

COs OF ALL SUBJECTS OF BIOTECHNOLOGY DEPARTMENT

BIOTECHNOLOGY – 2ND YEAR

BBT-301 TECHNIQUES IN BIOTECHNOLOGY

COURSE OUTCOME:

CO 1	Acquire knowledge on types of microscope and its applications in Biotechnology .
CO 2	Apply the principle of chromatographic techniques for qualitative and quantitative analysis of biomolecules.
CO 3	Employ various spectroscopic techniques for qualitative and quantitative analysis of Bio Molecules/Bio-Analytes.
CO 4	Employ various electrophoresis and centrifugation techniques for analysis of Bio Molecules/Bio-Analytes.
CO 5	Acquire knowledge on 3 D printing, flow cytometry and biosensors .

BBT-351 TECHNIQUES IN BIOTECHNOLOGY LAB

COURSE OUTCOME:

CO 1	Understand concept of precision, accuracy for principle and working of laboratory microscope.
CO 2	Learn and apply the spectrophotometric techniques for identification or quantification of biomolecules.
CO 3	Understand the principle and execute the different chromatographic techniques for separation of biomolecules.
CO 4	Apply the electrophoresis for quantitative and qualitative analysis of biomolecules
CO 5	Demonstrate the extraction and separation of biomolecules .

BBT-302 MICROBIOLOGY & IMMUNOLOGY

COURSE OUTCOME:

CO 1	Understand fundamental basics of microbiology along with physiological properties and growth kinetics of bacteria and strategies to hinder development of undesirable microorganisms.
CO 2	Comprehend different cell capacities eg transformation, reproduction, transduction & conjugation and gain proficiency in bacterial electron transport system
CO 3	Distinguish the major cells and tissue parts of innate and adaptive immune response along with study of immunological reaction and immune response to different types of antigenic reactions.
CO 4	Acquire basic understanding of fundamental immunological processes and along with the principle and applications of immunotechniques

CO 5	Apply concepts of immunology and microbiology in disease diagnosis, industrial use, environmental applications and immunotherapy
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BBT352 - MICROBIOLOGY & IMMUNOLOGY LAB

COURSE OUTCOME:

CO 1	Apply different sterilization method and inoculation methods
CO 2	Demonstrate different staining procedures and culturing of microbes
CO 3	Exhibit different methodology for colony counting
CO 4	Understand the principle of blood grouping and immunodiffusion
CO 5	Apply ELISA and electrophoresis.

BBT303- BIOCHEMISTRY

COURSE OUTCOME:

CO 1	Understand the concept of biomolecules and their role in biological systems
CO 2	Apply the concepts of carbohydrates, other biopolymers, and their role in biochemical pathways.
CO 3	Distinguish the knowledge of fats , lipids and its role in metabolism
CO 4	Apply the concept of protein structure, classification, bond formation and biosynthesis of amino acids
CO 5	Analyze and evaluate concept of biomolecules including purines and pyrimidines and their role in metabolism.

BBT 353- BIOCHEMISTRY LAB

COURSE OUTCOME:

CO 1	Understand the basics of molarity, normality, buffers and pH meter
CO 2	Demonstrate the basics of titration and carbohydrate estimation
CO 3	Exhibit the difference between reducing and non-reducing sugars and estimation of proteins and nucleic acids.
CO 4	Perform the extraction method of lipids and proteins on the basis of isoelectric point.
CO 5	Understand the significance of chromatography

BBT-401 BIOPROCESS ENGINEERING

COURSE OUTCOME:

CO 1	Comprehend the concept of media preparation, microbial growth and the associated parameters.
CO 2	Demonstrate the concepts of sterilization necessary for proper bioreactor operation .

CO 3	Discuss the basics of ideal bioreactor operations and the kinetics of microbes.
CO 4	Apply the concept of mass transfer, medium optimization and stoichiometric based calculations in bioprocessing.
CO 5	Analyze the concept of bioreactor control mechanism and identify suitable control system.

BBT-451 BIOPROCESS ENGINEERING LAB

COURSE OUTCOME:

CO 1	Demonstrate the growth pattern and death kinetics of E. coli.
CO 2	Discuss the upstream and downstream bioprocessing for product formation
CO 3	Analyze the mass transfer concepts in bioprocess.
CO 4	Perform immobilization of enzymes and microbial cell.
CO 5	Develop computational design for fermentative production.

BBT402- GENETICS AND MOLECULAR BIOLOGY

COURSE OUTCOME:

CO 1	Understand the fundamental principles of genetics.
CO 2	Understand genome organization in prokaryotes and eukaryotes as well as genome organization of cellular components.
CO 3	Discuss the process of DNA replication & different repair mechanisms
CO 4	Comprehend mutation, its causes and translation in detail.
CO 5	Discuss translation, recombinant DNA technology and enzymes involved in this process.

BBT452- GENETICS AND MOLECULAR BIOLOGY LAB

COURSE OUTCOME:

CO 1	Calculate the allelic frequencies of numeric problems.
CO 2	Isolate DNA from plant cell, plasmid DNA and bacterial genomic DNA from.
CO 3	Determine the T _m of DNA and analyze the concentration of DNA in a given cell using spectrophotometer.
CO 4	Purify the DNA using electrophoresis and its visualization under transilluminator.
CO 5	Separate DNA using PAGE and amplification of DNA using polymerase chain reaction.

BBT 403-ENZYME ENGINEERING

COURSE OUTCOME:

CO 1	Understand the concepts of enzyme and their kinetics
CO 2	Explain the factors affecting enzymatic reactions and role of inhibitors
CO 3	Perform the extraction, purification & characterization of different enzyme from different source.
CO 4	Understand the concept of enzyme immobilization and its applications
CO 5	Apply knowledge of enzyme in developing biosensors and bioreactors

BBT 453-ENZYME ENGINEERING LAB

COURSE OUTCOME:

CO 1	Exhibitthe extraction of enzyme and its enzyme activity
CO 2	Perform purification and characterization of enzyme
CO 3	Identity enzyme by enzyme assays
CO 4	Perform enzyme immobilization and strain improvement for increased production
CO 5	Comprehend the concept of enzyme inhibition.

BIOTECHNOLOGY – 3RD YEAR

KBT 501- GENETIC ENGINEERING

COURSE OUTCOME:

On successful completion of the course, the student will be able to:

- To be able to appraise the appropriate use of host and vector for gene cloning.
- Identification of appropriate method for DNA delivery into the host.
- Use of gene library for screening of desired gene sequence/protein.
- Cloning process of whole organism and its application.
- Process of recombinant protein expression, cell signaling and ethical issues related to Gene transfer.

KBT 551- GENETIC ENGINEERING LAB

COURSE OUTCOME:

On successful completion of the course, the student will be able to

- Demonstrate the isolation genetic materials
- Perform experiments related to cloning, ligation, restriction digestion and transformation etc.
- Demonstrate the Southern Blotting for identification of desired DNA in a pool DNA samples
- Perform the bacterial cell competent for transformation

KBT 502- FERMENTATION BIOTECHNOLOGY

COURSE OUTCOME:

After successful completion of the course the students will be able to:

- Understanding of the concepts and process technologies of fermentation.
- Application and use of different raw materials and its use in industrial scale production.
- Regulatory system in the microorganism.
- Strain improvement technologies and its role in Fermentation.
- Concepts of the scale up and scale down criteria of fermentation process and production of metabolites.

KBT 552- FERMENTATION BIOTECHNOLOGY LAB

COURSE OUTCOME:

On completion of this course, the students will be able to:

- Demonstrate the growth pattern of *E.coli*.
- Perform experiments related to production of antibiotics, enzymes and acids through fermentation process.
- Demonstrate the downstream processing of fermentative products.
- Perform the solid state fermentation and submerged fermentation.

KBT 503- BIOINFORMATICS-I

COURSE OUTCOME:

On completion of this course, the students will be able to:

- Understand concepts and application of Bioinformatics, types of databases, sequence similarity, sequence patterns and profiles
- Use sequence alignment techniques, database searching, pairwise and multiple sequence alignment using various tools.
- Understand scoring matrices and its types including PAM , BLOSUM series and matrices for nucleic acid and protein sequences.
- Apply phylogeny and its concepts in molecular evolution and different methods of Phylogenetic tree construction
- Understand and apply the protein structure prediction and application of bioinformatics in drug designing.

KBT 553- BIOINFORMATICS –I (VIRTUAL LAB)

COURSE OUTCOME:

On completion of this course, the students will be able to:

- Demonstrate the retrieval of sequence data
- Perform experiments related to locating chromosome and gene expression data.
- Demonstrate the data retrieval system of PubMed.
- Perform the ORF finding and retrieval of gene information

KBT 052- NANO BIOTECHNOLOGY

COURSE OUTCOME:

On completion of this course, the students will be able to:

- Explain and demonstrate the basics of nanoscience, nanobiotechnology and its techniques.
- Understand the synthesis of metal nanoparticles by chemical process.
- Perform the biological synthesis of metal nanoparticles.
- Estimate the toxicity, antibacterial property of metal nanoparticles.
- Understand the synthesis of carbon nanotubes from carbon source
- Explain the Nano characterization tools and techniques

KBT 055- BIOFUELS & ALCOHOL TECHNOLOGY

COURSE OUTCOME:

On completion of this course, the students will be able to:

- Explain basic concepts of metabolism and importance of metabolic engineering
- Understand the production of metabolites and its regulatory mechanism
- Explain the applications, specificity and product inhibition of bioconversion.
- Regulation of enzyme production and strain improvement.

KBT 601- BIOPROCESS ENGINEERING II

COURSE OUTCOME:

On successful completion of the course, the student will be able to:

- Understand the kinetics of microbial growth and the associated parameters.
- Utilize sterilization concepts necessary for proper bioreactor operation.
- Discuss the basics of ideal reactor operation.
- Explain the concept and mechanism of mass transfer in bioprocessing.
- Analyze the concept of bioreactor control mechanism and identify suitable control system.

KBT 651- BIOPROCESS ENGINEERING II LAB

COURSE OUTCOME:

On successful completion of the course, the student will be able to

- Analyze the data on growth kinetics of *E.coli*.
- Discuss the upstream and downstream bioprocessing for citric acid and α - amylase production.
- Analyze the volumetric liquid mass transfer coefficient (KLa) using sodium sulphite method.
- Perform immobilization of enzymes and cells.
- Develop computational design for fermentative production of L- lysine.

KBT 602- PLANT BIOTECHNOLOGY

COURSE OUTCOME:

After successful completion of the course the students will be able to:

- Understand the principle and basic requirements for plant tissue culture.
- Explain the difference between tissue and organ culture and their applicability.
- Understand haploid culture and in vitro selection of mutants.
- Analyze somaclonal variation for improved crop varieties in vitro cultures.
- Identify suitable cryopreservation and reculture technique for the cultured tissue.
- Understand the development of transgenic plants through genetic manipulations.

KBT 652- PLANTBIOTECHNOLOGY LAB

COURSE OUTCOME:

On completion of this course, the students will be able to:

- Operate and handle the plant biotechnology lab equipments.
- Perform tissue culture media preparation, sterilization and explants selection.
- Understand in vitro cultures through axillary bud induction.
- Analyze plant secondary metabolites from selected medicinal plants.

KBT 603- BIOINFORMATICS II

COURSE OUTCOME:

On completion of this course, the students will be able to

- Understand the various tools and techniques related to *Insilco* modeling of bimolecular along with methods of drug designing, protein docking.
- Analyze problems related to collection and analysis of biological data.
- Develop steady and time dependent solutions along with their limitations.

KBT 653- BIOINFORMATICS II LAB

COURSE OUTCOME:

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

- Understand the basic software and tools used in structure prediction of bimolecular.
- Conduct experimental procedure for Ramachandran plot and its analysis
- Construct and analyse of restriction maps, QSAR model and homology model
- Identify and structurally modify a natural product, to design a compound with the desired properties and to assess its therapeutic effects, theoretically.
- Enhance their practical knowledge and thus their employability.

KBT 063- FOOD BIOTECHNOLOGY

COURSE OUTCOME:

On completion of this course, the students will be able to:

- Understand importance of microbes and their products in food industry
- Acquire knowledge of types of foods and their production methodologies
- Learn the Hazard Analysis Critical Control Point System (HACCP system) and Predictive Microbiology/Microbial Modeling.

BIOTECHNOLOGY – 4TH YEAR

KBT073-ENVIRONMENTAL BIOTECHNOLOGY

COURSE OUTCOME:

On successful completion of the course, the student will be able to:

- Distinguish the exact root cause of environmental pollution problems.
- Apply the biotechnology core principles in waste treatment system.
- Design the novel biological treatment system at institutional as well as industrial scale.
- Analyze the outcome of designed system based on mathematical analysis of result.
- Understand the regulatory mechanism in the area of environmental compliance laid down by various agencies.

KBT-075-BIOSAFETY, BIOETHICS, IPR & PATENTS

COURSE OUTCOME:

After successful completion of the course the students will be able to:

- Get an adequate knowledge on Biosafety-regulatory framework for GMO's in India.
- Understand Biosafety-regulatory framework for GMOS at international level.
- Identify the role bioethics in IPR.
- Disseminate knowledge on different tools of IPR o make students aware about current trends in IPR and Govt. supports in promoting IPR.
- Identify the role of Patent and Patent law.

KBT 753C-ENVIRONMENTAL BIOTECHNOLOGY LAB

COURSE OUTCOME:

On successful completion of the course, the student will be able to

- Learn about various environment friendly methods for Environmental Biotechnology.
- Identify and appreciate the parameters for assessing environment.

KHU701/KHU801-RURAL DEVELOPMENT: ADMINISTRATION AND PLANNING KHU702/ KHU802-PROJECT MANAGEMENT & ENTREPRENEURSHIP

COURSE OUTCOME:

After completion of the course student will be able to:

- Students can understand the definitions, concepts and components of Rural Development
- Students will know the importance, structure, significance, resources of Indian rural economy.
- Students will have a clear idea about the area development programmes and its impact.
- Students will be able to acquire knowledge about rural entrepreneurship.
- Students will be able to understand about the using of different methods for human resource planning.