

JAMAL MOHAMED COLLEGE (AUTONOMOUS), TIRUCHIRAPPALLI - 620 020
P.G. & RESEARCH DEPARTMENT OF BIOTECHNOLOGY

Course Learning Outcomes (CLO) (2017-2018)

B.Sc Biotechnology

SEM	COURSE CODE	COURSE	COURSE TITLE	Course Learning Outcomes (CLO)
SEMESTER - I				
I	17UBT1C1	Core - I	Cell biology-	The students will learn different areas of cellular biology including the structure and functions of cell and its organelles.
	17UBT1C2P	Core - II	Cell biology - practical	The course will make the student understand & develop skill and hands on training in basics of cell biology
	17UBT1A1	Allied - I	Plant diversity	Students will gain the fundamental knowledge about plant and their reproductive biology
	17UBT1A1P	Allied - II	Plant diversity – practical	The morphological and anatomical structure of plants will be learnt by the student
SEMESTER - II				
II	17UBT2C3	Core - III	Principles of Genetics and Molecular Biology	On completion of this course, the student will be able to comprehend what is genetic material and Mendelian's principles in genetics, chromosome structure & gene expression in both prokaryotes and eukaryotes. The course also helps in understanding the structures and various molecular functions of macromolecules found in cells.
	17UBT2C3P	Core - IV	Principles of Genetics and Molecular Biology - practical	On completion of this course, the student will be able to comprehend the principles of genetics and gain hands on experience on various techniques of molecular biology and apply the gained knowledge in different fields.
	17UBT2A3	Allied - III	Biophysics and Biochemistry	Students will have a strong foundation in structures and reactions of biomolecules and metabolic pathway of the major biomolecules with relevance to clinical conductors.
	17UBT2A4P	Allied - IV	Biophysics and Biochemistry - practical	The student will gain hands on experience on various techniques of biochemistry and apply the gained knowledge in different fields.
SEMESTER - III				
III	17UBT3C5	Core - V	Bioinstrumentation	The students will get educated on different types of bioinstrumentations (microscopes, centrifugation, spectroscopy, chromatography, electrophoresis and radio isotopes) and its applications.
	17UBT3C6	Core - VI	Animal Diversity	This course will enable the students with fundamental knowledge about animals and its behaviours.
	17UBT3A1	Allied – I	Microbiology	This course will facilitate the students to gain expertise in diversity of microbial lifestyles, growth and its characterization and to study the structure of plant, animal viruses and methods involved in control of microorganisms.
	17UBT3A2P	Allied - II	Microbiology - practical	It gives an understanding about the basic techniques in Microbiology
	17UBT3N1	Non Major Elective - I	Mushroom Technology	This course provides an adequate knowledge on mushroom cultivation techniques
SEMESTER - IV				
IV	17UBT4C6	Core - VI	Recombinant DNA Technology	This course enables the student to understand the various principles underlying the basis of Recombinant DNA Technology and its applications
	17UBT4C7P	Core - VII	Recombinant DNA Technology - Practical	It makes the students competent in isolating the DNA from plant, animal, bacteria and to explain the underlying mechanisms of gene cloning.
	17UBT4A3	Allied - III	Immunology	On completion of this course, the student will be able <ul style="list-style-type: none"> • To comprehend the different type of cells, organs and mechanisms involved in immune system and their contributions in elucidating immune response. • To understand the various components and the techniques associated with the specific immunological reactions.

	17UBT4A4P	Allied - IV	Immunology - Practical	On completion of this course, the student will be able <ul style="list-style-type: none"> To gain hands on experience and develop ideas on various immunological techniques that include antigen - antibody interactions and quantification of antigen (or) antibody. To develop the knowledge on DNA isolation and cell counting from the blood sample
	17UBT4N2	Non Major Elective - II	Biofertilizer and Organic Farming	The course will make the student aware of the impacts of chemical based agriculture and the importance of Biofertilizer and organic farming.
SEMESTER - V				
V	17UBT5C8	Core - VIII	Plant Biotechnology	It makes the students understand the principles and techniques involved in plant tissue and the concepts of transformation and achievements of biotechnology in Plants.
	17UBT5C9	Core - IX	Animal Biotechnology	It provides an overview and current developments in different areas of animal biotechnology for development in animal breeding, reproductive technology and cloning of the cells,
	17UBT5C10	Core - X	Environmental Biotechnology	E student will know the basic concept and issues of environmental pollution biotechnological treatment to clean up polluted environments and to create valuable resources for the human society.
	17UBT5C11P	Core - XI	Plant Biotechnology, Animal Biotechnology and Environmental Biotechnology - Practical	On completion of this course, the student will be able to gain hands on experience on plant, animal and environmental biotechniques
	17UBT5M1A	Major Based Elective - I	Pharmacognosy and Pharmacology	The student will gain knowledge concerned with medicinal drugs obtained from plants or natural sources and understands the general principles of drug action and handling of drugs by the body and the factors affecting the drug action in body and drugs used in disorders.
	17UBT5M1B		Genomics and Proteomics	On completion of this course, the student will be able to understand the principles, various databases and tools associated with genomics and proteomics.
	17UBT5S2A	Skill Based Elective - II	Biostatistics and Computer Applications in Biology	This course will provide basic knowledge of computer and operating systems and their application in biological sciences such as packages related to data analysis, data processing and generating graphs. It also provides sufficient knowledge on the recent advances in computer application in biology filed
	17UBT5S2B		Forensic Science	It helps to study the sociological aspects, molecular mechanisms and its application in forensic science.
	17UBT5S3A	Skill Based Elective - III	Textile Science	The student will gain the basic knowledge of textiles and learn the properties and manufacturing of different fibers.
	17UBT5S3B		Textile Dyeing	It enables the students on eco – friendly processing in textiles. and develops the skills in dyeing of fabrics.
17UBT5EC1	Extra Credit Course - I	Ethnobotany and Herbal Medicine	It makes the student to know about Ethnobotany and Herbal Medicine and preparation for human health.	
SEMESTER - VI				
VI	17UBT6C12	Core - XII	Bioprocess Technology	On completion of this course, the student will be able <ul style="list-style-type: none"> To comprehend the microbial exploitation in bioconversion technology. To understand the various downstream processing methods and production of industrially significant products in fermentation.
	14UBT6C13	Core - XIII	Developmental Biology and Human Physiology	On completion of this course, the student will be able <ul style="list-style-type: none"> To comprehend the theories and various processes involved in the development of organisms. To comprehend the functions of different organs and organ systems involved in human Physiology
	17UBT6C14	Core - XIV	Bioinformatics	This paper introduces the modern fields of Bioinformatics and helps the students to understand the range of applications of biological software's fields

	17UBT6C15P	Core - XV	Bioprocess Technology, Developmental Biology and Human Physiology, Bioinformatics - Practical	On completion of this course, the student will be able <ul style="list-style-type: none"> To understand the principle of bioreactor operating system and exploitation of industrially important microbes in bioconversion technology. To visualize the developmental stages of model organisms and to understand the physiology of animals. To understand the basic principle of Bioinformatics and Bioinformatics tools.
	17UBT6M2A	Major Based Elective - II	Cancer and Stem Cell Biology	It enables the student to gain deep understanding on the basic processes related to the cancer, growth, causes, and its differentiation and to study the multipotent and pluripotent stem cells from various sources, its application and regulation
	17UBT6M2B		Food Biotechnology	It helps the student to understand the principles of food processing, preservation and manufacture
	17UBT6M3A	Major Based Elective - III	IPR, Biosafety and Bioethics	It makes the student aware of the intellectual property rights, biosafety of genetically engineered products and guidelines in India and also to understand the ethical implications in biotechnological applications.
	17UBT6M3B		Analytical Techniques in Biotechnology	On completion of this course, the student will be able to comprehend the principles of analytical techniques involved in Biotechnology.
	17UBT6EC2	Extra Credit Course-II	Marine Ecology and Biodiversity Conservation	It encourages the student for self-learning in the field of Marine ecology and Biodiversity Conservation.

M. Sc Biotechnology Course Outcomes

SEM	COURSE CODE	COURSE	COURSE TITLE	Course Learning Outcomes (CLO)
SEMESTER - I				
I	17PBT1C1	Core - I	Cell Biology	The course provide a thorough knowledge on structure and function of cells, cellular signalling, protein trafficking, bio molecules and cellular development
	17PBT1C2	Core - II	Advanced Biochemistry	The student will be made aware of biochemical processes responsible for the formation, breakdown and interconversion of carbohydrates, metabolism of amino acids, fatty acids and nucleic acids.
	17PBT1C3	Core - III	Immunology and Immunotechnology	On completion of this course, the student will be able <ul style="list-style-type: none"> To comprehend the different components and mechanisms involved in immune system and their contributions in elucidating different types of immune response. To understand the various advanced techniques and technologies associated with immunological reactions.
	17PBT1C4P	Core - IV	Cell biology, Advanced biochemistry, Immunology and Immunotechnology - Practical	It enables the student to develop knowledge on various types of macromolecules, cells and cell division stages and also helps to gain skill based knowledge on techniques associated with immunological reactions.
	17PBT1CE1A	Elective - I	Bioinstrumentation	The students will gain knowledge of working principle, types of microscope and centrifugation. And application of different types of centrifuges and electrochemical methods.
	17PBT1CE1B		Enzymology and Enzyme Technology	It will educate the students to understand the importance of biocatalysts and imparts the knowledge on enzyme inhibition, sources and applications of enzymes.
SEMESTER - II				
II	17PBT2C5	Core – V	Applied Microbiology	It provides information on the applied aspects of soil microbes and its role in biogeochemical cycling, use of microbes as biofertilizer and also the methods involved in food preservation, production of industrially important compounds and sterile pharmaceutical products.
	17PBT2C6	Core – VI	Molecular Biology and Microbial Genetics	It gives a basic knowledge on genetic material, nucleic acids, central dogma of molecular biology and DNA repair mechanisms. And in-depth knowledge on gene expression and variations involved with the regulation of gene expression in prokaryotic system.

	17PBT2C7	Core – VII	Recombinant DNA Technology	It makes the student to understand the role of enzymes, properties of vectors, methodologies and applications of Recombinant DNA technology and to discuss different types of PCR, its principle, applications and its sequencing methods.
	17PBT2C8P	Core – VIII	Applied Microbiology, Molecular Biology and Microbial Genetics & Recombinant DNA Technology – practical	The course gives hands on experience in Applied microbiology, Molecular biology and Recombinant DNA technology techniques
	17PBT2CE2A	Elective-II	Biopharmaceuticals in Nanomedicine	The student will be exposed to the history, pharmaceutical products and sources of Biopharmaceuticals and enable them in understanding the designing, producing novel nano biologics and nanoethics
	17PBT2CE2B		Stem cell biology course code:	It provides the students with wide-range of topics related to stem cell and to get familiarize with applications of stem cells in regenerative medicine.
SEMESTER - III				
III	17PBT3C9	Core - IX	Plant Biotechnology	The course will make the student to understand the principles and techniques involved in plant tissue culture and to learn the concepts of transformation and other achievements in Plant Biotechnology.
	17PBT 3C10	Core - X	Animal Biotechnology	The course will make the student understand the culture techniques, concepts and achievements in animal systems and the developmental stages in animals and humans.
	17PBT3C11	Allied – XI	Bioinformatics and Biostatistics	It helps the student to understand the basics of Bioinformatics and Biostatistics and the application of biological software's fields
	17PBT3C12P	Allied - XII	Plant Biotechnology, Animal Biotechnology, Bioinformatics and Biostatistics – Practical	The course will make the student experts in both wet and dry lab of plan and animal biotechnology
	17PBT3CE3A 17PBT 3CE3B	Elective - III	Research Methodology, IPR and Biosafety	It gives an understanding about research, IPR & Legal Protection and the process of Patent Filing, Infringement and Biosafety
			Genomics and Proteomics	The students will be able to understand the various techniques in Genome analysis and to understand the applications of proteomics in different fields.
	17PBT 3CE1	Extra credit -I	Genetic Toxicology	It helps the student to study the relationship of genetic toxicology and to describe the effects of radiation and chemical mutagens upon the environment and the possible effects on humans.
SEMESTER - IV				
IV	17PBT4C13	Core – XIII	Industrial Biotechnology	This course enables the student to study the overall industrial bioprocess so as to help them to manipulate the process to the requirement of the industrial needs and to study the bulk production of commercially important Bioproducts.
	17PBT4C14	Core – XIV	Environmental Biotechnology	It makes the student to understand the principles of microbiological treatment to clean up polluted environments and to create valuable resources for the human society.
	17PBT4C15	Core- XV	Industrial Biotechnology and Environmental Biotechnology – Practical	It helps the student to understand the concepts involved in production of biomass and to determine the physical and chemical parameters from water samples.
	17PBT4PW	Project	Project work	The main objective of Project and viva voice is to inculcate Research interest among students and this gives practical exposure and hands-on experience which will equip the students in their research work
	17PBT4EC2	Extra Credit -II	Agricultural Biotechnology	It helps the students to understand the importance of traditional and modern agricultural

M. Phil Biotechnology Course Outcomes

SEM	COURSE CODE	COURSE	COURSE TITLE	Course Learning Outcomes (CLO)
SEMESTER - I				
I	18MPBT1C1	Core-I	Research Methodology	It helps the student to understand the working principles, construction and applications of the instruments often used in the studies related to various disciplines of Biological Sciences and to understand the concept of Research and learn the techniques of paper writing and presentation.
	18MPBT1C2	Core-II	Modern Biotechnology	The course makes the student to understand the basic structure and functioning of the genetic system and to understand the molecular biology.
	18MPBT1C3	Core-III	Stem Cell Research	To provide knowledge in the science of working with stem cells, and devising ways to treat different diseases by replacing damaged dysfunctional tissue with healthy new tissue.
	18MPBT1C3		Nanoparticle and nanomedicine	To provide an in-depth learning to the students in field of nanotechnology, awareness & knowledge of different organization requirements and through varied subjects and training methodology in students.
	18MPBT1C4	Core-IV	Teaching and Learning Methodology	It makes the student to understand and study the modern method of learning technique.
	18MPBT 2PW	Project work	Dissertation	The main objective of Project and viva voce is to inculcate Research interest among students and this gives practical exposure and hands-on experience which will equip the students in their research work.

P.G Diploma in Fermentation Technology (P.G.D.F.T)

SEM	COURSE CODE	COURSE	COURSE TITLE	Course Learning Outcomes (CLO)
SEMESTER - I				
I	17PDFT1C1	Core - I	Biomolecules and Microbial Biochemistry	It helps the students to understand the molecular architecture of eukaryotic cells and organelles, including macromolecules.
	17PDFT1C2	Core - II	Biocatalysis and Biotransformations	It makes the student to identify enzymes of interest for target biotransformations by genome.
	17PDFT1C3	Core - III	Microbiology of Industrial Fermentation	It enables the student to understand microbial fermentation and microbes in the production of industrially important products.
	17PDFT1C4	Core - IV	Principles of Fermentation Technology	It introduces the students to fermenter and its operation in fermentation. The knowledge on fermentation process enable students to manipulate microbes for improvement.
	17PDFT1C5/P	Core - V	Microbiology, Enzymology and Fermentation - practical	It trains the students to understand the concepts of fermenter, and microbial enzymes
SEMESTER - II				
II	17PDFT2C1	Core – VI	Bioseparations and Biological Techniques	It empower the students with the concepts and principles of Biological techniques.
	17PDFT2C2	Core – VII	Animal and Plant cell Bioprocesses	It makes the student to understand the critical relationship among cell culture
	17PDFT2C3	Core – VIII	Downstream processes and Fermentation Economics	It makes the student to learn about the structural features of the components of downstream process.
	17PDFT2C4	Core – IX	Industrial Fermentation Processes	It makes the student to understand the potential scientific consequences of industrial fermentation products.
	17PDFT2C5/P	Core – X	Bioprocess - practical	It makes the student to understand the concepts, principles and design of a fermenter

Post Graduate Diploma in Bioinformatics (PGDBI)

SEM	COURSE CODE	COURSE	COURSE TITLE	Course Learning Outcomes (CLO)
SEMESTER - I				
I	17PDBI1C1	Core - I	Fundamentals of Bioinformatics	To offer basic understanding of Bioinformatics and its applications to Molecular Biology, Clinical medicine and other disciplines.
	17PDBI1C2	Core - II	Statistics for Bioinformatics	To improve their ability to analyze the statistical data to optimize
	17PDBI1C3	Core - III	Basic Structural Biology	To study cell structure and functions of organelle and understand the mechanism of cellular transport within and outside the cell membrane
	17PDBI1C4	Core - IV	Computer Programming	This subject presents the fundamentals of programming techniques namely sequence of execution and selection of blocks to be executed, repetition of execution etc with the help of C programming language.
	17PDBI1C5P	Core - V	C++ Programming and Web publishing - Practical	This paper includes analyzed some of the basic programs in C++ and web based applications
SEMESTER - II				
II	17PDBI2C1	Core – VI	Database Management systems	This course is to make students learn about concepts of database management, data warehousing and security
	17PDBI2C2	Core – VII	Genomics and proteomics	This paper deals with genome map, comparative genomics and functional genomics and regulation
	17PDBI2C3	Core – VIII	Computational Biology	The objective of the course is to make students learn about complex biological processes and their representations.
	17PDBI2C4	Core – IX	Molecular Modeling and Drug Designing	It deals with molecular modeling, quantum mechanics and molecular mechanics. Provide a broad and thorough background in modeling tools and docking programs.
	17PDBI2C5/P	Core – X	Bioinformatics -Practical	This practical describes to acquire information from Biological databases. Use of computational approaches to analyze the information