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)

M.SC. BIOTECHNOLOGY

For the students admittedin the

Academic Year 2020-2021

20PBT101

Programme code: 08		Programme title: M.Sc. Biotechnology		
Course code: 20PBT101		C.P.1 – Biochemistry and Metabolism		
Batch 2020–2021	Semester I	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

1. The student an overall understanding of structure of atoms, molecules and chemical bonds
2. Gains knowledge on enzyme kinetics
3. Understands biopolymers and metabolic reaction in the living systems.

Course Outcomes (CO)

K1	CO1	Defining the terms atoms and molecules
K2	CO2	Classifying and summarize Carbohydrates, proteins, amino acids and lipids structure and properties
K3	CO3	Applying the concept of Enzyme
K4	CO4	Distinguishing the different types of Vitamins

20PBT102

Programme code: 08		Programme title: M.Sc. Biotechnology		
Course code: 20PBT102		C.P.2 – Biostatistics and Bioinstrumentation		
Batch 2020–2021	Semester I	Hours / Week 5	Total Hours 75	Credits 4

Course Objectives

1. To make the student to understand the methods and tools in biostatistics
2. To obtain knowledge on working principles of different instruments
3. To learn the usage of instruments in experiments for future research

Course Outcomes (CO)

K1	CO1	To recollect the concepts of biostatistics and bioinstrumentation
K2	CO2	To understand the formula and principles used in biology
K3	CO3	To apply different data used in biological samples
K4	CO4	To analyse the importance about instruments in biological laboratory

20PBT103

Programme code: 08		Programme title: M.Sc. Biotechnology		
Course code:20PBT103		C.P.3 – Cell Biology and Molecular Genetics		
Batch 2020–2021	Semester I	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

- To understand and apply the principles and techniques of molecular biology
- To make the students to understand the concept of gene, modulation of gene its regulation, modes of transmission and defects
- To teach the advanced knowledge in a specialized field of molecular and cell biology

Course Outcomes (CO)

K1	CO1	Recalling the principles and basic mechanisms of metabolic control and molecular signaling
K2	CO2	Extending the knowledge and understanding of the molecular machinery of living cells
K3	CO3	Applying the knowledge gained through the understanding of Molecular Screening for disease diagnosis
K4	CO4	Analyzing the causes, genetics and recent treatment strategies of cancer

20PBT104

Programme code: 08		Programme title: M.Sc. Biotechnology		
Course code:20PBT104		C.P.4 – Microbiology		
Batch 2020–2021	Semester I	Hours / Week 5	Total Hours 75	Credits 4

Course Objectives

- To make the students to understand the basic concepts of the biology of microorganisms and its mechanism of action in host cells.
- To learn the microbiological techniques used for the classification of microorganisms
- To understand the microbe-host interaction and their metabolic activities

Course Outcomes (CO)

K1	CO1	Recollecting the early development and physiology of microbes
K2	CO2	Understanding the microbial taxonomy and classification methods.
K3	CO3	Applying the knowledge of microbiological methods to study about the microbes by phenotypic and genotypic methods
K4	CO4	Applying the knowledge to learn about the food spoilage due to cause of microbial contamination and food preservation methods

20PBT1CL

Programme code: 08		Programme title: M.Sc. Biotechnology		
Course code:20PBT1CL		C.Pr.1- Lab in Biochemistry, Biostatistics and Bioinstrumentation		
Batch 2020–2021	Semester I	Hours / Week 5	Total Hours 75	Credits 3

Course Objectives

- To get hands on experience and to learn the principles behind Biochemistry, Biostatistics and Bioinstrumentation techniques.
- To give experience in working principle of Instruments
- To train the students on SPSS software, ANOVA, Regression, Correlation and Standard deviation.

Course Outcomes (CO)

K3 K4 K5	CO1	Extending the hands on experience on standard solution preparation, quantitative analysis of compounds
	CO2	Developing and applying the skills gained through the instrumentation
	CO3	Examining and to analyze the results behind the Excel, SPSS software.

20PBT1CM

Programme code: 08		Programme title: M.Sc. Biotechnology		
Course code:20PBT1CM		C.Pr.2- Lab in Molecular Genetics and Microbiology		
Batch 2020–2021	Semester I	Hours / Week 5	Total Hours 75	Credits 3

Course Objectives

- To get hands on experience and to learn the principles behind molecular and microbiological techniques
- To give hands on experience in estimation of nucleic acids and isolation of cell organelles
- To train the students on microbiological media preparation, isolation of microbes and staining techniques

Course Outcomes (CO)

K3	CO1	Extending the hands on experience on standard solution preparation, Demonstrating the various pure culture as well as the staining techniques of microbiology and methods in Molecular Genetics
K4	CO2	Developing and applying the skills gained through the molecular and microbiological techniques for research as well as for in the various fields of applied science
K5	CO3	Examining and to analyze the results behind the molecular and microbiological techniques for the development of new techniques in future

20PBT205

Programme code: 08		Programme title: M.Sc. Biotechnology		
Course code:20PBT205		C.P. 5 – Genetic Engineering		
Batch 2020–2021	Semester II	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

1. To demonstrate the innovative utilization of manipulating enzymes, various cloning and expression vectors and analysis of genomic sequences.
2. To interpret the applications of genetic engineering in biotechnological research.
3. To educate the strategizing research methodologies employing recombinant DNA techniques.

Course Outcomes (CO)

K1	CO1	The students recall the principles of genetic engineering and the vectors used in cloning, methods of introduction of gene and expression
K2	CO2	The students appreciate the different cloning strategies and their expression
K3	CO3	The students also know about implementation of genetic engineering for different purposes
K4	CO4	The students will investigate the different strategies of recombinant DNA technology and resolve the problems encountered

20PBT206

Programme code: 08		Programme title: M.Sc. Biotechnology		
Course code:20PBT206		C.P. 6 Immunology and Immunotechnology		
Batch 2020–2021	Semester II	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

- To provide the students with a foundation in immunological processes
- To understand the immune response made in humans to foreign antigens including microbial pathogens
- To give the description of cells involved in the immune response as well to understand how the immune system recognizes self from non-self

Course Outcomes (CO)

K1	CO1	Defining the roleof the immune system to combat diseases
K2	CO2	Demonstrating the basic knowledge of the organization and function of the immune system
K3	CO3	Developing immunological concepts and methods to diagnose immune disorders and also for the treatment of disorders
K4	CO4	Distinguishing the mechanisms that lead to beneficial immune responses and immune disorders

20PBT207

Programme code: 08		Programme title: M.Sc. Biotechnology		
Course code:20PBT207		C.P. 7 – Animal Biotechnology		
Batch 2020–2021	Semester II	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

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

Course Outcomes (CO)

K1 K2 K3 K4	CO1	Students understand the role of Animal Tissue Culture medium and its Applications
	CO2	Students interpret the qualitative and quantitative assays and analyze them.
	CO3	Inculcate the understanding of cell culture technique, significance of its cultivation and its application in the production of valuable products
	CO4	Students impart knowledge on production of transgenic animals and how to imply onhuman welfare

20PBT208

Programme code: 08		Programme title: M.Sc. Biotechnology		
Course code:20PBT208		C.P.8– Environmental Biotechnology and Bionanotechnology		
Batch 2020–2021	Semester II	Hours / Week 5	Total Hours 75	Credits 4

Course Objectives

1. To reveal the current status and basics of environmental condition and conservation.
2. To make the students to understand the concepts of ecology and conservation of environment through advance technology.
3. To provide knowledge of current perspectives in ecological issues and advance Bionanotechnology applications

Course Outcomes (CO)

K1 K2 K3 K4	CO1	Students are trained to relate and recall each and every topic
	CO2	Students accept and understand the ecological status and their conservation
	CO3	Qualitative application are employed by the students to ensure the quality (good or bad) of the environmental samples for the betterment of society through advance technology
	CO4	Reported data and observed results are analyzed and interpreted by students

20PBT2CO

Programme code: 08		Programme title: M.Sc. Biotechnology		
Course code :20PBT2CO		C.Pr.4- Lab in Immunotechnology, Animal Biotechnology and Environmental Biotechnology		
Batch 2020–2021	Semester II	Hours / Week 5	Total Hours 75	Credits 3

Course Objectives

- To teach students the latest techniques and principles in Immunotechnology,animal biotechnology and environmental biotechnology
- To give hands on experience in immunological techniques
- To provide hands on training on animal cell culture techniques and environmental biotechnology

Course Outcomes (CO)

K3	CO3	Defining the fundamental concepts of immunology, disease diagnosis and animal tissue culture techniques
K4	CO4	Developing and applying the recent technology involved in diagnostic techniques of immunology and animal cell culture
K5	CO5	Examining and analyzing the results involved in immune techniques animal biotechnology and environmental biotechnology

20PBT309

Programme code: 08		Programme title: M.Sc. Biotechnology		
Course code :20PBT309		C.P.9 - FermentationTechnology		
Batch 2020–2021	Semester III	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

1. To learn the concepts of screening, optimization and maintenance of cultures and to introduce the students to the various concepts of microbial growth kinetics, fermentation and bioprocess engineering
2. To understand the basics of fermentation techniques and to enable the students to learn about the design of fermentors
3. To know about the principles involved in transport mechanisms and techniques involved in Upstream and downstream bioprocessing.

Course Outcomes (CO)

K1	CO1	Recognizing the basic principles of bioprocess technology and different types of fermenters
K2	CO2	Understanding the different processes involved in bioprocess technology
K3	CO3	Integrating scientific and technological knowledge on the use of bioprocesses for industrial products on the cell and process level
K4	CO4	Developing and assessing the conditions for efficient and sustainable design of bioprocesses

20PBT310

Programme code: 08		Programme title: M.Sc. Biotechnology		
Course code :20PBT310		C.P.10 - Plant Biotechnology		
Batch 2020–2021	Semester III	Hours / Week 5	Total Hours 75	Credits 5

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	Students are practiced to remember the specific terminologies by label the scientific words
K2	CO2	Students are explained wit neat diagrams to understand the topic easily
K3	CO3	Students are allowed to apply and utilize the scientific models for every topic
K4	CO4	Students are triggered to assume and analyze the each chapter in detail

20PBT311

Programme code: 08		Programme title: M.Sc. Biotechnology		
Course code :20PBT311		C.P.11- Genomics, Proteomics and Computational Biology		
Batch 2020–2021	Semester IV	Hours / Week 5	Total Hours 75	Credits 5

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 bioinformatic 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 interpret 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

20PBT3CP

Programme code: 08		Programme title: M.Sc. Biotechnology		
Course code :20PBT3CP		C. Pr. 4 – Lab in Fermentation Technology, Plant Biotechnology and Computational Biology		
Batch 2020–2021	Semester III	Hours / Week 5	Total Hours 75	Credits 3

Course Objectives

1. To gain hands-on experience and to learn the principles behind fermentation technology, plant biotechnology and bioinformatics
2. To know the process involved in isolation, separation, manipulation of bioprocessing, plant cell culture techniques
3. To apply the technology in pharmaceutical industries and plant tissue culture based industries

Course Outcomes (CO)

K3	CO1	Applying the concepts involved in fermentation technology, plant biotechnology and bioinformatics and demonstrating the techniques involved in Fermentation technology, plant cell culture and bioinformatics
K4	CO2	Executing the recent technology involved in bioinformatics, bioprocessing and plant cell culture
K5	CO3	Evaluating and analyzing the results involved in fermentation technology, plant biotechnology and bioinformatics

20PBT4Z1

Programme code: 08		Programme title: M.Sc. Biotechnology		
Course code :20PBT4Z1		Project work and viva-voce		
Batch 2020–2021	Semester IV	Hours / Week 21	Total Hours 315	Credits 5

Course Objectives

4. To develop independence in experimental design and interpretation and to develop research skills
5. To promote education and research in biotechnology and provide academic and professional excellence for immediate productivity in industrial, governmental, or clinical settings for an ultimate benefit of society and environment

Course Outcomes (CO)

K3	CO1	Developing and executing the knowledge by planning and coordinating a 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

Major Elective

Programme code: 08	Programme title: M.Sc. Biotechnology		
Major Elective – Pharmaceutical Biotechnology			
Batch 2020–2021	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

1. To enable the students to learn about various drugs, its effects, drug metabolism, drug receptors, drug tolerance, dependence and resistance with therapeutic monitoring of drugs.
2. To offers the students comprehensive information and insights in pharmaceutical biotechnology and the development of biopharmaceuticals in pharmaceutical industry.

Course Outcomes (CO)

K1	CO1	Recollecting the concept, classification production and application of pharmaceutical substances
K2	CO2	Imparting a comprehension of basic skills necessary for employing biotechnology principles
K3	CO3	The knowledge gained in this course would be used to understand and evaluate the different pharmaceutical parameters of the current and future biotechnology related products on the market
K4	CO4	Understanding in both scientific knowledge of designing and mechanism of action of drugs

Major Elective

Programme code: 08	Programme title: M.Sc. Biotechnology		
Major Elective – Bioethics, Biosafety, IPR and Total Quality Management			
Batch 2020–2021	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

1. To understand the concepts of bioethics, biosafety of genetic engineering, IPR, TQM, product planning
2. To learn the principles of bioethics and to know the requirements and assessment of biosafety
3. To make the students to understand the scope and significance of TQM

Course Outcomes (CO)

K1	CO1	Define the concepts of IPR, TQM, Product planning and development
K2	CO2	Understanding the scope and significance of biosafety in biotechnological process
K3	CO3	Developing knowledge on biosafety assessment in genetically modified organisms and their release into the environment
K4	CO4	Motivating the entrepreneurial development in life science

Major Elective

Programme code: 08		Programme title: M.Sc. Biotechnology		
Major Elective - Natural Products and Research Methodology				
Batch 2018-2019	Semester -	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

5. To understand the concepts, developments, applications of natural products
6. To know the novel methods in cultivation and conversation of natural products.
7. To make students understand the research concepts, plagiarism and thesis writing etc.

Course Outcomes (CO)

K1	CO1	Introducing the principle and concepts in natural products
K2	CO2	Updating the role of natural products extraction process
K3	CO3	Studying the advanced development in natural production utilization and conservation.
K4	CO4	Students are trained to identify research problems and to develop research article writing skills

Major Elective

Programme code: 08		Programme title: M.Sc. Biotechnology		
Major Elective - Bioentrepreneurship, Marine and algal biotechnology				
Batch 2018-2019	Semester -	Hours / Week 5	Total Hours 75	Credits 5

Course Objectives

1. To understand the concepts of Entrepreneurial traits
2. To understand the concepts of business idea to project design and development through entrepreneurship
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	CO1	Introducing the basic concepts in Bio entrepreneurship
K2	CO2	Updating the role of business ides to become an entrepreneur.
K3	CO3	Studying the advanced development in marine and algal natural products utilization and conservation.
K4	CO4	Discussing the various therapeutic applications of marine system

Non-Major Elective

Programme code: 08	Programme title: M.Sc. Biotechnology		
Non-Major Elective – Competitive Science-I			
Batch 2020–2021	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To understand the physiology of animal
2. To recall the physiology of plant
3. To know the principle and concepts of ecology

Course Outcomes (CO)

K1	CO1	Studying the concept of Blood circulation and cardiovascular system
K2	CO2	Studying the principles of respiratory and excretory system
K3	CO3	Studying the basics of digestive and reproductive system
K4	CO4	Discussing the principles of photosynthesis, ecology and biotic environment

Non-Major Elective

Programme code: 08	Programme title: M.Sc. Biotechnology		
Non-Major Elective – Competitive Science-II			
Batch 2020–2021	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To realize the concepts and principle of evolution
2. To recall the concepts of molecular evolution
3. To discuss the commercial applications of biotechnology

Course Outcomes (CO)

K1	CO1	Introducing the principle and concepts in evolution
K2	CO2	Studying the concepts of molecular evolution
K3	CO3	Studying the methods and approaches in the study of behavior
K4	CO4	Discussing the applications of biology

Non-Major Elective

Programme code: 08	Programme title: M.Sc. Biotechnology		
Non-Major Elective – Food Technology			
Batch 2020–2021	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To study the primary source of microbes in various foods,
2. To know the definition, general features and different products.
3. To understand the existence of microbes on foods and foodborne diseases.

Course Outcomes (CO)

K1	CO1	Introducing the students to the fundamentals of food science and technology
K2	CO2	Interpreting the role of carbohydrates and enzymes in food sciences.
K3	CO3	Identifying the foodborne diseases and causative agents with their social impacts.
K4	CO4	Understanding of the advanced principles of food processing and how to choose a method of preservation in relation to food composition

PBT60

Non-Major Elective

Programme code: 08	Programme title: M.Sc. Biotechnology		
Non- Major Elective – Cancer biology			
Batch 2020–2021	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To make students learn the basics of cancer biology
2. To make the students understand the molecular genetics of cancer
3. To provide knowledge on diagnosis and treatment of cancer.

Course Outcomes (CO)

K1	CO1	Students are practiced to remember the specific terminologies by repeated discussions
K2	CO2	Students are explained wit neat diagrams to understand the molecular mechanism of cancer
K3	CO3	Students are trained to apply their new ideas in the field of cancer therapy
K4	CO4	Students are triggered to assume and analyze the results and interpret

20PBT3X1

Programme code: 08		Programme title: M.Sc. Biotechnology		
Course Code: 20PBT3X1		Extra Departmental Course– Bioentrepreneurship skill development		
Batch 2020-2021	Semester III	Hours / Week 2	Total Hours 30	Credits 2

Course Objectives

1. To understand the concepts of Entrepreneurial traits
2. To understand the concepts of business idea to project design
3. To project appraisaland development through bioentrepreneurship

Course Outcomes (CO)

K1	CO1	Introducing the basic concepts in Bio entrepreneurship
K2	CO2	Updating the role of business ideas
K3	CO3	Studying the advanced development in Entrepreneurship
K4	CO4	Discussing the importance of Bio entrepreneurship skill development

20PBT0J1

Programme code: 08	Programme title: M.Sc. Biotechnology		
Course code :20PBT0J1	JOC 1 - Plant tissue culture and Organic farming		
Batch 2020–2021	Hours / Week 2	Total Hours 30	Credits 2

Course Objectives

1. To make students understand the applications of plant tissue culture
2. To give a detailed idea about the instruments used in plant tissue culture
3. To provide ideas on easy and low cost preparations of biomanures and biocontrol agents

Course Outcomes (CO)

K1	CO1	Students are remembered with names the scientific names by spell repeatedly
K2	CO2	Outline the concepts by summarize to easy understanding
K3	CO3	Students trained to choose the correct method and solve the problem by applying the specific techniques
K4	CO4	Students made in to distinguish even small variations by simple analysis

20PBT0J2

Programme code: 08	Programme title: M. Sc. Biotechnology		
Course code :20PBT0J2	JOC 2 - Herbal Biotechnology		
Batch 2020–2021	Hours / Week 2	Total Hours 30	Credits 2

Course Objectives

1. To enable the students to learn about the biochemicals synthesized in medicinal plants
2. To enable the students to learn about the extraction and enhancement of secondary metabolites using plant tissue culture techniques
3. To exploit and explore the bioactive properties of medicinal plants

Course Outcomes (CO)

K1	CO1	The students recall the biosynthesis of primary and secondary metabolites involved in plants
K2	CO2	The students understand the concept of phyto-chemical extraction and principles involved in DNA and chemical fingerprinting techniques
K3	CO3	The students also know about applications of phyto-constituents in development of drug
K4	CO4	The students can able to validate the results obtained using the techniques involved in photochemical analysis

20PBT0D2

Programme code: 08	Programme title: M. Sc. Biotechnology
Course code :20PBT0D2	ALC. 2 – Stem Cell Technology
Batch 2020–2021	Credits 2

Course Objectives

1. To make students understand the basics of stem cells
2. To give a detailed idea about the application of stem cells
3. To provide ideas on the technologies implied in stem cell culturing and application

Course Outcomes (CO)

K1	CO1	Students remember the scientific terms by repeated learning
K2	CO2	Students understand the concepts with help of videos displayed during class hours
K3	CO3	Students are trained to choose the correct method and solve the problem by applying the specific techniques
K4	CO4	Students are trained to distinguish even small variations by simple analysis