KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

Re-accredited by NAAC with 'A+' Grade (4th Cycle)
College of Excellence (UGC)
Coimbatore – 641 029

DEPARTMENT OF BIOTECHNOLOGY

COURSE OUTCOMES (CO)

B.SC. BIOTECHNOLOGY

For the students admittedin the

Academic Year 2020-2021

20UBT101

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 20UBT101		C. P. 1 – Cellular Biology		
Batch 2020-2021	Semester I	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To understand the structural and functional aspects of the prokaryotic and eukaryotic cells
2. To get knowledge on structural and functional aspects of cellular organelles and its functions
3. To make the student to learn molecular mechanisms underlying cellular functions

Course Outcomes (CO)

K1 K2	CO1	Recollecting the details about of prokaryotic and eukaryotic cells and organelles
K3	CO2	Understanding the theories of cell divisions and mechanisms of cell death
K4	CO3	Analyzing the cell to cell interactions
	CO4	Examining the cells and their interactions using microscopy

20UBT102

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 20UBT102		C. P. 2 – Bioinstrumentation and Environmental Biotechnology		
Batch 2020-2021	Semester I	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To impart the basic principles, knowledge about instruments
2. To understand the applications of instruments in biotechnology
3. To handle and maintain the instruments
4. To study the role of technology in solving environment issue and also to get wealth out of waste

Course Outcomes (CO)

K1 K2	CO1	Students are trained to remember each and every topics by comparative studies
	CO2	Students are taught with models and audio visuals to understand the concept easily
K3 K4	CO3	Direct applications and benefits of instruments are discussed with hands-on training to students
	CO4	Discuss the role of biotechnology to overcome environmental problems

20UBT1CL

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 20UBT1CL		C. Pr. 1 – Lab in Cellular Biology and Bioinstrumentation		
Batch 2020-2021	Semester II	Hours / Week 2	Total Hours 30	Credits 2

Course Objectives

1. To understand various basic aspects of cell biology and bioinstrumentation
2. To get hands on experience in identification of cells and examine the stages of cell divisions.
3. To learn about the cell fractionation and have hands on experience in smearing and counting of blood cell.

Course Outcomes (CO)

K3 K4 K5	CO1	Experiment with different cells types and developing skill on bioinstrumentation
	CO2	Examining the cell types and different stages of cell divisions
	CO3	Distinguishing the blood cells and obtaining the skill of blood cell counting and analyzing the amino acids pattern using chromatography techniques.

20UBT203

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 20UBT203		C. P. 3 – Microbiology		
Batch 2020-2021	Semester II	Hours / Week 6	Total Hours 90	Credits 4

Course Objectives

1. To make the students to understand the basic concepts of the biology of microorganisms
2. To learn the general principles for microbial the growth, evolution and classification
3. To make the students to understand the role of microbes in human life

Course Outcomes (CO)

K1 K2 K3 K4	CO1	Recollecting the early development, physiology and evolution of microorganisms
	CO2	Understanding the methods of studying microorganisms
	CO3	Identification of microbial interaction in soil, food, human and animals
	CO4	Studying the diseases caused by various microorganisms

20UBT2CM

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 20UBT2CM		C. Pr. 2– Lab in Microbiology		
Batch 2020-2021	Semester II	Hours / Week 3	Total Hours 45	Credits 2

Course Objective

1. To demonstrate the ability to work with standard lab safety protocols and procedures.
2. To acquire hands on experience in microbiological techniques
3. To get experience of analyzing, identifying and characterizing the microorganisms by using the appropriate microbiological techniques

Course Outcomes (CO)

K3 K4 K5	CO1	Understand the practical skill on basic microbial structure and function
	CO2	Analyzing master aseptic techniques and be able to perform routine culture handling tasks safely and effectively
	CO3	Compiling the methods of various physical and chemical growth requirements of bacteria and get equipped with various methods of bacterial growth measurement.

20UBT304

Programme code: 08		Programme title: Biotechnology		
Course Code: 20UBT304		C.P. 4 - Molecular Biology		
Batch 2020-2021	Semester III	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To seed the basic concepts about molecular biology
2. To make students understand regulations and mechanism of cell
3. To employ and study mutations and its defect.

Course Outcomes (CO)

K1 K2 K3 K4	CO1	Students are trained to remember molecular aspects of genome organization
	CO2	Students are made to penetrate deep into the concept with help of visual aids for their better understanding
	CO3	Interaction sessions are engaged in order to discuss the application of molecular techniques.
	CO4	Students are made to figure out the gene expression and regulation and to analyze the same.

20UBT305

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 20UBT305		C. P. 5 – Genetics		
Batch 2020-2021	Semester III	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To make the students to understand the principles and theories of inheritance
2. To learn the concepts of chromosome morphology
3. To make the students to understand the gene expression and regulation

Course Outcomes (CO)

K1 K2 K3 K4	CO1	Revising the Mendelian Genetics and molecular basis of heredity
	CO2	Understanding the modern concept of genes and population genetics
	CO3	Applying the gene transformation in recombination
	CO4	Analyzing the types gene mutation and causes on genetic disorders

20UBT3CN

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 20UBT3CN		C. Pr. 3: Lab in Molecular biology and Genetics		
Batch 2020-2021	Semester III	Hours / Week 2	Total Hours 30	Credits 2

Course Objectives

1. To exhibit a knowledge base in genetics, cell and molecular biology, and anatomy and physiology
2. To independently execute a laboratory experiment using the standard methods and techniques in molecular biology, with the appropriate analysis and interpretation of results obtained
3. To analyse the need and importance of ongoing development through the available lifelong learning

Course Outcomes (CO)

K3 K4 K5	CO1	Developing their handling knowledge to execute a laboratory experiment using the standard methods and techniques in molecular biology and with the appropriate analysis and interpretation of results obtained
	CO2	Demonstrating the relationship between phenotype and genotype in human genetic traits.
	CO3	Examining the techniques involved in molecular biology and genetics.

20UBT406

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 20UBT406		C.P.6 – Fundamentals of Biochemistry		
Batch 2020-2021	Semester IV	Hours / Week 5	Total Hours 75	Credits 4

Course Objectives

1. To get an overall understanding of structure of atoms, molecules and chemical bonds.
2. To understand the enzyme kinetics.
3. To gains the knowledge of biopolymers and metabolic reaction in the living systems.

Course Outcomes (CO)

K1 K2 K3 K4	CO1	Defining the Structure of atoms, molecules, chemical bonds
	CO2	Classification and comparison of biopolymers and metabolic reactions
	CO3	Understanding the functions and manifestations of vitamins and minerals
	CO4	Simplifying the enzyme kinetics

20UBT4CO

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 20UBT4CO		C. Pr. 4 – Lab in Biochemistry		
Batch 2020-2021	Semester IV	Hours / Week 3	Total Hours 45	Credits 2

Course Objectives

1. To understand various basic aspects of Biochemistry
2. To get hands on experience in preparation of standard solutions – Normality, Molarity and Molality
3. To learn about the Qualitative and Quantitative estimation of Sugars, Proteins, lipids and Separation technique like Chromatography.

Course Outcomes (CO)

K3 K4 K5	CO1	Preparation of Standard solution
	CO2	Qualitative and Quantitative analysis of Sugars, Proteins, Lipids
	CO3	Separation of Amino acids by Chromatographic techniques

20UBT507

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 20UBT507		C.P.7– Immunology		
Batch 2020-2021	Semester V	Hours / Week 5	Total Hours 75	Credits 4

Course Objectives

- To make the student to understand the definition and concepts of immunity
- To make the student to be familiar about the structural features and components of the immune system as well as their functions
- To know how the immune system recognizes self from non-self

Course Outcomes (CO)

K1 K2 K3 K4	CO1	Recalling the innate and adaptive immune responses coordinate to fight invading pathogens
	CO2	Demonstrating the strategies used to enhance immune responses or to suppress unnecessary immune responses such as might be required in hypersensitivity reactions, transplantations or autoimmune diseases.
	CO3	Applying key immunological concepts and methods to diagnose immune disorders
	CO4	Analyzing the strategies to improve existing vaccines and drugs

20UBT508

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 20UBT508		C. P. 8 – Recombinant DNA Technology		
Batch 2020-2021	Semester V	Hours / Week 5	Total Hours 75	Credits 4

Course Objectives

1. To enable the students to learn the various molecular biology techniques and principles of recombinant DNA technology, which includes cloning strategies
2. To enable the students to learn about the manipulating enzymes, various cloning and expression vectors and its screening procedures
3. To know about the applications of recombinant DNA technology in various fields

Course Outcomes (CO)

K1 K2 K3 K4	CO1	Remembering the principles of recombinant DNA technology and the structure and pattern of different type of vectors for cloning and expression
	CO2	Understanding the concept of different cloning strategies and their expression
	CO3	Exploiting the applications of genetic engineering for different purposes and also know how to solve the problems encountered
	CO4	Analysing and applying the results obtained using recombinant DNA technology strategies

20UBT509

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 20UBT509		C. P. 9 : Animal Biotechnology		
Batch 2020-2021	Semester V	Hours / Week 5	Total Hours 75	Credits 4

Course Objectives

1. To enable the students to remember the basics of animal biotechnology.
2. To equip the students to learn and understand various culturing techniques
3. To provide knowledge on gene transferring methods

Course Outcomes (CO)

K1 K2 K3 K4	CO1	Debates and interactions are carried out to elicit and remember the core of animal biotechnology
	CO2	Students understand the molecular events and mechanism with proper interpretations and reasoning.
	CO3	Students are assigned to apply the techniques in production of natural drugs and proteins
	CO4	Students use to interpret the qualitative and quantitative assays and analyze them.

20UBT5CP

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course Code: 20UBT5CP		C. Pr. 5 –Lab in Immunology, rDNA Technology and Animal Biotechnology		
Batch 2020-2021	Semester V	Hours / Week 6	Total Hours 90	Credits 3

Course Objectives

- To have hands on experience and to learn the principles behind immunological techniques
- To give hands on experience in manipulation and detection of nucleic acids and proteins
- To understand the principles behind animal cell culture techniques

Course Outcomes (CO)

K3 K4 K5	CO1	Developing and applying the recent technology involved in diagnostic techniques of immunology and animal cell culture
	CO2	Analyzing the results involved in immuno techniques, rDNA Technology and Animal Biotechnology
	CO3	Examining the techniques involved in Immunology, rDNA Technology and Animal Biotechnology

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course Code: 20UBT610		Course title: C. P. 10 – Bioprocess Technology		
Batch 2020-2021	Semester VI	Hours / Week 5	Total Hours 75	Credits 4

Course Objectives

1. To understand the basic principle and applications of Bioreactors
2. To makes the student to learn the concepts of upstream and downstream process of fermentation
3. To learn the role of industrially important microorganisms in yield of products

Course Outcomes (CO)

K1 K2 K3 K4	CO1	Recollecting the principle and application of industrially important microorganisms on large yield of products
	CO2	Explaining the basic design and types of bioreactors and its working principles
	CO3	Demonstrating various techniques like media formulation, strain improvement and inocula development and product recovery to improve processing
	CO4	Obtaining the skill to examine the growth kinetics of fermentation systems to improve product yield

20UBT611

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 20UBT611		Course title: C. P. 11-Plant Biotechnology		
Batch 2020-2021	Semester VI	Hours / Week 5	Total Hours 75	Credits 4

Course Objectives

1. To make students understand about the basics of plant science
2. To equip students with culture techniques and scope of plant biotechnology
3. To provide knowledge on genetic engineering in the improvement of plants for human welfare

Course Outcomes (CO)

K1 K2 K3 K4	CO1	Topics are recall with repeated discussions
	CO2	With the help of comparative statements students are understand the concepts
	CO3	Students are practiced to apply the experiments for their study topics
	CO4	Students ability is judged by using class seminars and discussions

20UBT612

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code : 20UBT612		C. P. 12 – Genomics, Proteomics and Bioinformatics		
Batch 2020-2021	Semester VI	Hours / Week 5	Total Hours 75	Credits 4

Course Objectives

1. To study and deduce the molecular characterization of human genome
2. To study the techniques involved in structural and functional proteomics
3. To utilize the bioinformatics tools to design and development of novel drugs

Course Outcomes (CO)

K1 K2 K3 K4	CO1	Commemorating the molecular techniques involved in characterization of genomes and proteomes
	CO2	Recognizing and interpreting the techniques involved in genomics, proteomics, bioinformatics
	CO3	Administering the principles of genomics, proteomics, bioinformatics to discovery novel drug development
	CO4	Analyzing the molecular markers and its applications

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code : 20UBT6CQ		C.Pr.6: Lab in Bioprocess technology, Plant biotechnology and Bioinformatics		
Batch 2020-2021	Semester VI	Hours / Week 6	Total Hours 90	Credits 3

Course Objectives

1. To get hands on experience in large scale production of products by industrially important microorganisms.
2. To make students to learn and have experience on plant tissue culture and techniques behind the transgenic plants synthesis.
3. To get hands on knowledge on basic tools of *in silico* analysis

Course Outcomes (CO)

K1 K2 K3	CO1	Developing the handling techniques in plant tissue culture Utilizing the basic tools in sequencing
	CO2	Comparing the different growth parameters to optimize the growth to improve yields and to analyse the products like amylase, ethanol and lactic acid.
	CO3	Utilizing the basic tools in sequencing

Major Elective

Programme code: 08	Programme name: B. Sc. Biotechnology		
Course code:	Major Elective : Research Methodology and Biostatistics		
Batch 2020-2021	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

1. To make students understand the research concepts, plagiarism and thesis writing etc.
2. To create idea about data collection and data processing
3. To teach various statistical tools for analysis and interpretation of results

Course Outcomes (CO)

K1 K2 K3 K4	CO1	Students are trained to remember the concepts by label the important concepts
	CO2	Concepts are made in to easily understandable by interpreting the results
	CO3	Students are practiced to apply the statistical concepts by using models
	CO4	Students are tested to solve the statistical calculations

Major Elective

Programme code: 08	Programme name: B. Sc. Biotechnology		
Course code:	Major elective Biodiversity and Bioentrepreunership		
Batch 2020-2021	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

1. To provide knowledge about the importance of conserving biodiversity
2. To understand the concepts of business idea to project design
3. To project appraisal and development through bioentrepreneurship

Course Outcomes (CO)

K1 K2 K3 K4	CO1	Defining the principles and scope of Biodiversity
	CO2	Illustration of the fundamental problems in conserving biodiversity
	CO3	Introducing the basic concepts in Bio-entrepreneurship
	CO4	Updating the role of business ideas

Major Elective

Programme code: 08	Programme name: B. Sc. Biotechnology		
Course code:	Major Elective – Bionanotechnology, IPR and Biosafety		
Batch 2020-2021	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

1. To understand the new concept of nanotechnology applied to the area of biotechnology
2. To acquire requisite skills for the design and development of high throughput screening in nanobiotechnology, IPR
3. To give assay methods leading to the novel drug discovery and designing and biosafety methods.

Course Outcomes (CO)

K1 K2 K3 K4	CO1	Understanding the basic concepts of Nanobiotechnology, IPR
	CO2	Differentiate various methods of synthesis of nanoparticles and obtain the skills in characterization methods of the nanomaterials
	CO3	Learning the scope and applications of nanomaterials, IPR, biosafety
	CO4	Know how Intellectual property rights and biosafety are important to Biotechnology

Major Elective

Programme code: 08	Programme name: B. Sc. Biotechnology		
Course code:	Major Elective – Natural Products and Algal Biotechnology		
Batch 2020-2021	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

1. To understand the concepts, developments, applications of natural products
2. To know the novel methods in cultivation and conversation of natural products
3. To recollect the biotechnological approaches in marine and algal technology for multiple applications.
4. To know the novel methods development in marine and algal products.

Course Outcomes (CO)

K1 K2 K3 K4	CO1	Introducing the principle and concepts in natural products
	CO2	Updating the role of natural products extraction process
	CO3	Studying the advanced development in natural production utilization and conservation.
	CO4	Studying the advanced development in marine and algal natural products utilization and conservation.

Major Elective

Programme code: 08	Programme name: B. Sc. Biotechnology		
Course code:	Major Elective – Enzyme Technology		
Batch 2020-2021	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

1. To gain knowledge about enzyme technology and production of enzymes

2. To provide an overview of enzyme production processes

3 To obtain the knowledge of cancer, stem cell and gene therapy methods.

Course Outcomes (CO)

K1 K2 K3 K4	CO1	Illustrating the knowledge about the enzymes and their chemistry is of prime importance.
	CO2	Updating the knowledge in the recent developments in medical biotechnology and to acquire the knowledge in different forms of cancer therapy.
	CO3	Categorizing the enzyme technology with their principles and its applications
	CO4	Understanding the concepts in enzyme technology and methods for the production of sustainable and high value-added products utilizing enzymes as biocatalysts and microbes as efficient producers, in order to meet various human needs

Major Elective

Programme code: 08	Programme name: B. Sc. Biotechnology		
Course code:	Major Elective – Developmental Biology		
Batch 2020-2021	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

1. Name, describe and order the main stages of development common to most multicellular organisms
2. Describe the main anatomical changes that occur during development
3. Identify the cellular behaviors that lead to morphological change during development

Course Outcomes (CO)

K1 K2 K3 K4	CO1	Illustrating the basics of gametogenesis and fertilization
	CO2	Developing knowledge on the role of blastulation and gastrulation in early embryonic development
	CO3	Categorizing organogenesis and developmental behavior in mammals
	CO4	Understanding how errors in development lead to congenital defects and spontaneous abortion

Practicum and Viva-voce

20UBT6Z1

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 20UBT6Z1		Practicum and Viva-voce *		
Batch 2020-2021	Semester VI	Hours / Week 4	Total Hours 60	Credits 3

Course Objectives

1. To identify the talent at early stage, by providing them with excellent on scientific projects
2. To explore the ability to plan carryout innovation project in group
3. To develop and execute the knowledge by planning and coordinating a project.

Course Outcomes (CO)

K3 K4 K5	CO1	Applying the practical experience to design project
	CO2	Inducing the students to become scientist
	CO3	Have gained practical experience in planning of projects and project management in biotechnological industry

20UBT4S2

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code : 20UBT4S2		Skill Based Subject 2: Clinical lab technology I –Pathology		
Batch 2020-2021	Semester IV	Hours / Week 2	Total Hours 30	Credits 3

Course Objectives

1. To understand the laboratory organization and histopathology techniques

Course Outcomes (CO)

K1 K2 K3 K4	CO1	To learn the facts on Laboratory Organization and quality control techniques
	CO2	Acquiring knowledge about the Histopathology techniques
	CO3	Organizing the acquire knowledge of Frozen Section technique
	CO4	Simplifying and assessing the clinical pathology techniques

20UBT5S3

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code : 20UBT5S3		Skill Based Subject 3: Clinical lab technology II – Hematology		
Batch 2020-2021	Semester V	Hours / Week 2	Total Hours 30	Credits 3

Course Objectives

1. To understand the ABO blood group system and Rh factor
2. To diagnose Laboratory methods used in the investigation of anemia.
3. To analyze the investigation of hemorrhagic disorders

Course Outcomes (CO)

K1 K2 K3 K4	CO1	To define the ABO Blood group system
	CO2	To explain the concept of Pathogenesis
	CO3	To identify the Diagnosis of diseases
	CO4	To discover the Assessment of behavioral and neurological functions

20UBT6SL

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course Code: 20UBT6SL		Skill Based Subject 4: Practical Clinical lab technology		
Batch 2020-2021	Semester VI	Hours / Week	Total Hours	Credits

Course Objectives

1. To understand various basic aspects of histopathology and haematology.
2. To get hands on experience in Examination of urine, Histopathological techniques and blood analysis.
3. To learn about the stool examination, grossing techniques and differential RBC and WBC count.

Course Outcome (CO)

K3 K4 K5	CO1	Analyse the physical, chemical and Microscopic examination of urine sample
	CO2	Understanding the parts of the tissue processor and calculating the bleeding time and clotting time
	CO3	Estimating the Hemoglobin and blood count

20UBT5X1

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code : 20UBT5X1		EDC – 1: Life Style Biotechnology		
Batch 2020-2021	Semester V	Hours / Week 2	Total Hours 30	Credits 3

Course Objectives

1. To describe the principle of health and nutrition.
2. To understand the concepts and diagnostic methods of Life style disease
3. To facilitate, implement good life style to avoid health problems

Course Outcomes (CO)

K1 K2 K3 K4	CO1	Defining the basic principles of health and nutrition
	CO2	Stating the deficiency and abnormal values leading to diseases
	CO3	Applying the molecular diagnostic methods to detect disease
	CO4	Categorizing good life style methods to have healthy life

Programme code: 08	Programme name: B. Sc. Biotechnology		
Course code: 20UBT0J1	JOC1 – Clinical Research & Medical Coding		
Batch 2020-2021	Hours / Week 2	Total Hours 30	Credits 2

Course Objectives

1. To learn the various medical terminology and treatment strategies used for medical coding
2. To Interpret and understand healthcare documentation and billing
3. To assign and understand diagnostic and procedure codes using ICD and HCPCS/CPT coding systems

Course Outcomes (CO)

K1 K2 K3 K4	CO1	Remembering the various medical terminology and treatment strategies used for medical coding
	CO2	Conceiving the different procedures involved in medical documentation and billing
	CO3	Applying the standard coding resources for accurate insurance billing
	CO4	Estimating the accurately and maintain medical records using codes

Programme code: 08	Programme name: B. Sc. Biotechnology		
Course code : 20UBT0J2	JOC 2 – Agro Industrial biotechnology		
Batch 2020-2021	Hours / Week 2	Total Hours 30	Credits 2

Course Objectives

- To provide knowledge on Indian agriculture, biomass, biofertilizer and biocontrol agents
- To develop students technical skills on bio fertilizer and Biocontrol agents production
- To encourage natural ways of crop disease management

Course Outcomes (CO)

K1 K2 K3 K4	CO1	Defining and to impart training of ecofriendly agricultural inputs so as to nullify the ill effects of chemical fertilizers.
	CO2	Illustrating the production and use of biopesticides, bio-control agents etc as alternative inputs in organic farming
	CO3	Demonstrating the effectiveness of biofertilizer cultural practices in the farmers fields for enhanced crop productivity through bioreclamation of waste land
	CO4	Analyzing and promoting disease management in the country