describe the methodologies and requirements of in vitro plant tissue culture, meristem culture and clonal propagation of plants, understand the technique of cryopreservation and its applications
- CO3:** Describe the requirements animal cell culture, primary culture, cell lines and cell differentiation.
- CO4:** Explain Monoclonal antibodies production, understand the applications of monoclonal antibodies; describe the methodology

**Course Name: *Laboratory course- VII: Biostatistics & Microbiology***

**Course Code: BTP405**

**Course Outcomes:**

After successful completion of Biostatistics and Microbiology laboratory course the students will be able to

**CO1:** Perform various sampling techniques

**CO2:** Carry out application of probability of CRD and RBD experimental design

**CO3:** Analyse simple correlation and regression

**CO4:** Perform various staining techniques for observation of microorganisms

**CO5:** Prepare nutrient agar and nutrient broth

**CO6:** Isolate bacteria and fungi from soil, air and water

**CO7:** Estimate the total count of microorganisms by using haemocytometer

**CO8:** Perform antibiotic sensitivity test by paper disc method

**Course Name: *Laboratory course- VIII: Plant & Molecular Biotechnology-I***

**Course Code: BTP406**

**Course Outcomes:**

After successful completion of laboratory course in plant and molecular biotechnology I the students will be able to

**CO1:** Know the laboratory set up of a plant tissue culture and perform the various aseptic techniques.

**CO2:** Prepare nutrient media for plant tissue culture and establish culture from various explants

**CO3:** Initiate callus culture and perform micropropagation of important medicinal plants.

**CO4:** Perform gel electrophoresis for DNA analysis and estimate plasmid DNA by various techniques.

**CO5:** Learn the different chromatographic techniques and perform PCR and restriction digestion

**FIFTH SEMESTER**

**COURSE NAME: BIODIVERSITY AND MOLECULAR TAXONOMY**

**COURSE CODE: BTT 501**

**COURSE OUTCOMES:**

At the end of the course students should be able to:

**CO1:** State the importance of ecological conservation and also factors that causes ecological degradation.

**CO2:** Understand significance of the important biodiversity spots in India, economic values of biodiversity and the need for conservation.

**CO3:** State the classification, nomenclature, taxonomy and genetic aspects of evolution and speciation in relation to DNA characteristics and protein sequences

**CO4:** Understand evolution at molecular level and the application of genetics in taxonomy

**COURSE NAME: Plant Biotechnology**

**COURSE CODE: BTT502**

**COURSE OUTCOMES:**

After the successful completion of plant biotechnology course the students will be able to

**CO1:** Learn the various applications of plant tissue culture like micropropagation, Somatic hybrid, meristem culture (production of disease free plant) etc.

**CO2:** Learn the essential steps for transgenic plant development and also its application and ecological impact in agriculture and food industry.

**CO3:** Understand the concept of plant bioreactors and the use of plants cell culture for secondary metabolite production.

**CO4:** Understand the role of various molecular markers in crop improvement and plant molecuar farming for the production of edible vaccines, nutraceuticals and other products. The student will also know about the use and production of biofertilizer and bioplastic.

**Course Name: Animal Biotechnology**

**Course Code: BTT503**

**COURSE OUTCOMES:**

**On successful completion of the course, the students should be able to**

**CO1:** Learn about the Human Genome Project and understand its implications/significance; describe the techniques involved for analysis of genome

**CO2:** Describe the use of animal cells as bioreactors for production of useful proteins

**CO3:** Understand the use of animal cells for vaccine production; scaling up of animal cell cultures for large scale production; learn about hybridoma technology and the applications of monoclonal antibodies

**CO4:** Describe processes involved in artificial breeding, transgenic animal production and analyse the pros and cons of such processes.

**Course Name: Bioprocess technology and Nanobiotechnology**

**Course Code: BTT504**

**COURSE OUTCOMES:**

After the successful completion of Bioprocess technology and nanobiotechnology course the students would be able to –

**CO1:** Know how to screen for microbes of industrial importance from the environment and how to improve strain for increase yield.

**CO2:** Know about the various design of bioreactors and their types.

**CO3:** To understand the transport phenomena during fermentation and know the controlling and monitoring variables during fermentation process.

**CO4:** Elucidate the concept and properties of nanoparticles.

**CO5:** Discuss the application of nanoparticles in allied fields.

**Course Name: LABORATORY COURSE IX: Plant biotechnology II**

**Course Code: BTT 505**

**Course Outcomes:**

After successful completion of laboratory course in plant biotechnology II, students will be able to

**CO1:** Know the techniques of cell suspension culture and encapsulation of plants.

**CO2:** Know how to prepare synthetic seed.

**CO3:** Isolate and culture protoplast from plant.

**CO4:** Isolate and purify genomic DNA from plant.

**CO5:** Perform the various propagation methods of plants through tissue culture.

**CO6:** Learn about the genetic transformation of plants using Agrobacterium.

**CO7:** Detect DNA and RNA in transgenic plants and learn the technique of Western and Southern Blotting.

**Course Name: *Laboratory course- X: Animal biotechnology-II & Immunology***

**Course Code: BTT 506**

**Course Outcomes:**

After successful completion of laboratory course in plant biotechnology II student will be able to

**CO1:** Illustrate how antibodies are raised in immunised animals, the routes of immunisation

**CO2:** understand the working principles and methodologies of immunological techniques and carry out experiments

**CO3:** understand the setup of an animal cell culture lab and follow basic protocols (SOPs)

**SIXTH SEMESTER**

**Course Name: Computer application & Bioinformatics**

**Course Code: BTT 601**

**Course Outcomes:**

After completion of Environmental Biotechnology course the student is expected to–

**CO1.** Know the statistical analysis by using computer software, Data presentation using NCBI, Gene bank, DDBJ, EMBL, SWISS. PROT.

**CO2.** Know the technique of BOD, VAM staining, microbial load in food and culture staining.

**CO3.** Know the yeast cell formation and estimation of lactic acid and lactose formation.

**CO4.** Studies indigenous fermented food and beverage found in N.E. Region and identification of microorganisms involved in fermentation.

**COURSE NAME: Environmental Biotechnology**

**COURSE CODE: BTT602**

**COURSE OUTCOMES:**

After completion of Environmental Biotechnology course the student is expected to–

**CO1.** Understand and differentiate the renewable and non-renewable resources and its impact in the environment.

**CO2.** Know the importance certain bacteria in the production of modern fuel

**CO3.** Define bioremediation and their role in environmental detoxification.

**CO4.** Know the various types of treatments of municipal waste and industrial effluents.

**CO5.** Understand the role of microbes in improving the soil fertility and production of biofertilizers.

**CO6.** Know the environmental significance of genetically modified microorganisms, plants and animals.

**CO7.** Discuss the basic concept of applied ecology- environmental pollution, global environmental change, biodiversity status etc.

**COURSE NAME: FOOD BIOTECHNOLOGY**

**COURSE CODE: BTT603**

**COURSE OUTCOMES:**

Upon completion of this course students should be able to,

**CO1:** Develop application skills of biotechnology, food industries, processing of foods etc.

**CO2:** Understand the application of modern biotechnology in food industries in an environment friendly way.

**CO3:** Describe food processing, separation, extraction etc. during fermentation process.

**CO4:** Understand Nutritional values of fermented foods and about the application of lactic acid bacteria, yeast, moulds etc. in fermentation process and also will develop techniques to prepare products like kimchi, bamboo shots, rice beer, dosa, etc

**CO5:** Develop applicable knowledge about SCP, pathogens, microbes, mycotoxins, physiological effects of microbes etc.

**COURSE NAME: Entrepreneurship & Management**

**COURSE CODE: BTT604**

**COURSE OUTCOMES:**

After successfully completing this course, the student should be able to

**CO1:** Appreciate the need for having entrepreneurs in a country and discuss the sources of finance available to entrepreneurs.

**CO2:** State the function, importance, problems of marketing in micro and small enterprises in the country

**CO3:** Realise the significance of effective communication in business

**CO4:** Draft various trading letters and develop appropriate skills for report writing

**Course Name:** *Laboratory course- XI: Bioinformatics and food biotechnology*

**Course Code:** 605

**Course Outcomes:**

After successfully completing this course, the student should be able to

**CO1:** Know the statistical analysis by using computer software, Data presentation using NCBI, Gene bank, DDBJ, EMBL, SWISS, PROT.

**CO2:** Know the technique of BOD, VAM staining, microbial load in food and culture staining.

**CO3:** Know the yeast cell formation and estimation of lactic acid and lactose formation.

**CO4:** Studies indigenous fermented food and beverage found in N.E. Region and identification of microorganisms involved in fermentation.

**BTP606: Project Work (Max. marks 100)**

Project work may be carried out on any topic out of the syllabus. However preference should be given on Food Biotechnology and Bioremediation of water as the course was opened under Innovative Programme of the UGC on the topic "Application of Biotechnology in Food and Water Security". Students should be encouraged to work independently, however each student should be assigned to a faculty member of the Department. At the end of the project work, each student should submit report in the form of dissertation to the Head of the Department within a dateline fixed by the Head of the Department. The dissertation should be examined and evaluated by a committee of faculty members.