KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

Re-accredited by NAAC with 'A' Grade – 3.64 CGPA out of 4 (3rd Cycle)

College of Excellence (UGC)

Coimbatore – 641 029

DEPARTMENT OF BIOTECHNOLOGY (Unaided)

COURSE OUTCOMES (CO)

B.Sc. BIOTECHNOLOGY

For the students admitted
In the
Academic Year 2018-2019

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 18UBT101		C. P. 1 – Cellular Biology		
Batch 2018-2019	Semester II	Hours / Week 6	Total Hours 90	Credits 5

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

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 18UBT202		C.P.2 – Fundamentals of Biochemistry		
Batch 2018-2019	Semester II	Hours / Week 6	Total Hours 90	Credits 5

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

rogramme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 18UBT2CL		C. Pr. 1 – Lab. in Cellular Biology and Biochemistry		
Batch 2018-2019	Semester II	Hours / Week 3+3	Total Hours 45+45	Credits 3

Course Objectives

1. To understand various basic aspects of cell biology and biochemical analysis
2. To get hands on experience in identification of cells and examine the stages of cell divisions also have an experience in estimation of sugars and proteins.
3. To learn about the cell fractionation and have hands on experience in smearing and counting of blood cell.

Course Outcomes (CO)

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

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 18UBT303		C. P. 3 – Bioinstrumentation and Biophysics		
Batch 2018-2019	Semester III	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To seed the basic knowledge about instruments
2. To make students understand the applications of instruments in biotechnology
3. To train the students handle and maintain the instruments

Course Outcomes (CO)

K1	CO1	Students are trained to remember each and every topics by comparative studies
K2	CO2	Students are taught with models and audio visuals to understand the concept easily
K3	CO3	Direct applications and benefits of instruments are discussed with hands-on training to students
K4	CO4	Critical steps and important calculations are taught and asked the students to analyze the same

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 18UBT304		C. P. 4 – Genetics		
Batch 2018-2019	Semester II	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	CO1	Revising the Mendelian Genetics and molecular basis of heredity
K2	CO2	Understanding the modern concept of genes and population genetics
K3	CO3	Applying the gene transformation in recombination
K4	CO4	Analyzing the types gene mutation and causes on genetic disorders

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 18UBT405		C. P. 5 – Microbiology		
Batch 2018-2019	Semester IV	Hours / Week 4	Total Hours 60	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	CO1	Recollecting the early development, physiology and evolution of microorganisms
K2	CO2	Understanding the methods of studying microorganisms
K3	CO3	Identification of microbial interaction in soil, food, human and animals
K4	CO4	Studying the diseases caused by various microorganisms

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 18UBT4CM		C. Pr. 2: Lab. in Bioinstrumentation, Genetics and Microbiology		
Batch 2018-2019	Semester IV	Hours / Week 3+3	Total Hours 45+45	Credits 3

Course Objectives

1. To get the practical experience in operating the essential instrumentations and to learn their principle and applications
2. To acquire hands on experience in extraction and estimation of chromosomal DNA and RNA.
3. To get experience of analyzing, identifying and characterizing the microorganisms by using the appropriate microbiological techniques

Course Outcomes (CO)

K3	CO1	Developing their handling knowledge on the mendelian concepts in genetics
K4	CO2	Analyzing the quality and quantity of macromolecules
K5	CO3	Compiling the methods of identification and characterization of microorganisms

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 18UBT506		C.P.6 – Immunology		
Batch 2018-2019	Semester V	Hours / Week 4	Total Hours 60	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	CO1	Recalling the innate and adaptive immune responses coordinate to fight invading pathogens
K2	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.
K3	CO3	Applying key immunological concepts and methods to diagnose immune disorders
K4	CO4	Analyzing the strategies to improve existing vaccines

Programme code: 08		Programme title: Biotechnology		
Course Code: 18UBT507		C.P. 7 - Molecular Biology		
Batch 2018-2019	Semester **V**	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	CO1	Students are trained to remember each and every topics by comparative studies
K2	CO2	Students are made to penetrate deep into the concept with help of visual aids for their better understanding
K3	CO3	Interaction sessions are engaged in order to discuss the application of molecular techniques.
K4	CO4	Students are made to figure out the gene expression and regulation and to analyze the same.

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 18UBT508		C. P. 8 – Recombinant DNA Technology		
Batch 2018-2019	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	CO1	Remembering the principles of recombinant DNA technology and the structure and pattern of different type of vectors for cloning and expression
K2	CO2	Understanding the concept of different cloning strategies and their expression,
K3	CO3	Exploiting the applications of genetic engineering for different purposes and also know how to solve the problems encountered
K4	CO4	Analysing and applying the results obtained using recombinant DNA technology strategies

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 18UBT509		C. P. 9 : Animal Biotechnology		
Batch 2018-2019	Semester V	Hours / Week 4	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	CO1	Debates and interactions are carried out to elicit and remember the core of animal biotechnology
K2	CO2	Students understand the molecular events and mechanism with proper interpretations and reasoning.
K3	CO3	Students are assigned to apply the techniques in production of natural drugs and proteins
K4	CO4	Students use to interpret the qualitative and quantitative assays and analyze them.

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course Code: 18UBT5CN		C. Pr. 3 –Lab. in Immunology, Molecular Biology, rDNA Technology and Animal Biotechnology		
Batch 2018-2019	Semester V	Hours / Week 4	Total Hours 60	Credits 3

Course Objectives

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

Course Outcomes (CO)

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

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course Code: 18UBT610		Course title: C. P. 10 – Bioprocess Technology		
Batch 2018-2019	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	CO1	Recallecting the principle and application of industrially important microorganisms on large yield of products
K2	CO2	Explaining the basic design and types of bioreactors and its working principles
K3	CO3	Demonstrating various techniques like media formulation, strain improvement and inocula development and product recovery to improve processing
K4	CO4	Obtaining the skill to examine the growth kinetics of fermentation
		systems to improve product yield

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 18UBT611		Course title: C. P. 11-Plant Biotechnology		
Batch 2018-2019	Semester VI	Hours / Week 4	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	CO1	Topics are recall with repeated discussions
K2	CO2	With the help of comparative statements students are understand the concepts
K3	CO3	Students are practiced to apply the experiments for their study topics
K4	CO4	Students ability is judged by using class seminars and discussions

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code : 18UBT612		C. P. 12 – Genomics, Proteomics and Bioinformatics		
Batch 2018-2019	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	CO1	Commemorating the molecular techniques involved in characterization of genomes and proteomes
K2	CO2	Recognizing and interpreting the techniques involved in genomics, proteomics, bioinformatics
K3	CO3	Administering the principles of genomics, proteomics, bioinformatics to discovery novel drug development
K4	CO4	Analyzing the molecular markers and its applications

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code : 18UBT6CO		C. Pr.-4: Lab in. Bioprocess technology, Plant biotechnology and Bioinformatics		
Batch 2018-2019	Semester VI	Hours / Week 5	Total Hours 75	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	CO1	Developing the handling techniques in plant tissue culture Utilizing the basic tools in sequencing
K2	CO2	Comparing the different growth parameters to optimize the growth to improve yields and to analyse the products like amylase, ethanol and lactic acid.
K3	CO3	Utilizing the basic tools in sequencing

Programme code: 08	Programme name: B. Sc. Biotechnology		
	Major Elective : Research Methodology and Biostatistics		
Batch 2018-2019	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	CO1	Students are trained to remember the concepts by label the important concepts
K2	CO2	Concepts are made in to easily understandable by interpreting the results
K3	CO3	Students are practiced to apply the statistical concepts by using models
K4	CO4	Students are tested to solve the statistical calculations

Programme code: 08	Programme name: B. Sc. Biotechnology		
Major Elective – Nanobiotechnology and Intellectual Property Rights			
Batch 2018-2019	Hours / Week 6	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
3. To give assay methods leading to the novel drug discovery and designing.

Course Outcomes (CO)

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

Programme code: 08	Programme name: B. Sc. Biotechnology		
Major elective - Biodiversity and Environmental Biotechnology			
Batch 2018-2019	Hours / Week 6	Total Hours 75	Credits 5

Course Objectives

1. To provide Knowledge about the importance of conserving biodiversity and to acquire a broad base of knowledge of environmental systems
2. It enables the students to understand the fundamental and applied aspects of environmental biotechnology
3. To understand the pros and cons of the usage of bioscience in various aspects of environment and its applications

Course Outcomes (CO)

K1	CO1	Defining the principles and scope of Biodiversity and Environmental Biotechnology
K2	CO2	Illustration of the fundamental problems in environment
K3	CO3	Develop the students to take up roles as environmental analysts and environmental managers with an emphasis on environmental monitoring and pollution control
K4	CO4	Discover the environmental and technological issues in the management and control of air, soil and water pollution

Programme code: 08	Programme name: B. Sc. Biotechnology		
Major Elective – Medical Biotechnology			
Batch **2018-2019**	Hours / Week **6**	Total Hours **75**	Credits **5**

Course Objectives

1. To acquire the knowledge of medical biotechnology
2. To introduce clinical aspects of biotechnology and significance in diagnostics
3 To obtain the knowledge of cancer, stem cell and gene therapy methods.

Course Outcomes (CO)

K1	CO1	Introducing medical biotechnology, regulatory measures, organizations and drug discovery
K2	CO2	Understanding the role of healthcare, molecular tools and biosensors
K3	CO3	Analyzing the vaccine technology principles and its applications
K4	CO4	Updating the knowledge in the recent developments in medical biotechnology and to acquire the knowledge in different forms of cancer therapy.

Programme code: 08	Programme name: B. Sc. Biotechnology		
Major Elective – Enzyme Technology			
Batch 2018-2019	Hours / Week 6	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	CO1	Illustrating the knowledge about the enzymes and their chemistry is of prime importance.
K2	CO2	Updating the knowledge in the recent developments in medical biotechnology and to acquire the knowledge in different forms of cancer therapy.
K3	CO3	Categorizing the enzyme technology with their principles and its applications
K4	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

Programme code: 08	Programme name: B. Sc. Biotechnology		
Major Elective – Developmental Biology			
Batch **2018-2019**	Hours / Week **6**	Total Hours **75**	Credits **5**

Course Objectives

- Describe the events in the developmental process,
- Predict the results of genetic or embryological manipulations, based on their knowledge of the developmental process,
- Make hypotheses about the mechanisms involved in the process based on experimental results, and
- Design experiments to test hypotheses about the developmental process.

Course Outcomes (CO)

K1	CO1	Illustrating the basics of medical biotechnology, regulatory measures, organizations and drug discovery
K2	CO2	Developing the role of healthcare, molecular tools and biosensors
K3	CO3	Categorizing the vaccine technology with their principles and its applications
K4	CO4	Updating the knowledge in the recent developments in medical biotechnology and to acquire the knowledge in different forms of cancer therapy.

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 18UBT6Z1		Practicum and Viva-voce *		
Batch 2018-2019	Semester VI	Hours / Week 2	Total Hours 60	Credits 4

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

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code : 18UBT4S2		Skill Based Subject 2: Clinical lab technology I – Pathology		
Batch 2018-2019	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	CO1	To learn the facts on Laboratory Organisation and quality control techniques
K2	CO2	Acquiring knowledge about the Histopathology techniques
K3	CO3	Organizing the acquire knowledge of Frozen Section technique
K4	CO4	Simplifying and assessing the clinical pathology techniques

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code : 18UBT4S3		Skill Based Subject 3: Clinical lab technology II – Hematology		
Batch 2018-2019	Semester VI	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	CO1	To define the ABO Blood group system
K2	CO2	To explain the concept of Pathogenesis
K3	CO3	To identify the Diagnosis of diseases
K4	CO4	To discover the Assessment of behavioral and neurological functions

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course Code: 18UBT4SL		Skill Based Subject 4: Lab in Clinical lab technology		
Batch 2018-2019	Semester II	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 Outcomes (CO)

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

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code : **18UBT5X1**		**EDC – 1: Life Style Biotechnology**		
Batch 2018-2019	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	CO1	Defining the basic principles of health and nutrition
K2	CO2	Stating the deficiency and abnormal values leading to diseases
K3	CO3	Applying the molecular diagnostic methods to detect disease
K4	CO4	Categorizing good life style methods to have healthy life

Programme code: 08	Programme name: B. Sc. Biotechnology		
Course code: 18UBT0J1	JOC1 – Medical Coding		
Batch 2018-2019	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	CO1	Remembering the various medical terminology and treatment strategies used for medical coding
K2	CO2	Conceiving the different procedures involved in medical documentation and billing
K3	CO3	Applying the standard coding resources for accurate insurance billing
K4	CO4	Estimating the accurately and maintain medical records using codes

Programme code: 08	Programme name: B. Sc. Biotechnology		
Course code : 18UBT0J2	JOC 2 – Agrobiotechnology		
Batch 2018-2019	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	CO1	Defining and to impart training of ecofriendly agricultural inputs so as to nullify the ill effects of chemical fertilizers.
K2	CO2	Illustrating the production and use of biopesticides, bio-control agents etc as alternative inputs in organic farming
K3	CO3	Demonstrating the effectiveness of biofertilizer cultural practices in the farmers fields for enhanced crop productivity through bioreclamation of waste land
K4	CO4	Analyzing and promoting disease management in the country

KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

Re-accredited by NAAC with 'A' Grade – 3.64 CGPA out of 4 (3rd Cycle)

College of Excellence (UGC)

Coimbatore – 641 029

DEPARTMENT OF BIOTECHNOLOGY (Unaided)

COURSE OUTCOMES (CO)

B.Sc. BIOTECHNOLOGY

For the students admitted
In the
Academic Year 2019-2020

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 19UBT101		C. P. 1 – Cellular Biology		
Batch 2019-2020	Semester II	Hours / Week 6	Total Hours 90	Credits 5

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

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 19UBT202		C.P.2 – Fundamentals of Biochemistry		
Batch 2019-2020	Semester II	Hours / Week 6	Total Hours 90	Credits 5

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

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 19UBT2CL		C. Pr. 1 – Lab. in Cellular Biology and Biochemistry		
Batch 2019-2020	Semester II	Hours / Week 3+3	Total Hours 45+45	Credits 3

Course Objectives

1. To understand various basic aspects of cell biology and biochemical analysis
2. To get hands on experience in identification of cells and examine the stages of cell divisions also have an experience in estimation of sugars and proteins.
3. To learn about the cell fractionation and have hands on experience in smearing and counting of blood cell.

Course Outcomes (CO)

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

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 19UBT303		C. P. 3 – Bioinstrumentation and Environmental Biotechnology		
Batch 2019-2020	Semester III	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To seed the basic knowledge about instruments
2. To make students understand the applications of instruments in biotechnology
3. To train the students 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	CO1	Students are trained to remember each and every topics by comparative studies
K2	CO2	Students are taught with models and audio visuals to understand the concept easily
K3	CO3	Direct applications and benefits of instruments are discussed with hands-on training to students
K4	CO4	Discuss the role of biotechnology to overcome environmental problems

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 19UBT304		C. P. 4 – Genetics		
Batch 2019-2020	Semester II	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	CO1	Revising the Mendelian Genetics and molecular basis of heredity
K2	CO2	Understanding the modern concept of genes and population genetics
K3	CO3	Applying the gene transformation in recombination
K4	CO4	Analyzing the types gene mutation and causes on genetic disorders

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 19UBT405		C. P. 5 – Microbiology		
Batch 2019-2020	Semester IV	Hours / Week 4	Total Hours 60	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	CO1	Recollecting the early development, physiology and evolution of microorganisms
K2	CO2	Understanding the methods of studying microorganisms
K3	CO3	Identification of microbial interaction in soil, food, human and animals
K4	CO4	Studying the diseases caused by various microorganisms

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 19UBT4CM		C. Pr. 2: Lab. in Bioinstrumentation, Genetics and Microbiology		
Batch 2019-2020	Semester IV	Hours / Week 3+3	Total Hours 45+45	Credits 3

Course Objectives

1. To get the practical experience in operating the essential instrumentations and to learn their principle and applications
2. To acquire hands on experience in extraction and estimation of chromosomal DNA and RNA.
3. To get experience of analyzing, identifying and characterizing the microorganisms by using the appropriate microbiological techniques

Course Outcomes (CO)

K3	CO1	Developing their handling knowledge on the mendelian concepts in genetics
K4	CO2	Analyzing the quality and quantity of macromolecules
K5	CO3	Compiling the methods of identification and characterization of microorganisms

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 19UBT506		C.P.6 – Immunology		
Batch 2019-2020	Semester V	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

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

Course Outcomes (CO)

K1	CO1	Recalling the innate and adaptive immune responses coordinate to fight invading pathogens
K2	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.
K3	CO3	Applying key immunological concepts and methods to diagnose immune disorders
K4	CO4	Analyzing the strategies to improve existing vaccines

Programme code: 08		Programme title: Biotechnology		
Course Code: 19UBT507		C.P. 7 - Molecular Biology		
Batch 2019-2020	Semester **V**	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	CO1	Students are trained to remember each and every topics by comparative studies
K2	CO2	Students are made to penetrate deep into the concept with help of visual aids for their better understanding
K3	CO3	Interaction sessions are engaged in order to discuss the application of molecular techniques.
K4	CO4	Students are made to figure out the gene expression and regulation and to analyze the same.

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 19UBT508		C. P. 8 – Recombinant DNA Technology		
Batch 2019-2020	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	CO1	Remembering the principles of recombinant DNA technology and the structure and pattern of different type of vectors for cloning and expression
K2	CO2	Understanding the concept of different cloning strategies and their expression,
K3	CO3	Exploiting the applications of genetic engineering for different purposes and also know how to solve the problems encountered
K4	CO4	Analysing and applying the results obtained using recombinant DNA technology strategies

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 19UBT509		C. P. 9 : Animal Biotechnology		
Batch 2019-2020	Semester V	Hours / Week 4	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	CO1	Debates and interactions are carried out to elicit and remember the core of animal biotechnology
K2	CO2	Students understand the molecular events and mechanism with proper interpretations and reasoning.
K3	CO3	Students are assigned to apply the techniques in production of natural drugs and proteins
K4	CO4	Students use to interpret the qualitative and quantitative assays and analyze them.

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course Code: 19UBT5CN		C. Pr. 3 –Lab. in Immunology, Molecular Biology, rDNA Technology and Animal Biotechnology		
Batch 2019-2020	Semester V	Hours / Week 4	Total Hours 60	Credits 3

Course Objectives

1. To have hands on experience and to learn the principles behind immunological techniques
2. To give hands on experience in isolation, separation, manipulation and detection of nucleic acids and proteins
3. To understand the principles behind animal cell culture techniques

Course Outcomes (CO)

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

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course Code: 19UBT610		Course title: C. P. 10 – Bioprocess Technology		
Batch 2019-2020	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	CO1	Recallecting the principle and application of industrially important microorganisms on large yield of products
K2	CO2	Explaining the basic design and types of bioreactors and its working principles
K3	CO3	Demonstrating various techniques like media formulation, strain improvement and inocula development and product recovery to improve processing
K4	CO4	Obtaining the skill to examine the growth kinetics of fermentation
		systems to improve product yield

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 19UBT611		Course title: C. P. 11-Plant Biotechnology		
Batch 2019-2020	Semester VI	Hours / Week 4	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	CO1	Topics are recall with repeated discussions
K2	CO2	With the help of comparative statements students are understand the concepts
K3	CO3	Students are practiced to apply the experiments for their study topics
K4	CO4	Students ability is judged by using class seminars and discussions

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code : 19UBT612		C. P. 12 – Genomics, Proteomics and Bioinformatics		
Batch 2019-2020	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	CO1	Commemorating the molecular techniques involved in characterization of genomes and proteomes
K2	CO2	Recognizing and interpreting the techniques involved in genomics, proteomics, bioinformatics
K3	CO3	Administering the principles of genomics, proteomics, bioinformatics to discovery novel drug development
K4	CO4	Analyzing the molecular markers and its applications

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code : 19UBT6CO		C. Pr.-4: Lab in. Bioprocess technology, Plant biotechnology and Bioinformatics		
Batch 2019-2020	Semester VI	Hours / Week 5	Total Hours 75	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	CO1	Developing the handling techniques in plant tissue culture Utilizing the basic tools in sequencing
K2	CO2	Comparing the different growth parameters to optimize the growth to improve yields and to analyse the products like amylase, ethanol and lactic acid.
K3	CO3	Utilizing the basic tools in sequencing

Programme code: 08	Programme name: B. Sc. Biotechnology		
	Major Elective : Research Methodology and Biostatistics		
Batch 2019-2020	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	CO1	Students are trained to remember the concepts by label the important concepts
K2	CO2	Concepts are made in to easily understandable by interpreting the results
K3	CO3	Students are practiced to apply the statistical concepts by using models
K4	CO4	Students are tested to solve the statistical calculations

Programme code: 08	Programme name: B. Sc. Biotechnology		
Major Elective – Nanobiotechnology and Intellectual Property Rights			
Batch 2019-2020	Hours / Week 6	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
3. To give assay methods leading to the novel drug discovery and designing.

Course Outcomes (CO)

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

Programme code: 08	Programme name: B. Sc. Biotechnology		
Major elective - Biodiversity and Environmental Biotechnology			
Batch 2019-2020	Hours / Week 6	Total Hours 75	Credits 5

Course Objectives

1. To provide Knowledge about the importance of conserving biodiversity and to acquire a broad base of knowledge of environmental systems
2. It enables the students to understand the fundamental and applied aspects of environmental biotechnology
3. To understand the pros and cons of the usage of bioscience in various aspects of environment and its applications

Course Outcomes (CO)

K1	CO1	Defining the principles and scope of Biodiversity and Environmental Biotechnology
K2	CO2	Illustration of the fundamental problems in environment
K3	CO3	Develop the students to take up roles as environmental analysts and environmental managers with an emphasis on environmental monitoring and pollution control
K4	CO4	Discover the environmental and technological issues in the management and control of air, soil and water pollution

Programme code: 08	Programme name: B. Sc. Biotechnology		
Major Elective – Enzyme Technology			
Batch 2019-2020	Hours / Week 6	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. 3 To obtain the knowledge of cancer, stem cell and gene therapy methods

Corse Outcomes (CO)

K1	CO1	Illustrating the knowledge about the enzymes and their chemistry is of prime importance.
K2	CO2	Updating the knowledge in the recent developments in medical biotechnology and to acquire the knowledge in different forms of cancer therapy.
K3	CO3	Categorizing the enzyme Technology with their principles and its applications
K4	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

Programme code: 08	Programme name: B. Sc. Biotechnology		
Major Elective – Developmental Biology			
Batch **2019-2020**	Hours / Week **6**	Total Hours **75**	Credits **5**

Course Objectives

1. Describe the events in the developmental process,
2. Predict the results of genetic or embryological manipulations, based on their knowledge of the developmental process,
3. Make hypotheses about the mechanisms involved in the process based on experimental results, and
4. Design experiments to test hypotheses about the developmental process.

Course Outcomes (CO)

K1	CO1	Illustrating the basics of medical biotechnology, regulatory measures, organizations and drug discovery
K2	CO2	Developing the role of healthcare, molecular tools and biosensors
K3	CO3	Categorizing the vaccine technology with their principles and its applications
K4	CO4	Updating the knowledge in the recent developments in medical biotechnology and to acquire the knowledge in different forms of cancer therapy.

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code: 19UBT6Z1		Practicum and Viva-voce *		
Batch 2019-2020	Semester VI	Hours / Week 2	Total Hours 60	Credits 4

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

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code : 19UBT4S2		Skill Based Subject 2: Clinical lab technology I – Pathology		
Batch 2019-2020	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	CO1	To learn the facts on Laboratory Organisation and quality control techniques
K2	CO2	Acquiring knowledge about the Histopathology techniques
K3	CO3	Organizing the acquire knowledge of Frozen Section technique
K4	CO4	Simplifying and assessing the clinical pathology techniques

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code : 19UBT4S3		Skill Based Subject 3: Clinical lab technology II – Hematology		
Batch 2019-2020	Semester VI	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	CO1	To define the ABO Blood group system
K2	CO2	To explain the concept of Pathogenesis
K3	CO3	To identify the Diagnosis of diseases
K4	CO4	To discover the Assessment of behavioral and neurological functions

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course Code: 19UBT4SL		Skill Based Subject 4: Lab in Clinical lab technology		
Batch 2019-2020	Semester II	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 Outcomes (CO)

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

Programme code: 08		Programme name: B. Sc. Biotechnology		
Course code : **19UBT5X1**		**EDC – 1: Life Style Biotechnology**		
Batch 2019-2020	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	CO1	Defining the basic principles of health and nutrition
K2	CO2	Stating the deficiency and abnormal values leading to diseases
K3	CO3	Applying the molecular diagnostic methods to detect disease
K4	CO4	Categorizing good life style methods to have healthy life

Programme code: 08	Programme name: B. Sc. Biotechnology		
Course code: 19UBT0J1	JOC1 – Clinical Research And Medical Coding		
Batch 2019-2020	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	CO1	Remembering the various medical terminology and treatment strategies used for medical coding
K2	CO2	Conceiving the different procedures involved in medical documentation and billing
K3	CO3	Applying the standard coding resources for accurate insurance billing
K4	CO4	Estimating the accurately and maintain medical records using codes

Programme code: 08	Programme name: B. Sc. Biotechnology		
Course code : 19UBT0J2	JOC 2 – Agroindustrial biotechnology		
Batch 2019-2020	Hours / Week 2	Total Hours 30	Credits 2

Course Objectives

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

Course Outcomes (CO)

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