Key Indicator - 1.1 Curriculum Design and Development

1.1.1 Curricula developed and implemented have relevance to the local, regional, national and global developmental needs, which is reflected in the Programme outcomes (POs) and Course Outcomes (COs) of the Programmes offered by the institution

Programme Outcomes (POs) and Course Outcomes (COs) – (2019-2020 Onwards)

DEPARTMENT OF BIOTECHNOLOGY

B. Sc – Biotechnology

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Statements
PEO1	To make our student competent in various areas of biotechnology.
PEO2	To inculcate the capability to work as entrepreneurs with strong ethicsand communication skills.
PEO3	To equip the students to pursue higher education and research in reputed institutes at national and international levels.
PEO4	To develop a working knowledge of biotechnological product and processes.

PROGRAMME OUTCOMES (POs)

POs	Programme Outcome On completion of B. Sc Biotechnology Programme, the students will be able to,
PO1	Apply ethical principles and commit to professional ethics and responsibilities in technology usages.
PO2	Function effectively as an individual and as a member in multidisciplinary settings.
PO3	Demonstrate knowledge in various environment with respect to sustainable development.
PO4	Recognize the need for and have the preparation & ability to engage independent and lifelong learning in the broadest context of technological change.

COURSE OUTCOMES (COs)

Course Title: CELL BIOLOGY Course Code: 19UBT1CC1		
CO Number	**CO Statement On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Exhibit a knowledge base in classes of cells, types of cell division	**K1**
CO2	Outline a clear and concise idea about cell membrane and cytoskeleton	**K2**
CO3	Discuss the properties and functions of the cytoplasmic organelles.	**K2**
CO4	Illustrate the reactions that comprise energy metabolism.	**K2**
CO5	Explain about cell cycle and its regulations.	**K2**

Course Title: LAB IN CELL BIOLOGY Course Code: 19UBT1CC1P		
CO Number	**CO Statement On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Describe the basic instruments involved in Cell Biology	**K1**
CO2	Demonstrate the morphology of various types of cells and their enumeration.	**K1**
CO3	Illustrate the different types of cell division.	**K2**
CO4	Outline a clear and concise idea about embryogenesis.	**K2**
CO5	Identify the Barr body from Buccal Cells.	**K2**

Course Title: GENERAL MICROBIOLOGY Course Code: 19UBT1AC1		
CO Number	**CO Statement On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Recall the history of Microbiology and list out the scopes.	**K1**
CO2	Outline the methods involved in media preparation and sterilization.	**K2**
CO3	Summarize the structural organization of Bacteria.	**K2**
CO4	Explain the general characteristic features of Algae and Fungi.	**K2**
CO5	Describe the Diversity, Ecology and Characteristics of different Protozoa and Viruses.	**K3**

Course Title: LAB IN MICROBIOLOGY Course Code: 19UBT1AC1P		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Illustrate the techniques involved in sterilization of media and glasswares.	**K1**
CO2	Outline the methods for isolation and enumeration of microorganisms from different samples.	**K2**
CO3	Demonstrate the various pure culture techniques and to measure the bacterial growth.	**K2**
CO4	Identify the organisms by various staining techniques.	**K3**
CO5	Apply various biochemical tests to characterize microorganisms.	**K3**

Course Title: MOLECULAR BIOLOGY Course Code: 19UBT2CC2		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Describe the organization and development of the genetic makeup on cellular, chromosomal and gene level.	**K1**
CO2	Recall basic concepts of hereditary and population genetics.	**K1**
CO3	Explain DNA replication and repair mechanism.	**K2**
CO4	Summarise the mechanisms of transcription and translation	**K2**
CO5	Outline the gene regulatory mechanisms.	**K2**

Course Title: LAB IN MOLECULAR BIOLOGY Course Code: 19UBT2CC2P		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the methods for the isolation and purification ofgenomic DNA and plasmid DNA.	**K1**
CO2	Outline the process of separation of DNA and protein by electrophoresis.	**K2**
CO3	Apply the various methods for the quantification of nucleic acids.	**K3**
CO4	Experiment with various gene transfer methods.	**K3**

CRITERION I **POs and COs**

Course Title: BIOINSTRUMENTATION **Course Code: 19UBT2AC2**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define the principle of microscope and its various types	**K1**
CO2	Demonstrate the various Electrophoretic techniques and its Applications	**K2**
CO3	Explain the principle, types and applications of Chromatographic techniques.	**K2**
CO4	Outline the principle, types and applications of Colorimetry.	**K2**
CO5	Summarize the principle, types and applications of Centrifugation.	K2

Signature Not Verified
Digitally Signed
Signed by: Sujatha.V
Designation: Principal
Reason: NAAC
Location: Tiruchirappalli, Tamil Nadu, India
Date: 30-Sep-2024 10:43:46

Key Indicator - 1.1 Curriculum Design and Development

1.1.1 Curricula developed and implemented have relevance to the local, regional, national and global developmental needs, which is reflected in the Programme outcomes (POs) and Course Outcomes (COs) of the Programmes offered by the institution

Programme Outcomes (POs) and Course Outcomes (COs) – (2020-2021 Onwards)

DEPARTMENT OF BIOTECHNOLOGY

B. Sc – Biotechnology

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Statements
PEO1	To make our student competent in various areas of
PEO2	To inculcate the capability to work as entrepreneurs with strong ethicsand communication skills.
PEO3	To equip the students to pursue higher education and research in reputed institutes at national and international levels.
PEO4	To develop a working knowledge of biotechnological product and processes.

PROGRAMME OUTCOMES (POs)

POs	Programme Outcome On completion of B. Sc Biotechnology Programme, the students will be able to,
PO1	Apply ethical principles and commit to professional ethics and responsibilities in technology usages.
PO2	Function effectively as an individual and as a member in multidisciplinary settings.
PO3	Demonstrate knowledge in various environment with respect to sustainable development.
PO4	Recognize the need for and have the preparation & ability to engage independent and lifelong learning in the broadest context of technological change.

COURSE OUTCOMES (COs)

Course Title: CELL BIOLOGY Course Code: 19UBT1CC1		
CO Number	**CO Statement On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Exhibit a knowledge base in classes of cells, types of cell division	**K1**
CO2	Outline a clear and concise idea about cell membrane and cytoskeleton	**K2**
CO3	Discuss the properties and functions of the cytoplasmic organelles.	**K2**
CO4	Illustrate the reactions that comprise energy metabolism.	**K2**
CO5	Explain about cell cycle and its regulations.	**K2**

Course Title: LAB IN CELL BIOLOGY Course Code: 19UBT1CC1P		
CO Number	**CO Statement On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Describe the basic instruments involved in Cell Biology	**K1**
CO2	Demonstrate the morphology of various types of cells and their enumeration.	**K1**
CO3	Illustrate the different types of cell division.	**K2**
CO4	Outline a clear and concise idea about embryogenesis.	**K2**
CO5	Identify the Barr body from Buccal Cells.	**K2**

Course Title: GENERAL MICROBIOLOGY Course Code: 19UBT1AC1		
CO Number	**CO Statement On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Recall the history of Microbiology and list out the scopes.	**K1**
CO2	Outline the methods involved in media preparation and sterilization.	**K2**
CO3	Summarize the structural organization of Bacteria.	**K2**
CO4	Explain the general characteristic features of Algae and Fungi.	**K2**
CO5	Describe the Diversity, Ecology and Characteristics of different Protozoa and Viruses.	**K3**

Course Title: LAB IN MICROBIOLOGY Course Code: 19UBT1AC1P		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Illustrate the techniques involved in sterilization of media and glasswares.	**K1**
CO2	Outline the methods for isolation and enumeration of microorganisms from different samples.	**K2**
CO3	Demonstrate the various pure culture techniques and to measure the bacterial growth.	**K2**
CO4	Identify the organisms by various staining techniques.	**K3**
CO5	Apply various biochemical tests to characterize microorganisms.	**K3**

Course Title: MOLECULAR BIOLOGY Course Code: 19UBT2CC2		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Describe the organization and development of the genetic makeup on cellular, chromosomal and gene level.	**K1**
CO2	Recall basic concepts of hereditary and population genetics.	**K1**
CO3	Explain DNA replication and repair mechanism.	**K2**
CO4	Summarise the mechanisms of transcription and translation	**K2**
CO5	Outline the gene regulatory mechanisms.	**K2**

Course Title: LAB IN MOLECULAR BIOLOGY Course Code: 19UBT2CC2P		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the methods for the isolation and purification ofgenomic DNA and plasmid DNA.	**K1**
CO2	Outline the process of separation of DNA and protein by electrophoresis.	**K2**
CO3	Apply the various methods for the quantification of nucleic acids.	**K3**
CO4	Experiment with various gene transfer methods.	**K3**

CRITERION I **POs and COs**

Course Title: BIOINSTRUMENTATION **Course Code: 19UBT2AC2**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define the principle of microscope and its various types	**K1**
CO2	Demonstrate the various Electrophoretic techniques and its Applications	**K2**
CO3	Explain the principle, types and applications of Chromatographic techniques.	**K2**
CO4	Outline the principle, types and applications of Colorimetry.	**K2**
CO5	Summarize the principle, types and applications of Centrifugation.	K2

Course Title: rDNA TECHNOLOGY **Course Code: 19UBT3CC3**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Utilize Knowledge on various tools & principles in Genetic Engineering	**K1**
CO2	Recall the knowledge on creation of genomic libraries & explain the strategies in generating transgenics.	**K2**
CO3	Contrast the methods of gene cloning using different vectors & assessing arecombinant plasmid	**K2**
CO4	Technical knowhow on versatile techniques in Recombinant DNA Technology and to employ them in isolation procedures.	**K3**
CO5	Outline the applications of Genetic engineering in basic and applied biology, proficiency in designing and conducting experiments involvinggenetic manipulation for societal applications.	**K3**

Course Title: LAB IN rDNA TECHNOLOGY **Course Code: 19UBT3CC3P**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the genomic DNA isolation method from different sources.	**K1**
CO2	Describe the method of Agarose Gel Electrophoresis.	**K2**
CO3	Illustrate about the restriction digestion and ligation of DNA.	**K2**
CO4	Outline a clear and concise idea about transformation.	**K3**
CO5	Identify the recombinant DNA products.	**K3**

CRITERION I **POs and COs**

Course Title: BIOCHEMISTRY **Course Code: 19UBT3AC3**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Study the structures and functions of biomolecules	**K1**
CO2	Outline the metabolism of macromolecules- proteins and nucleic Acids	**K1**
CO3	Understand the regulations and disorders of metabolic pathways	**K2**
CO4	Impart knowledge in principles and applications of Biochemistry	**K3**
CO5	Obtain knowledge in Pharmaceutical, Microbial and Industrial Biochemistry.	**K3**

Course Title: LAB IN BIOCHEMISTRY **Course Code: 19UBT3AC2P**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Outline the process of separation of plant pigments by chromatographic techniques	**K1**
CO2	Apply the various methods for the estimation of proteins, lipids and Carbohydrates	**K3**
CO3	Analysis of Blood glucose level	**K3**
CO4	Analysis of Enzyme Kinetics for various enzymes	**K3**

Course Title: BASICS OF BIOTECHNOLOGY **Course Code: 19UBT3NME1**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Understand the basic concepts and significant findings in thefield of biotechnology.	**K1**
CO2	Understand the structure and function of cells and organelles	**K2**
CO3	Learn the basic structure of DNA, RNA and understand theflow of genetic information	**K2**
CO4	Apply the existing techniques in waste management	**K3**
CO5	Explore more advanced application-based aspects inbiotechnology	**K3**

CRITERION I **POs and COs**

Course Title: IMMUNOLOGY **Course Code: 19UBT4CC4**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the types of cells involved in immune system.	**K1**
CO2	Describe the agents of nonspecific immunity.	**K2**
CO3	Illustrate about the structure and functions of immunoglobulins and monoclonal antibodies.	**K2**
CO4	Outline the clear and concise idea about Vaccines	**K3**
CO5	Obtain Knowledge in transplantation and tumor immunology.	**K3**

Course Title: LAB IN IMMUNOLOGY **Course Code: 19UBT4CC4P**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the methods to Identify the Blood Cells	**K1**
CO2	Experiments for Enumeration of Blood Cells	**K3**
CO3	Techniques for Plasma and Serum Separation and Identify the Blood Groups	**K3**
CO4	Apply the diagnostic skills for identification of certain diseases, immunological techniques.	**K3**

Course Title: PLANT ANATOMY AND PHYSIOLOGY **Course Code: 19UBT4AC4**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Compare the account of anatomy of Dicot stem and Monocot stem	**K2**
CO2	Classify the internal structure of Dicot root and Monocot root	**K2**
CO3	Sketch the various pathway for translocation of minerals in plants	**K3**
CO4	Analyse the utilization of plant hormones in agriculture	**K4**
CO5	Design various biochemical pathways to characterize C3 and C4 plants	**K6**

Course Title: APPLIED BIOTECHNOLOGY **Course Code: 19UBT4NME2**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define the importance of biotechnology in the field of life science	**K1**
CO2	Outline the principle and application of biotechnology in foodindustry	**K2**
CO3	Explain the efficiency of microbes in waste treatment andpollution control	**K2**
CO4	Apply the concept of DNA fingerprinting in forensic science	**K3**
CO5	Interpret regulations and guidelines for ensuring biosafetymeasures for protection of public health and environment.	**K3**

Course Title: INFORMATION INOMICS AND APPLICATIONS Course Code: 19UBT4SBE1A		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Develop knowledge on the basics of omics and their versatile Applications	**K1**
CO2	Understand the omics data analysis	**K2**
CO3	Integration of omics approaches for improvement of life	**K2**
CO4	Technical skills and knowledge development on versatile techniques in omics	**K3**
CO5	Explore more advanced application based aspects in omics	**K3**

Course Title: BIOINFORMATICS Course Code: 19UBT4SBE1B		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Understand the basic concepts and terminologies in bioinformatics	**K1**
CO2	Learn the basic online biological resources and databases	**K2**
CO3	Learn and apply the online softwares and tools for macromolecular structure prediction and sequencing	**K2**
CO4	Apply the bioinformatics tools in medicine for drug discovery and identification of novel drugs	**K3**
CO5	Apply the bioinformatics ideas in different fields and explore upcoming areas of interest in bioinformatics	**K3**

Key Indicator - 1.1 Curriculum Design and Development

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Programme Outcomes (POs) and Course Outcomes (COs) – (2021-2022 Onwards)

DEPARTMENT OF BIOTECHNOLOGY

B. Sc – Biotechnology

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

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PEO1	To make our student competent in various areas of
PEO2	To inculcate the capability to work as entrepreneurs with strong ethicsand communication skills.
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PROGRAMME OUTCOMES (POs)

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PO2	Function effectively as an individual and as a member in multidisciplinary settings.
PO3	Demonstrate knowledge in various environment with respect to sustainable development.
PO4	Recognize the need for and have the preparation & ability to engage independent and lifelong learning in the broadest context of technological change.

COURSE OUTCOMES (COs)

Course Title: CELL BIOLOGY Course Code: 19UBT1CC1		
CO Number	**CO Statement On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Exhibit a knowledge base in classes of cells, types of cell division	**K1**
CO2	Outline a clear and concise idea about cell membrane and cytoskeleton	**K2**
CO3	Discuss the properties and functions of the cytoplasmic organelles.	**K2**
CO4	Illustrate the reactions that comprise energy metabolism.	**K2**
CO5	Explain about cell cycle and its regulations.	**K2**

Course Title: LAB IN CELL BIOLOGY Course Code: 19UBT1CC1P		
CO Number	**CO Statement On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Describe the basic instruments involved in Cell Biology	**K1**
CO2	Demonstrate the morphology of various types of cells and their enumeration.	**K1**
CO3	Illustrate the different types of cell division.	**K2**
CO4	Outline a clear and concise idea about embryogenesis.	**K2**
CO5	Identify the Barr body from Buccal Cells.	**K2**

Course Title: GENERAL MICROBIOLOGY Course Code: 19UBT1AC1		
CO Number	**CO Statement On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Recall the history of Microbiology and list out the scopes.	**K1**
CO2	Outline the methods involved in media preparation and sterilization.	**K2**
CO3	Summarize the structural organization of Bacteria.	**K2**
CO4	Explain the general characteristic features of Algae and Fungi.	**K2**
CO5	Describe the Diversity, Ecology and Characteristics of different Protozoa and Viruses.	**K3**

Course Title: LAB IN MICROBIOLOGY Course Code: 19UBT1AC1P		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Illustrate the techniques involved in sterilization of media and glasswares.	**K1**
CO2	Outline the methods for isolation and enumeration of microorganisms from different samples.	**K2**
CO3	Demonstrate the various pure culture techniques and to measure the bacterial growth.	**K2**
CO4	Identify the organisms by various staining techniques.	**K3**
CO5	Apply various biochemical tests to characterize microorganisms.	**K3**

Course Title: MOLECULAR BIOLOGY Course Code: 19UBT2CC2		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Describe the organization and development of the genetic makeup on cellular, chromosomal and gene level.	**K1**
CO2	Recall basic concepts of hereditary and population genetics.	**K1**
CO3	Explain DNA replication and repair mechanism.	**K2**
CO4	Summarise the mechanisms of transcription and translation	**K2**
CO5	Outline the gene regulatory mechanisms.	**K2**

Course Title: LAB IN MOLECULAR BIOLOGY Course Code: 19UBT2CC2P		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the methods for the isolation and purification ofgenomic DNA and plasmid DNA.	**K1**
CO2	Outline the process of separation of DNA and protein by electrophoresis.	**K2**
CO3	Apply the various methods for the quantification of nucleic acids.	**K3**
CO4	Experiment with various gene transfer methods.	**K3**

CRITERION I **POs and COs**

Course Title: BIOINSTRUMENTATION **Course Code: 19UBT2AC2**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define the principle of microscope and its various types	**K1**
CO2	Demonstrate the various Electrophoretic techniques and its Applications	**K2**
CO3	Explain the principle, types and applications of Chromatographic techniques.	**K2**
CO4	Outline the principle, types and applications of Colorimetry.	**K2**
CO5	Summarize the principle, types and applications of Centrifugation.	K2

Course Title: rDNA TECHNOLOGY **Course Code: 19UBT3CC3**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Utilize Knowledge on various tools & principles in Genetic Engineering	**K1**
CO2	Recall the knowledge on creation of genomic libraries & explain the strategies in generating transgenics.	**K2**
CO3	Contrast the methods of gene cloning using different vectors & assessing arecombinant plasmid	**K2**
CO4	Technical knowhow on versatile techniques in Recombinant DNA Technology and to employ them in isolation procedures.	**K3**
CO5	Outline the applications of Genetic engineering in basic and applied biology, proficiency in designing and conducting experiments involvinggenetic manipulation for societal applications.	**K3**

Course Title: LAB IN rDNA TECHNOLOGY **Course Code: 19UBT3CC3P**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the genomic DNA isolation method from different sources.	**K1**
CO2	Describe the method of Agarose Gel Electrophoresis.	**K2**
CO3	Illustrate about the restriction digestion and ligation of DNA.	**K2**
CO4	Outline a clear and concise idea about transformation.	**K3**
CO5	Identify the recombinant DNA products.	**K3**

CRITERION I **POs and COs**

Course Title: BIOCHEMISTRY **Course Code: 19UBT3AC3**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Study the structures and functions of biomolecules	**K1**
CO2	Outline the metabolism of macromolecules- proteins and nucleic Acids	**K1**
CO3	Understand the regulations and disorders of metabolic pathways	**K2**
CO4	Impart knowledge in principles and applications of Biochemistry	**K3**
CO5	Obtain knowledge in Pharmaceutical, Microbial and Industrial Biochemistry.	**K3**

Course Title: LAB IN BIOCHEMISTRY **Course Code: 19UBT3AC2P**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Outline the process of separation of plant pigments by chromatographic techniques	**K1**
CO2	Apply the various methods for the estimation of proteins, lipids and Carbohydrates	**K3**
CO3	Analysis of Blood glucose level	**K3**
CO4	Analysis of Enzyme Kinetics for various enzymes	**K3**

Course Title: BASICS OF BIOTECHNOLOGY **Course Code: 19UBT3NME1**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Understand the basic concepts and significant findings in thefield of biotechnology.	**K1**
CO2	Understand the structure and function of cells and organelles	**K2**
CO3	Learn the basic structure of DNA, RNA and understand theflow of genetic information	**K2**
CO4	Apply the existing techniques in waste management	**K3**
CO5	Explore more advanced application-based aspects inbiotechnology	**K3**

CRITERION I **POs and COs**

Course Title: IMMUNOLOGY **Course Code: 19UBT4CC4**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the types of cells involved in immune system.	**K1**
CO2	Describe the agents of nonspecific immunity.	**K2**
CO3	Illustrate about the structure and functions of immunoglobulins and monoclonal antibodies.	**K2**
CO4	Outline the clear and concise idea about Vaccines	**K3**
CO5	Obtain Knowledge in transplantation and tumor immunology.	**K3**

Course Title: LAB IN IMMUNOLOGY **Course Code: 19UBT4CC4P**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the methods to Identify the Blood Cells	**K1**
CO2	Experiments for Enumeration of Blood Cells	**K3**
CO3	Techniques for Plasma and Serum Separation and Identify the Blood Groups	**K3**
CO4	Apply the diagnostic skills for identification of certain diseases, immunological techniques.	**K3**

Course Title: PLANT ANATOMY AND PHYSIOLOGY **Course Code: 19UBT4AC4**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Compare the account of anatomy of Dicot stem and Monocot stem	**K2**
CO2	Classify the internal structure of Dicot root and Monocot root	**K2**
CO3	Sketch the various pathway for translocation of minerals in plants	**K3**
CO4	Analyse the utilization of plant hormones in agriculture	**K4**
CO5	Design various biochemical pathways to characterize C3 and C4 plants	**K6**

Course Title: APPLIED BIOTECHNOLOGY **Course Code: 19UBT4NME2**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define the importance of biotechnology in the field of life science	**K1**
CO2	Outline the principle and application of biotechnology in foodindustry	**K2**
CO3	Explain the efficiency of microbes in waste treatment andpollution control	**K2**
CO4	Apply the concept of DNA fingerprinting in forensic science	**K3**
CO5	Interpret regulations and guidelines for ensuring biosafetymeasures for protection of public health and environment.	**K3**

CRITERION I **POs and COs**

Course Title: INFORMATION INOMICS AND APPLICATIONS **Course Code: 19UBT4SBE1A**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Develop knowledge on the basics of omics and their versatile Applications	**K1**
CO2	Understand the omics data analysis	**K2**
CO3	Integration of omics approaches for improvement of life	**K2**
CO4	Technical skills and knowledge development on versatile techniques in omics	**K3**
CO5	Explore more advanced application based aspects in omics	**K3**

Course Title: BIOINFORMATICS **Course Code: 19UBT4SBE1B**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Understand the basic concepts and terminologies in bioinformatics	**K1**
CO2	Learn the basic online biological resources and databases	**K2**
CO3	Learn and apply the online softwares and tools for macromolecular structure prediction and sequencing	**K2**
CO4	Apply the bioinformatics tools in medicine for drug discovery and identification of novel drugs	**K3**
CO5	Apply the bioinformatics ideas in different fields and explore upcoming areas of interest in bioinformatics	**K3**

Course Title: PLANT BIOTECHNOLOGY **Course Code: 19UBT5CC5**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the plant tissue culture, types and production of triploids.	**K1**
CO2	Describe the plant nuclear, mitochondrial and chloroplastgenome organization and genomic interactions.	**K2**
CO3	Illustrate about the Genetic engineering of plants.	**K2**
CO4	Outline the clear and concise idea about Plant products.	**K3**
CO5	Obtain Knowledge in role of RFLP in plant breeding.	**K3**

CRITERION I **POs and COs**

Course Title: ANIMAL BIOTECHNOLOGY **Course Code: 19UBT5CC6**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Explain the fundamental scientific principles that underlie cell culture and its importance.	**K1**
CO2	Acquire knowledge for isolation, maintain and growth of cells.	**K2**
CO3	Develop techniques for the production of Growth Hormones, monoclonal antibodies etc.	**K3**
CO4	Explain proficiency in establishing and maintaining of cell lines.	**K3**
CO5	Analyze principles and applications of animal cloning and gene therapy along with ethical concerns.	**K1**

Course Title: BIOSTATISTICS **Course Code: 19UBT5CC7**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Explain the basic concepts of biostatistics, functions and limitations	**K3**
CO2	Classify the data and sampling deign	**K3**
CO3	Compute the measures of central tendency and measures of Dispersion	**K3**
CO4	Apply the concepts of skewness, moments, kurtosis, correlation and regression to solve the problems.	**K4**
CO5	Examine the various testing of hypothesis and also analysis of variance based on one-way classification and two-way classification	**K4**

Course Title: LAB IN PLANT AND ANIMAL BIOTECHNOLOGY **Course Code: 19UBT5CC5P**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Establish and maintain aseptic conditions in tissue culture lab	**K1**
CO2	Demonstrate the method of DNA isolation from various sources and identification in agarose gel electrophoresis.	**K2**
CO3	Select & formulate media based on requirement of animal cell culture.	**K3**
CO4	Enumerate the cells using haemocytometer	**K3**
CO5	Utilize the skills and basic techniques in culturing cells using primary and secondary methods	**K3**

CRITERION I **POs and COs**

Course Title: PHARMACOGNOSY **Course Code: 19UBT5MBE1A**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Understand the importance of drugs in the treatment of Diseases	**K1**
CO2	Demonstrate the. Physical, Chemical and sensory characters of crude drugs of plant and mineral origin	**K2**
CO3	Outline the scope and importance of Ethnomedicine,	**K2**
CO4	Design the Drug Preparation Methods from medicinal plants	**K3**
CO5	Analyse the effects of drugs in allopathy with traditional systems of Medicine	**K3**

Course Title: CANCER BIOLOGY **Course Code: 19UBT5MBE1B**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the types of carcinomas.	**K1**
CO2	Infer recent incidents and mortality of Global Cancer	**K2**
CO3	Outline the clear and concise idea about Lifestyle& Dietary factors causing cancer.	**K2**
CO4	Apply concepts of prevention of cancer, cancer-related deaths and cancer-related disabilities	**K3**
CO5	Analyse the molecular mechanisms of cancer establishment and its progression by the process of metastasis and Angiogenesis	**K3**

Course Title: MOLECULAR DIAGNOSTICS AND THERAPEUTICS **Course Code: 19UBT5SBE2A**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define the principle behind various types of human Diseases	**K1**
CO2	Outline the molecular markers and its sources	**K2**
CO3	Explain the molecular techniques involved in the disease diagnosis.	**K2**
CO4	Apply the approaches pertaining to the treatment of disease.	**K3**
CO5	Identify recombinant products that are made with thehelp of cell machinery.	**K3**

CRITERION I **POs and COs**

Course Title: LAB IN BIOINFORMATICS **Course Code: 19UBT5SBE2BP**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate nucleotide analysis from various databases	**K1**
CO2	Analyze the structure of novel proteins	**K2**
CO3	Perform basic phylogenic analysis for species identification	**K2**
CO4	Apply the sequencing skills in various molecular analysis	**K3**
CO5	Identify and analyze any disorders in a genome sequence	**K3**

Course Title: DNA FINGERPRINTING **Course Code: 19UBT5SBE3A**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Understand the basis of DNA fingerprinting	**K1**
CO2	Demonstrate the sample preparation and processing from various specimens	**K2**
CO3	Familiarize with the available analytical tools and techniques for DNA fingerprinting	**K2**
CO4	Analyse various case studies based on DNA fingerprinting	**K3**
CO5	Apply the knowledge in various problem-solving aspects	**K3**

Course Title: LAB IN PLANT TISSUECULTURE **Course Code: 19UBT5SBE3BP**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Design and maintain aseptic environment and formulate required media and stock solutions based on requirement.	**K1**
CO2	Demonstrate the methods of preparing callus and suspension Cultures	**K2**
CO3	Handle and establish various explants and induce callus Formation	**K2**
CO4	Isolate and culture protoplast from plant sources	**K3**
CO5	Analyse the callus propagated through tissue culture	**K3**

CRITERION I **POs and COs**

Course Title: MICROBIAL BIOTECHNOLOGY **Course Code: 19UBT6CC8**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the isolation of industrially important microorganisms and their preservation	**K1**
CO2	Outline a clear and concise idea about concepts and basic methods in fermentation process	**K2**
CO3	Discuss the design and types of bioreactors and upstream processing	**K3**
CO4	Illustrate the various methods of bio separation	**K4**
CO5	Obtain knowledge in applications of microbes in food processing and production	**K5**

Course Title: IPR, BIOETHICS AND BIOSAFETY **Course Code: 19UBT6CC9**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define the fundamental aspects of Intellectual Property Rights for development and management of innovative projects in industries	**K1**
CO2	Outline the current trends in IPR and Govt. steps in fostering IPR	**K2**
CO3	Explain about the ethical issues involving biological material.	**K3**
CO4	Utilize adequate knowledge in the use of genetically modified organisms and its effect on human health	**K3**
CO5	Make use of critical thinking skills to analyze information and situations in order to respond and act ethically with regard to scientificresearch, practice, and technology.	**K3**

Course Title: LAB IN MICROBIALBIOTECHNOLOGY **Course Code: 19UBT6CC6P**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Enumerate the industrially important microorganisms.	**K1**
CO2	Demonstrate various types Fermentation methods.	**K2**
CO3	Handle and establish the techniques of Immobilization.	**K2**
CO4	Produce Single Cell Protein, Biofertilizer and Bio -Enzymes.	**K3**
CO5	Understand the skills and basic techniques of AntibioticSensitivity Test of Microorganisms.	**K3**

CRITERION I **POs and COs**

Course Title: ENVIRONMENTAL BIOTECHNOLOGY **Course Code: 19UBT6MBE2A**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the utilization of microbial processes in waste.	**K1**
CO2	Describe the concept of pollution management.	**K2**
CO3	Apply the Green manuring technology for crop production.	**K3**
CO4	Apply the concepts of Biotechnology in EnvironmentalManagement.	**K3**
CO5	Apply the practical skills for entrepreneurial development in biofertilizer production	**K3**

Course Title: STEM CELL BIOLOGY **Course Code: 19UBT6MBE2B**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define the fundamental scientific principles of embryonic andadult stem cells.	**K1**
CO2	Explain the techniques involved in isolation, maintain andgrowth of stem cells.	**K2**
CO3	Outline the basic concepts in stem cell epigenetics.	**K2**
CO4	Make use of the potential benefits and clinical applications ofstem cells	**K3**
CO5	Utilize the clinical significance and ethical issues pertaining to stem cell research	**K3**

Course Title: BIOENTREPRENEURSHIP **Course Code: 19UBT6MBE3A**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Understand the basic concepts in entrepreneurship and marketing strategies related to biotechnology	**K1**
CO2	Demonstrate the composting process using various methods	**K2**
CO3	Learn apiculture concepts and methods	**K3**
CO4	Analyse the techniques and methods in mushroom cultivation	**K3**
CO5	Implement an integrated farming system with multiple Components	**K3**

CRITERION I **POs and COs**

Course Title: DRUG DISCOVERY AND DEVELOPMENT **Course Code: 19UBT6MBE3B**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Classify drugs based on their source, nature, nomenclature and dosageand routes of administration.	**K1**
CO2	Interpret the current approaches of drug discovery with their advantagesand limitations.	**K2**
CO3	Summarize the fate of drug in the biological system.	**K2**
CO4	Interpret the regulatory aspects and stages of drug development.	**K3**
CO5	Impart the concepts of novel drug systems.	**K3**

Signature Not Verified
Digitally Signed
Signed by: Sujatha.V
Designation: Principal
Reason: NAAC
Location: Tiruchirappalli, Tamil Nadu, India
Date: 30-Sep-2024 10:43:46

Key Indicator - 1.1 Curriculum Design and Development

1.1.1 Curricula developed and implemented have relevance to the local, regional, national and global developmental needs, which is reflected in the Programme outcomes (POs) and Course Outcomes (COs) of the Programmes offered by the institution

Programme Outcomes (POs) and Course Outcomes (COs) – (2022-2023 Onwards)

DEPARTMENT OF BIOTECHNOLOGY

B. Sc – Biotechnology

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Statements
PEO1	**LEARNING ENVIRONMENT** To facilitate value-based holistic and comprehensive learning by integrating innovative learning practices to match the highest quality standards and train the students to be effective leaders in their chosen fields.
PEO2	**ACADEMIC EXCELLENCE** To provide a conducive environment to unleash students hidden talents and to nurture the spirit of critical thinking and encourage them to achieve their goal.
PEO3	**EMPLOYABILITY** To equip students with the required skills in order to adapt to the changing global scenario and gain access to versatile career opportunities in multidisciplinary domains.
PEO4	**PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY** To develop a sense of social responsibility by formulating ethics and equity to transform students into committed professionals with a strong attitude towards the development of the nation.
PEO5	**GREEN SUSTAINABILITY** To understand the impact of professional solutions in societal and environmental contexts and demonstrate the knowledge for overall sustainable development.

PROGRAMME OUTCOMES (POs)

POs	Programme Outcome On completion of B. Sc Biotechnology Programme, the students will be able to,
PO1	**Academic Excellence and Competence:** Elicit firm fundamental knowledge in theory as well as practical for coherent understanding of academic field to pursue multi and interdisciplinary science careers in the future.
PO2	**Holistic and Social approach:** Create novel ideas related to the scientific research concepts through advanced technology and sensitivity towards sustainable environmental practices as well as social issues.
PO3	**Professional ethics and Teamwork:** Explore professional responsibility through projects, internships, field trips/industrial visits and mentorship programmes to transmit communication skills.
PO4	**Critical and Scientific thinking:** Equip training skills in Internships, Research Projects to do higher studies in multidisciplinary paths with a higher level of specialization to become professionals of high - quality standards.
PO5	**Social Responsibility with ethical values:** Ensure ethical, social and holistic values in the minds of learners and attain gender parity for building a healthy nation.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSOs	Programme Specific Outcomes Students of B. Sc Biotechnology will be able to	POs Addressed
PSO1	Acquire knowledge of biological sciences with the implementation of technology on different living systems like plants, animals and microbes.	PO1 PO 2
PSO2	Explain the fundamental concepts and develop skills in Immunology, Developmental biology, Nanobiotechnology, Genomics, Proteomics, Bioinformatics, Agriculture and Medicine	PO 1 PO 2
PSO3	Apply the technical aspects related to the improvement of microbes, plants and live-stocks for the welfare of human and environment.	PO 2 PO 4
PSO4	Impart hands-on techniques in various thrust areas of biotechnology to meet the emerging demands in industry, academia and research.	PO 2 PO 4
PSO5	Gaining knowledge to transform theoretical concepts to practical products/process to move ahead in entrepreneurship and apply the laws concerning to IPR and bioethics	PO 2 PO 3 PO 5

CRITERION I **POs and COs**

COURSE OUTCOMES (COs)

Course Title: CELL BIOLOGY **Course Code: 22UBT1CC1**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Relate and explain the basics of cell biology, types, structure, and properties of cells.	**K1, K2**
CO2	Apply the knowledge of cell biology in diverse research areas.	**K3**
CO3	Illustrate the Ultra structure and list the functions of cellular organelles in various types of cells	**K2, K4**
CO4	Explain the significance of cells and specialized cells	**K5**
CO5	Interpret the concepts of cell, cell division, compartmentalization, transport of nutrients and cell signalling in different types of cells.	**K5**

Course Title: CELL BIOLOGY (P) **Course Code: 22UBT1CC1P**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define and describe the basic instruments involved in Biology.	**K1, K2**
CO2	Discuss and differentiate the morphology of various types of cells.	**K2**
CO3	Classify and illustrate the different cell organelles.	**K3**
CO4	Categorize the different types and stages of cell division.	**K4**
CO5	Illustrate and conclude cell viability and counting.	**K4**

Course Title: GENERAL MICROBIOLOGY **Course Code: 22UBT1AC1**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Recall and infer the factual and conceptual information required for understanding microbiology.	**K1, K2**
CO2	Illustrate the different structural organization of bacteria, Algae,Fungi, protozoa and virus.	**K2**
CO3	Develop the different microbial culture media for isolation of microbes and compare the lifecycle of bacteria, algae, fungi, protozoa and virus.	**K3, K4**
CO4	Classify the different kind of microbes (Classification) and explain the general characteristic features of the Algae, Fungi, protozoa and virus.	**K4, K5**
CO5	Elaborate the diagnostic methods and controlling measures of various pathogenic microbial diseases for the human welfare.	**K6**

CRITERION I **POs and COs**

Course Title: BIOCHEMISTRY **Course Code: 22UBT1AC2**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Understand and remember the chemistry and salient features of macromolecules	**K1, K2**
CO2	In depth knowledge about the properties and significance of the biomolecules	**K2**
CO3	Explain and differentiate the relationship between different kinds of biomolecules such as carbohydrates, lipids, nucleic acid andproteins.	**K2, K4**
CO4	Classify and demonstrate the various sources and functions of the nutrients. Calorific value of food.	**K3, K4**
CO5	Evaluate and analyze the concept of nutrition in health and disease,with metabolism and functions of a living system	**K4, K5**

Course Title: MOLECULAR BIOLOGY& GENETICS **Course Code: 22UBT2CC2**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Understand and remember chemistry and salient features of DNA and the concepts of inheritance.	**K1, K2**
CO2	In-depth knowledge of the mendelian laws, sex determination, replication, transcription and translation.	**K2**
CO3	Explain and differentiate the process of DNA replication, transcription and translation between prokaryotes and Eukaryotes.	**K2, K4**
CO4	Compare and distinguish the laws of segregation, law of independent assortment, linkage, multiple alleles, and Eukaryotic and prokaryotic gene expression.	**K3, K4**
CO5	Evaluate and analyze the basic concepts of classical and molecular genetics	**K4, K5**

Course Title: MOLECULAR BIOLOGY &GENETICS (P) **Course Code: 22UBT2CC2P**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate and analyze the DNA isolation methods.	**K3, K4**
CO2	Infer the separation techniques for DNA and protein and their quantification methods.	**K4**
CO3	Illustrate and interpret the different mutagenesis techniques.	**K3**
CO4	Explain the Mendelian traits and distinguish the male and female *Drosophila* cultures.	**K4**
CO5	Categorize the different genetic disorders in man using the Pedigree Chart.	**K4**

CRITERION I **POs and COs**

Course Title: BIOINSTRUMENTATION **Course Code: 22UBT2CC3**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define and Express the principle of Microscopy, Electrophoresis, Chromatography, Colorimeter and tracingtechniques	**K1, K2**
CO2	Demonstrate and develop the working mechanism of various analytical techniques.	**K2, K3**
CO3	List the types and applications of microscopy, Electrophoresis, Chromatography, Colorimeter and Centrifugation techniques.	**K4**
CO4	Appraise the advantages of advanced techniques like HR-TEM, 2D-GEL, LC-MS, FTIR and NMR	**K5**
CO5	Elaborate the role of Bioinstrumentation techniques in Biomedical applications.	**K6**

Course Title: MICROBIOLOGY AND BIOCHEMISTRY (P) **Course Code: 22UBT2AC3P**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define and demonstrate aseptic and pure culture techniques inisolation and culture of microorganisms	**K1, K2**
CO2	Identify and classify the type of microorganism using stainingtechniques & biochemical tests.	**K2, K3**
CO3	Make use of various tests for examination of urine & enzymes.	**K3**
CO4	Apply various qualitative tests to identify the biomolecules.	**K3**
CO5	Identify and examine the biomolecules present in the given sample.	**K3, K4**

Course Title: rDNA TECHNOLOGY **Course Code: 19UBT3CC3**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Utilize Knowledge on various tools & principles in Genetic Engineering	**K1**
CO2	Recall the knowledge on creation of genomic libraries & explain the strategies in generating transgenics.	**K2**
CO3	Contrast the methods of gene cloning using different vectors & assessing arecombinant plasmid	**K2**
CO4	Technical knowhow on versatile techniques in Recombinant DNA Technology and to employ them in isolation procedures.	**K3**
CO5	Outline the applications of Genetic engineering in basic and applied biology, proficiency in designing and conducting experiments involvinggenetic manipulation for societal applications.	**K3**

Course Title: LAB IN rDNA TECHNOLOGY Course Code: 19UBT3CC3P		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the genomic DNA isolation method from different sources.	**K1**
CO2	Describe the method of Agarose Gel Electrophoresis.	**K2**
CO3	Illustrate about the restriction digestion and ligation of DNA.	**K2**
CO4	Outline a clear and concise idea about transformation.	**K3**
CO5	Identify the recombinant DNA products.	**K3**

Course Title: BIOCHEMISTRY Course Code: 19UBT3AC3		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Study the structures and functions of biomolecules	**K1**
CO2	Outline the metabolism of macromolecules- proteins and nucleic Acids	**K1**
CO3	Understand the regulations and disorders of metabolic pathways	**K2**
CO4	Impart knowledge in principles and applications of Biochemistry	**K3**
CO5	Obtain knowledge in Pharmaceutical, Microbial and Industrial Biochemistry.	**K3**

Course Title: LAB IN BIOCHEMISTRY Course Code: 19UBT3AC2P		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Outline the process of separation of plant pigments by chromatographic techniques	**K1**
CO2	Apply the various methods for the estimation of proteins, lipids and Carbohydrates	**K3**
CO3	Analysis of Blood glucose level	**K3**
CO4	Analysis of Enzyme Kinetics for various enzymes	**K3**

Course Title: BASICS OF BIOTECHNOLOGY Course Code: 19UBT3NME1		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Understand the basic concepts and significant findings in thefield of biotechnology.	**K1**
CO2	Understand the structure and function of cells and organelles	**K2**
CO3	Learn the basic structure of DNA, RNA and understand theflow of genetic information	**K2**
CO4	Apply the existing techniques in waste management	**K3**
CO5	Explore more advanced application-based aspects inbiotechnology	**K3**

CRITERION I **POs and COs**

Course Title: IMMUNOLOGY **Course Code: 19UBT4CC4**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the types of cells involved in immune system.	**K1**
CO2	Describe the agents of nonspecific immunity.	**K2**
CO3	Illustrate about the structure and functions of immunoglobulins and monoclonal antibodies.	**K2**
CO4	Outline the clear and concise idea about Vaccines	**K3**
CO5	Obtain Knowledge in transplantation and tumor immunology.	**K3**

Course Title: LAB IN IMMUNOLOGY **Course Code: 19UBT4CC4P**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the methods to Identify the Blood Cells	**K1**
CO2	Experiments for Enumeration of Blood Cells	**K3**
CO3	Techniques for Plasma and Serum Separation and Identify the Blood Groups	**K3**
CO4	Apply the diagnostic skills for identification of certain diseases, immunological techniques.	**K3**

Course Title: PLANT ANATOMY AND PHYSIOLOGY **Course Code: 19UBT4AC4**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Compare the account of anatomy of Dicot stem and Monocot stem	**K2**
CO2	Classify the internal structure of Dicot root and Monocot root	**K2**
CO3	Sketch the various pathway for translocation of minerals in plants	**K3**
CO4	Analyse the utilization of plant hormones in agriculture	**K4**
CO5	Design various biochemical pathways to characterize C3 and C4 plants	**K6**

Course Title: APPLIED BIOTECHNOLOGY **Course Code: 19UBT4NME2**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define the importance of biotechnology in the field of life science	**K1**
CO2	Outline the principle and application of biotechnology in foodindustry	**K2**
CO3	Explain the efficiency of microbes in waste treatment andpollution control	**K2**
CO4	Apply the concept of DNA fingerprinting in forensic science	**K3**
CO5	Interpret regulations and guidelines for ensuring biosafetymeasures for protection of public health and environment.	**K3**

CRITERION I **POs and COs**

Course Title: INFORMATION INOMICS AND APPLICATIONS **Course Code: 19UBT4SBE1A**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Develop knowledge on the basics of omics and their versatile Applications	**K1**
CO2	Understand the omics data analysis	**K2**
CO3	Integration of omics approaches for improvement of life	**K2**
CO4	Technical skills and knowledge development on versatile techniques in omics	**K3**
CO5	Explore more advanced application based aspects in omics	**K3**

Course Title: BIOINFORMATICS **Course Code: 19UBT4SBE1B**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Understand the basic concepts and terminologies in bioinformatics	**K1**
CO2	Learn the basic online biological resources and databases	**K2**
CO3	Learn and apply the online softwares and tools for macromolecular structure prediction and sequencing	**K2**
CO4	Apply the bioinformatics tools in medicine for drug discovery and identification of novel drugs	**K3**
CO5	Apply the bioinformatics ideas in different fields and explore upcoming areas of interest in bioinformatics	**K3**

Course Title: PLANT BIOTECHNOLOGY **Course Code: 19UBT5CC5**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the plant tissue culture, types and production of triploids.	**K1**
CO2	Describe the plant nuclear, mitochondrial and chloroplastgenome organization and genomic interactions.	**K2**
CO3	Illustrate about the Genetic engineering of plants.	**K2**
CO4	Outline the clear and concise idea about Plant products.	**K3**
CO5	Obtain Knowledge in role of RFLP in plant breeding.	**K3**

CRITERION I **POs and COs**

Course Title: ANIMAL BIOTECHNOLOGY **Course Code: 19UBT5CC6**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Explain the fundamental scientific principles that underlie cell culture and its importance.	**K1**
CO2	Acquire knowledge for isolation, maintain and growth of cells.	**K2**
CO3	Develop techniques for the production of Growth Hormones, monoclonal antibodies etc.	**K3**
CO4	Explain proficiency in establishing and maintaining of cell lines.	**K3**
CO5	Analyze principles and applications of animal cloning and gene therapy along with ethical concerns.	**K1**

Course Title: BIOSTATISTICS **Course Code: 19UBT5CC7**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Explain the basic concepts of biostatistics, functions and limitations	**K3**
CO2	Classify the data and sampling deign	**K3**
CO3	Compute the measures of central tendency and measures of Dispersion	**K3**
CO4	Apply the concepts of skewness, moments, kurtosis, correlation and regression to solve the problems.	**K4**
CO5	Examine the various testing of hypothesis and also analysis of variance based on one-way classification and two-way classification	**K4**

Course Title: LAB IN PLANT AND ANIMAL BIOTECHNOLOGY **Course Code: 19UBT5CC5P**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Establish and maintain aseptic conditions in tissue culture lab	**K1**
CO2	Demonstrate the method of DNA isolation from various sources and identification in agarose gel electrophoresis.	**K2**
CO3	Select & formulate media based on requirement of animal cell culture.	**K3**
CO4	Enumerate the cells using haemocytometer	**K3**
CO5	Utilize the skills and basic techniques in culturing cells using primary and secondary methods	**K3**

CRITERION I **POs and COs**

Course Title: PHARMACOGNOSY **Course Code: 19UBT5MBE1A**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Understand the importance of drugs in the treatment of Diseases	**K1**
CO2	Demonstrate the. Physical, Chemical and sensory characters of crude drugs of plant and mineral origin	**K2**
CO3	Outline the scope and importance of Ethnomedicine,	**K2**
CO4	Design the Drug Preparation Methods from medicinal plants	**K3**
CO5	Analyse the effects of drugs in allopathy with traditional systems of Medicine	**K3**

Course Title: CANCER BIOLOGY **Course Code: 19UBT5MBE1B**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the types of carcinomas.	**K1**
CO2	Infer recent incidents and mortality of Global Cancer	**K2**
CO3	Outline the clear and concise idea about Lifestyle& Dietary factors causing cancer.	**K2**
CO4	Apply concepts of prevention of cancer, cancer-related deaths and cancer-related disabilities	**K3**
CO5	Analyse the molecular mechanisms of cancer establishment and its progression by the process of metastasis and Angiogenesis	**K3**

Course Title: MOLECULAR DIAGNOSTICS AND THERAPEUTICS **Course Code: 19UBT5SBE2A**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define the principle behind various types of human Diseases	**K1**
CO2	Outline the molecular markers and its sources	**K2**
CO3	Explain the molecular techniques involved in the disease diagnosis.	**K2**
CO4	Apply the approaches pertaining to the treatment of disease.	**K3**
CO5	Identify recombinant products that are made with thehelp of cell machinery.	**K3**

CRITERION I **POs and COs**

Course Title: LAB IN BIOINFORMATICS **Course Code: 19UBT5SBE2BP**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate nucleotide analysis from various databases	**K1**
CO2	Analyze the structure of novel proteins	**K2**
CO3	Perform basic phylogenic analysis for species identification	**K2**
CO4	Apply the sequencing skills in various molecular analysis	**K3**
CO5	Identify and analyze any disorders in a genome sequence	**K3**

Course Title: DNA FINGERPRINTING **Course Code: 19UBT5SBE3A**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Understand the basis of DNA fingerprinting	**K1**
CO2	Demonstrate the sample preparation and processing from various specimens	**K2**
CO3	Familiarize with the available analytical tools and techniques for DNA fingerprinting	**K2**
CO4	Analyse various case studies based on DNA fingerprinting	**K3**
CO5	Apply the knowledge in various problem-solving aspects	**K3**

Course Title: LAB IN PLANT TISSUECULTURE **Course Code: 19UBT5SBE3BP**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Design and maintain aseptic environment and formulate required media and stock solutions based on requirement.	**K1**
CO2	Demonstrate the methods of preparing callus and suspension Cultures	**K2**
CO3	Handle and establish various explants and induce callus Formation	**K2**
CO4	Isolate and culture protoplast from plant sources	**K3**
CO5	Analyse the callus propagated through tissue culture	**K3**

CRITERION I **POs and COs**

Course Title: MICROBIAL BIOTECHNOLOGY **Course Code: 19UBT6CC8**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the isolation of industrially important microorganisms and their preservation	**K1**
CO2	Outline a clear and concise idea about concepts and basic methods in fermentation process	**K2**
CO3	Discuss the design and types of bioreactors and upstream processing	**K3**
CO4	Illustrate the various methods of bio separation	**K4**
CO5	Obtain knowledge in applications of microbes in food processing and production	**K5**

Course Title: IPR, BIOETHICS AND BIOSAFETY **Course Code: 19UBT6CC9**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define the fundamental aspects of Intellectual Property Rights for development and management of innovative projects in industries	**K1**
CO2	Outline the current trends in IPR and Govt. steps in fostering IPR	**K2**
CO3	Explain about the ethical issues involving biological material.	**K3**
CO4	Utilize adequate knowledge in the use of genetically modified organisms and its effect on human health	**K3**
CO5	Make use of critical thinking skills to analyze information and situations in order to respond and act ethically with regard to scientificresearch, practice, and technology.	**K3**

Course Title: LAB IN MICROBIALBIOTECHNOLOGY **Course Code: 19UBT6CC6P**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Enumerate the industrially important microorganisms.	**K1**
CO2	Demonstrate various types Fermentation methods.	**K2**
CO3	Handle and establish the techniques of Immobilization.	**K2**
CO4	Produce Single Cell Protein, Biofertilizer and Bio -Enzymes.	**K3**
CO5	Understand the skills and basic techniques of AntibioticSensitivity Test of Microorganisms.	**K3**

CRITERION I **POs and COs**

Course Title: ENVIRONMENTAL BIOTECHNOLOGY **Course Code: 19UBT6MBE2A**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the utilization of microbial processes in waste.	**K1**
CO2	Describe the concept of pollution management.	**K2**
CO3	Apply the Green manuring technology for crop production.	**K3**
CO4	Apply the concepts of Biotechnology in EnvironmentalManagement.	**K3**
CO5	Apply the practical skills for entrepreneurial development in biofertilizer production	**K3**

Course Title: STEM CELL BIOLOGY **Course Code: 19UBT6MBE2B**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define the fundamental scientific principles of embryonic andadult stem cells.	**K1**
CO2	Explain the techniques involved in isolation, maintain andgrowth of stem cells.	**K2**
CO3	Outline the basic concepts in stem cell epigenetics.	**K2**
CO4	Make use of the potential benefits and clinical applications ofstem cells	**K3**
CO5	Utilize the clinical significance and ethical issues pertaining to stem cell research	**K3**

Course Title: BIOENTREPRENEURSHIP **Course Code: 19UBT6MBE3A**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Understand the basic concepts in entrepreneurship and marketing strategies related to biotechnology	**K1**
CO2	Demonstrate the composting process using various methods	**K2**
CO3	Learn apiculture concepts and methods	**K3**
CO4	Analyse the techniques and methods in mushroom cultivation	**K3**
CO5	Implement an integrated farming system with multiple Components	**K3**

CRITERION I **POs and COs**

Course Title: DRUG DISCOVERY AND DEVELOPMENT **Course Code: 19UBT6MBE3B**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Classify drugs based on their source, nature, nomenclature and dosageand routes of administration.	**K1**
CO2	Interpret the current approaches of drug discovery with their advantagesand limitations.	**K2**
CO3	Summarize the fate of drug in the biological system.	**K2**
CO4	Interpret the regulatory aspects and stages of drug development.	**K3**
CO5	Impart the concepts of novel drug systems.	**K3**

Signature Not Verified
Digitally Signed
Signed by: Sujatha.V
Designation: Principal
Reason: NAAC
Location: Tiruchirappalli, Tamil Nadu, India
Date: 30-Sep-2024 10:43:46

Key Indicator - 1.1 Curriculum Design and Development

1.1.1 Curricula developed and implemented have relevance to the local, regional, national and global developmental needs, which is reflected in the Programme outcomes (POs) and Course Outcomes (COs) of the Programmes offered by the institution

Programme Outcomes (POs) and Course Outcomes (COs) – (2023-2024 Onwards)

DEPARTMENT OF BIOTECHNOLOGY

B. Sc – Biotechnology

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Statements
PEO1	**LEARNING ENVIRONMENT** To facilitate value-based holistic and comprehensive learning by integrating innovative learning practices to match the highest quality standards and train the students to be effective leaders in their chosen fields.
PEO2	**ACADEMIC EXCELLENCE** To provide a conducive environment to unleash students hidden talents and to nurture the spirit of critical thinking and encourage them to achieve their goal.
PEO3	**EMPLOYABILITY** To equip students with the required skills in order to adapt to the changing global scenario and gain access to versatile career opportunities in multidisciplinary domains.
PEO4	**PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY** To develop a sense of social responsibility by formulating ethics and equity to transform students into committed professionals with a strong attitude towards the development of the nation.
PEO5	**GREEN SUSTAINABILITY** To understand the impact of professional solutions in societal and environmental contexts and demonstrate the knowledge for overall sustainable development.

PROGRAMME OUTCOMES (POs)

POs	Programme Outcome On completion of B. Sc Biotechnology Programme, the students will be able to,
PO1	**Academic Excellence and Competence:** Elicit firm fundamental knowledge in theory as well as practical for coherent understanding of academic field to pursue multi and interdisciplinary science careers in the future.
PO2	**Holistic and Social approach:** Create novel ideas related to the scientific research concepts through advanced technology and sensitivity towards sustainable environmental practices as well as social issues.
PO3	**Professional ethics and Teamwork:** Explore professional responsibility through projects, internships, field trips/industrial visits and mentorship programmes to transmit communication skills.
PO4	**Critical and Scientific thinking:** Equip training skills in Internships, Research Projects to do higher studies in multidisciplinary paths with a higher level of specialization to become professionals of high - quality standards.
PO5	**Social Responsibility with ethical values:** Ensure ethical, social and holistic values in the minds of learners and attain gender parity for building a healthy nation.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

PSOs	Programme Specific Outcomes Students of B. Sc Biotechnology will be able to	POs Addressed
PSO1	Acquire knowledge of biological sciences with the implementation of technology on different living systems like plants, animals and microbes.	PO1 PO 2
PSO2	Explain the fundamental concepts and develop skills in Immunology, Developmental biology, Nanobiotechnology, Genomics, Proteomics, Bioinformatics, Agriculture and Medicine	PO 1 PO 2
PSO3	Apply the technical aspects related to the improvement of microbes, plants and live-stocks for the welfare of human and environment.	PO 2 PO 4
PSO4	Impart hands-on techniques in various thrust areas of biotechnology to meet the emerging demands in industry, academia and research.	PO 2 PO 4
PSO5	Gaining knowledge to transform theoretical concepts to practical products/process to move ahead in entrepreneurship and apply the laws concerning to IPR and bioethics	PO 2 PO 3 PO 5

COURSE OUTCOMES (COs)

Course Title: CELL AND MOLECULAR BIOLOGY Course Code: 23UBT1CC1		
CO Number	**CO Statement On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Understand the basic knowledge about cell and to compare thestructure of prokaryotic cell with eukaryotic cell	**K1, K2**
CO2	Illustrate the fundamentals about the structural and functional aspects of cell organelles and cell membrane	**K2**
CO3	Categorize the importance of cells to the intra and extracellular environment by discussing about the intracellular signaling pathways	**K3**
CO4	Analyze the structure and functions of nucleic acid and acquire knowledge about the molecular mechanism of DNA and RNA	**K4**
CO5	Analyze the molecular mechanism of transcription, translation andpost translational modifications of proteins	**K4**

Course Title: CELL AND MOLECULAR BIOLOGY (P) Course Code: 23UBT1CC1P		
CO Number	**CO Statement On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define and describe the basic instruments involved in Biology.	**K1, K2**
CO2	Discuss and differentiate the morphology of various types of cells.	**K2**
CO3	Classify and illustrate the different cellular organelles.	**K3**
CO4	Categorize the different types and stages of cell division.	**K4**
CO5	Illustrate the techniques involved in size analysis of macromolecules.	**K4**

Course Title: BIOLOGICAL CHEMISTRY Course Code: 23UBT1AC1		
CO Number	**CO Statement On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Understand the basic knowledge about structure of atoms, periodic properties of elements and differentiate the properties of chemical substances	**K1, K2**
CO2	Illustrate the types of chemical reactions and to calculate the stoichiometry and rate	**K2**
CO3	Categorize the importance of classification, properties, structure of carbohydrates and various biochemical cycles involved in carbohydrate metabolism	**K3**
CO4	Analyze the classification and structural properties of lipids, fattyacids and nucleic acids	**K4**
CO5	Determine the chemistry, classification, structural properties ofproteins, amino acids, vitamins and hormones	**K4**

Course Title: BIOLOGICAL CHEMISTRY (P) Course Code: 23UBT1AC2P		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate and discuss the genomic DNA and protein isolationmethod from different sources	**K1, K2**
CO2	Describe and outline the method of qualitative and quantitative analysis of organic compounds.	**K2, K3**
CO3	Classify and categorize the organic compound according to the experimental analysis	**K3, K4**
CO4	Analyse and estimate the quantity of compounds in unknown given sample.	**K4, K5**
CO5	Analyze, compare and distinguish the nature of various organicclasses of compounds qualitatively.	**K4, K5**

Course Title: GENETICS Course Code: 23UBT2CC2		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Understand the historical milestones in molecular biology and genetics, the structure and functions of nucleic acids and their significance in the field of biology and genetics.	**K1, K2**
CO2	Illustrate about the structural organization of chromosome, chromosomalaberrations, chromosomal disorders.	**K2**
CO3	Understand the fundamental principles of inheritance as elucidated by Mendel, as well as subsequent developments in genetics related to gene linkage and independent assortment.	**K3**
CO4	Analyse pedigrees to determine the inheritance patterns of sex-linked traits and predict the probabilities of inheritance.	**K4**
CO5	Apply the knowledge of gene frequency, genetic drift and shift, pedigreeanalysis into study of evolution, genetic disorders.	**K4**

Course Title: GENETICS (P) Course Code: 23UBT2CC2P		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the basic principles of important techniques in Genetics.	**K1**
CO2	Analyze the Polytene chromosome of the organisms. Identify Barr bodiesfrom Buccal smear	**K2**
CO3	Perform basic genetics problem based on Mendel's laws	**K2**
CO4	Apply the effects of mutation and appraise the applications of molecular markers.	**K3**
CO5	Identify and analyze chromosomal aberrations using karyotyping methods	**K3**

CRITERION I **POs and COs**

Course Title: BIOMOLECULAR TECHNIQUES **Course Code: 23UBT2CC3**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define and Express the principle of Microscopy, Electrophoresis, Chromatography, Colorimeter and tracingTechniques	**K1, K2**
CO2	Demonstrate and analyze of the economic and environmental aspects of bioinstrumentation, including cost-effective instrument selection, maintenance, and sustainable practices	**K2, K4**
CO3	Interpret the types and applications of microscopy, Electrophoresis, Chromatography, Colorimeter and Centrifugation techniques	**K3**
CO4	Appraise the advantages of advanced techniques like HR-TEM,2D-GEL, LC-MS, FTIR and NMR	**K5**
CO5	Elaborate the role of Bioinstrumentation techniques in advancing healthcare, scientific discovery, and the understanding of biological systems	**K6**

Course Title: GENERAL MICROBIOLOGY **Course Code: 23UBT2AC3**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Recall the history of Microbiology and list out the scopes.	**K1**
CO2	Outline the methods involved in media preparation and sterilization.	**K2**
CO3	Summarize the structural organization of Bacteria.	**K2**
CO4	Explain the general characteristic features of Algae and Fungi.	**K2**
CO5	Describe the Diversity, Ecology and Characteristics of different Protozoa and Viruses.	**K3**

Course Title: rDNA TECHNOLOGY **Course Code: 22UBT3CC4**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Utilize and infer the knowledge on principles of Genetic Engineering in application of biotechnological research	**K1, K2**
CO2	Illustrate the knowledge on various tools and the genetic engineering strategies for transgenic products and its applications.	**K2**
CO3	Develop the Genomic and cDNA libraries and compare the tools such as Enzymes, Vectors, Gene transfer and selection techniques in the rDNA Technology.	**K3, K4**
CO4	Classify the versatile techniques in rDNA Technology and to explain the concepts of genetic transformation, gene sequencing, gene manipulation and genetically modified organisms.	**K4, K5**
CO5	Elaborate the applications of Genetic engineering in basic and applied biology, proficiency in designing and conducting.	**K6**

CRITERION I **POs and COs**

Course Title: rDNA TECHNOLOGY (P) **Course Code: 22UBT3CC3P**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate and discuss the genomic DNA and protein isolation method from different sources	**K1, K2**
CO2	Describe and outline the method of Agarose Gel Electrophoresis and SDS PAGE for DNA and Protein identification	**K2, K3**
CO3	Classify and categorize the restriction digestion and ligation of DNA	**K3, K4**
CO4	Analyse the working principles of PCR, RFLP and other important Genetic Engineering techniques.	**K4**
CO5	Analyze, compare and distinguish the recombinant DNA products.	**K4, K5**

Course Title: BIOINFORMATICS **Course Code: 22UBT3AC4**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Acquire knowledge about the developments and applications of Bioinformatics	**K1, K2**
CO2	Gain knowledge about the importance of bioinformatics, databases, tools, software of bioinformatics and different types of biological Databases	**K2**
CO3	Understand the basics of sequence alignment, sequence analysis and protein structure prediction method.	**K2**
CO4	Introduce the importance of drug designing and apply the bioinformatics tools in medicine for drug discovery and identification of novel drugs	**K3**
CO5	Analyze the different applications of bioinformatics in various fields and explore upcoming areas of interest in bioinformatics	**K4**

Course Title: BIOINFORMATICS (P) **Course Code: 22UBT3AC5P**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate nucleotide analysis from various databases	**K1**
CO2	Analyze various sequence format from different database	**K2**
CO3	Perform basic phylogenic analysis for species identification	**K2**
CO4	Apply the sequencing skills in various molecular analysis	**K3**
CO5	Identify and analyze Structural classifications of Proteins	**K3**

CRITERION I **POs and COs**

Course Title: BASICS OF BIOTECHNOLOGY **Course Code: 22UBT3GEC1**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Understand and explain the basic concepts and significant findings in the field of biotechnology.	**K1, K2**
CO2	Illustrate the structure and function of cells and their organelles.	**K2**
CO3	Classify the basic structure of DNA, RNA the flow of genetic information.	**K2**
CO4	Apply the knowledge of rDNA technique in creating genetic modified organisms.	**K3**
CO5	Analyze the different applications of biotechnology in various field.	**K4**

Course Title: IMMUNOLOGY **Course Code: 22UBT4CC5**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate and distinguish the types of lymphoid organ involved in immune system.	**K1,K2**
CO2	Describe and Differentiate humoral and Cell mediated immunity	**K2, K3**
CO3	Illustrate and justify the Principle, Methodology and applications ELISA, Fluorescent antibody techniques and Monoclonal antibody production	**K3, K4**
CO4	Infer the structure and explain the functions of MHC Molecules and different types of Vaccines and clinical transplantation	**K5, K6**
CO5	Explain the causes of Immunological Disorders and Tumor Immunity	**K6**

Course Title: IMMUNOLOGY (P) **Course Code: 22UBT4CC4P**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define and Demonstrate the methods to identify the Blood Cells	**K1, K2**
CO2	Elaborate and determine the experiments for Enumeration of Blood Cells	**K2, K3**
CO3	Apply the techniques for Plasma and Serum Separation and examine the Blood Group types	**K3, K4**
CO4	Criticize the diagnostic skills for different types of Immuno electrophoresis techniques.	**K5**
CO5	Explain how the detection of viral fever by slide agglutination tests.	**K6**

Course Title: BASICS OF FORENSIC BIOLOGY Course Code: 22UBT4AC6		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Analyze the multifaceted field of forensic biology and ethical considerations to gain a comprehensive understanding.	**K1, K2**
CO2	Utilize course knowledge and evidence-based techniques to address intricate forensic challenges.	**K2**
CO3	Evaluate the ethical obligations in forensic biology demand impartiality, meticulous chain of custody, and unwavering commitment to preservingevidence integrity.	**K3, K4**
CO4	Apply acquired skills to actively contribute to forensic investigations, aiding in crime scene reconstruction, suspect identification, and victim analysis.	**K4. K5**
CO5	Utilize forensic methods, like DNA profiling, serology, and entomologyfor interpreting biological evidence in diverse criminal cases	**K6**

Course Title: APPLIED BIOTECHNOLOGY Course Code: 22UBT4GEC2		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define and outline the significant applications of biotechnologyin improving human health.	**K1, K2**
CO2	Relate the role of biotechnology in monitoring and controllingpollution for sustainable environment.	**K2**
CO3	Summarize and utilize several molecular techniques for disease diagnosis, treatment and prevention for the betterment of humanhealth.	**K2, K3**
CO4	Identify potential hazards pertaining to biosafety for the protection of laboratory workers, public, and the environment.	**K3**
CO5	Infer biotechnological applications that facilitate healthier lives& positively impact society.	**K4**

Course Title: MEDICAL LAB TECHNOLOGY - I (P) Course Code: 22UBT4SEC1P		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the basic principles of important techniques in hematology	**K1**
CO2	Analyze and determine the constituents of blood samples	**K2**
CO3	Perform basic blood cell counting using various methods	**K2**
CO4	Apply the knowledge on serological parameters.	**K3**
CO5	Identify and analyze the parameters for pathological conditions	**K3**

CRITERION I **POs and COs**

Course Title: PLANT BIOTECHNOLOGY **Course Code: 19UBT5CC5**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the plant tissue culture, types and production of triploids.	**K1**
CO2	Describe the plant nuclear, mitochondrial and chloroplastgenome organization and genomic interactions.	**K2**
CO3	Illustrate about the Genetic engineering of plants.	**K2**
CO4	Outline the clear and concise idea about Plant products.	**K3**
CO5	Obtain Knowledge in role of RFLP in plant breeding.	**K3**

Course Title: ANIMAL BIOTECHNOLOGY **Course Code: 19UBT5CC6**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Explain the fundamental scientific principles that underlie cell culture and its importance.	**K1**
CO2	Acquire knowledge for isolation, maintain and growth of cells.	**K2**
CO3	Develop techniques for the production of Growth Hormones, monoclonal antibodies etc.	**K3**
CO4	Explain proficiency in establishing and maintaining of cell lines.	**K3**
CO5	Analyze principles and applications of animal cloning and gene therapy along with ethical concerns.	**K1**

Course Title: BIOSTATISTICS **Course Code: 19UBT5CC7**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Explain the basic concepts of biostatistics, functions and limitations	**K3**
CO2	Classify the data and sampling deign	**K3**
CO3	Compute the measures of central tendency and measures of Dispersion	**K3**
CO4	Apply the concepts of skewness, moments, kurtosis, correlation and regression to solve the problems.	**K4**
CO5	Examine the various testing of hypothesis and also analysis of variance based on one-way classification and two-way classification	**K4**

Course Title: LAB IN PLANT AND ANIMAL BIOTECHNOLOGY Course Code: 19UBT5CC5P		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Establish and maintain aseptic conditions in tissue culture lab	**K1**
CO2	Demonstrate the method of DNA isolation from various sources and identification in agarose gel electrophoresis.	**K2**
CO3	Select & formulate media based on requirement of animal cell culture.	**K3**
CO4	Enumerate the cells using haemocytometer	**K3**
CO5	Utilize the skills and basic techniques in culturing cells using primary and secondary methods	**K3**

Course Title: PHARMACOGNOSY Course Code: 19UBT5MBE1A		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Understand the importance of drugs in the treatment of Diseases	**K1**
CO2	Demonstrate the. Physical, Chemical and sensory characters of crude drugs of plant and mineral origin	**K2**
CO3	Outline the scope and importance of Ethnomedicine,	**K2**
CO4	Design the Drug Preparation Methods from medicinal plants	**K3**
CO5	Analyse the effects of drugs in allopathy with traditional systems of Medicine	**K3**

Course Title: CANCER BIOLOGY Course Code: 19UBT5MBE1B		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the types of carcinomas.	**K1**
CO2	Infer recent incidents and mortality of Global Cancer	**K2**
CO3	Outline the clear and concise idea about Lifestyle& Dietary factors causing cancer.	**K2**
CO4	Apply concepts of prevention of cancer, cancer-related deaths and cancer-related disabilities	**K3**
CO5	Analyse the molecular mechanisms of cancer establishment and its progression by the process of metastasis and Angiogenesis	**K3**

Course Title: MOLECULAR DIAGNOSTICS AND THERAPEUTICS Course Code: 19UBT5SBE2A		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define the principle behind various types of human Diseases	**K1**
CO2	Outline the molecular markers and its sources	**K2**
CO3	Explain the molecular techniques involved in the disease diagnosis.	**K2**
CO4	Apply the approaches pertaining to the treatment of disease.	**K3**
CO5	Identify recombinant products that are made with thehelp of cell machinery.	**K3**

Course Title: LAB IN BIOINFORMATICS Course Code: 19UBT5SBE2BP		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate nucleotide analysis from various databases	**K1**
CO2	Analyze the structure of novel proteins	**K2**
CO3	Perform basic phylogenic analysis for species identification	**K2**
CO4	Apply the sequencing skills in various molecular analysis	**K3**
CO5	Identify and analyze any disorders in a genome sequence	**K3**

Course Title: DNA FINGERPRINTING Course Code: 19UBT5SBE3A		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Understand the basis of DNA fingerprinting	**K1**
CO2	Demonstrate the sample preparation and processing from various specimens	**K2**
CO3	Familiarize with the available analytical tools and techniques for DNA fingerprinting	**K2**
CO4	Analyse various case studies based on DNA fingerprinting	**K3**
CO5	Apply the knowledge in various problem-solving aspects	**K3**

Course Title: LAB IN PLANT TISSUECULTURE Course Code: 19UBT5SBE3BP		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Design and maintain aseptic environment and formulate required media and stock solutions based on requirement.	**K1**
CO2	Demonstrate the methods of preparing callus and suspension Cultures	**K2**
CO3	Handle and establish various explants and induce callus Formation	**K2**
CO4	Isolate and culture protoplast from plant sources	**K3**
CO5	Analyse the callus propagated through tissue culture	**K3**

CRITERION I **POs and COs**

Course Title: MICROBIAL BIOTECHNOLOGY **Course Code: 19UBT6CC8**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the isolation of industrially important microorganisms and their preservation	**K1**
CO2	Outline a clear and concise idea about concepts and basic methods in fermentation process	**K2**
CO3	Discuss the design and types of bioreactors and upstream processing	**K3**
CO4	Illustrate the various methods of bio separation	**K4**
CO5	Obtain knowledge in applications of microbes in food processing and production	**K5**

Course Title: IPR, BIOETHICS AND BIOSAFETY **Course Code: 19UBT6CC9**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define the fundamental aspects of Intellectual Property Rights for development and management of innovative projects in industries	**K1**
CO2	Outline the current trends in IPR and Govt. steps in fostering IPR	**K2**
CO3	Explain about the ethical issues involving biological material.	**K3**
CO4	Utilize adequate knowledge in the use of genetically modified organisms and its effect on human health	**K3**
CO5	Make use of critical thinking skills to analyze information and situations in order to respond and act ethically with regard to scientificresearch, practice, and technology.	**K3**

Course Title: LAB IN MICROBIALBIOTECHNOLOGY **Course Code: 19UBT6CC6P**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Enumerate the industrially important microorganisms.	**K1**
CO2	Demonstrate various types Fermentation methods.	**K2**
CO3	Handle and establish the techniques of Immobilization.	**K2**
CO4	Produce Single Cell Protein, Biofertilizer and Bio -Enzymes.	**K3**
CO5	Understand the skills and basic techniques of AntibioticSensitivity Test of Microorganisms.	**K3**

CRITERION I **POs and COs**

Course Title: ENVIRONMENTAL BIOTECHNOLOGY **Course Code: 19UBT6MBE2A**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Demonstrate the utilization of microbial processes in waste.	**K1**
CO2	Describe the concept of pollution management.	**K2**
CO3	Apply the Green manuring technology for crop production.	**K3**
CO4	Apply the concepts of Biotechnology in EnvironmentalManagement.	**K3**
CO5	Apply the practical skills for entrepreneurial development in biofertilizer production	**K3**

Course Title: STEM CELL BIOLOGY **Course Code: 19UBT6MBE2B**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Define the fundamental scientific principles of embryonic andadult stem cells.	**K1**
CO2	Explain the techniques involved in isolation, maintain andgrowth of stem cells.	**K2**
CO3	Outline the basic concepts in stem cell epigenetics.	**K2**
CO4	Make use of the potential benefits and clinical applications ofstem cells	**K3**
CO5	Utilize the clinical significance and ethical issues pertaining to stem cell research	**K3**

Course Title: BIOENTREPRENEURSHIP **Course Code: 19UBT6MBE3A**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Understand the basic concepts in entrepreneurship and marketing strategies related to biotechnology	**K1**
CO2	Demonstrate the composting process using various methods	**K2**
CO3	Learn apiculture concepts and methods	**K3**
CO4	Analyse the techniques and methods in mushroom cultivation	**K3**
CO5	Implement an integrated farming system with multiple Components	**K3**

CRITERION I **POs and COs**

Course Title: DRUG DISCOVERY AND DEVELOPMENT **Course Code: 19UBT6MBE3B**		
CO Number	**CO Statement** **On the successful completion of the course, students will be able to,**	**Knowledge Level**
CO1	Classify drugs based on their source, nature, nomenclature and dosageand routes of administration.	**K1**
CO2	Interpret the current approaches of drug discovery with their advantagesand limitations.	**K2**
CO3	Summarize the fate of drug in the biological system.	**K2**
CO4	Interpret the regulatory aspects and stages of drug development.	**K3**
CO5	Impart the concepts of novel drug systems.	**K3**

Signature Not Verified
Digitally Signed
Signed by: Sujatha.V
Designation: Principal
Reason: NAAC
Location: Tiruchirappalli, Tamil Nadu, India
Date: 30-Sep-2024 10:43:46