



**PRINCE SHRI VENKATESHWARA ARTS AND SCIENCE COLLEGE**

Gowrvakkam, Chennai-600073.

Affiliated to University of Madras

**DEPARTMENT OF BIOTECHNOLOGY**

**2018-2019**

**COURSE OUTCOMES**

**M.SC. BIOTECHNOLOGY**

**YEAR/ SEM: I/ I – MDK1A- Biochemistry**

NO.	COURSE OUTCOME
<b>C101.1</b>	To fully understand the fundamentals of pH, associated ideas, and the metabolism of carbohydrates.
<b>C101.2</b>	To impart fundamental understanding of lipid metabolism and its relevance.
<b>C101.3</b>	To enlighten the students on Bio-energetics and biological oxidation pathways.
<b>C101.4</b>	To update the knowledge on Amino acids and Protein.
<b>C101.5</b>	To assess and appraise the role of Nucleic acids.

**YEAR/ SEM: I/ I –MDK1B- Molecular Genetics**

NO.	COURSE OUTCOME
<b>C102.1</b>	To develop a thorough understanding of the concepts underlying the structure and roles of genetic material in living things, as well as the molecular mechanisms underlying gene expression.
<b>C102.2</b>	Establish and differentiate between different levels of genetic regulatory mechanisms, elucidate the mechanisms underlying mutations and other genetic alterations, and investigate a range of chromosomal abnormalities.
<b>C102.3</b>	Furthermore, ensure that the students comprehend the various types of DNA damage and the range of instruments available to them for detection.
<b>C102.4</b>	Explore the principles of transposons and how they are used.
<b>C102.5</b>	Illustrates the ideas underlying the theory of evolution and finds allele and genotype frequencies in populations.



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### YEAR/ SEM: I/I –MDKIC- Molecular Cell Biology

NO.	COURSE OUTCOME
C103.1	Understanding cell structure, organelle functions, biomembranes, and cell interactions including junctions and ECM role in growth.
C103.2	Mastery of various microscopy techniques, tissue preparation methods, hybridization, flow cytometry, and cell fractionation.
C103.3	Exploring DNA organization, replication, transcription, translation, post-translational modifications, protein processing, and sorting mechanisms.
C103.4	Grasping the molecular aspects of the cell cycle, cell death processes, signaling pathways, and the molecular basis of cancer development.
C103.5	Comprehending the structural dynamics and functions of microfilaments, intermediate filaments, and microtubules in cellular activities and motility.

### YEAR/ SEM: I/I – MDKAA -Bioinstrumentation

NO.	COURSE OUTCOME
C104.1	Gain proficiency in diverse microscopic techniques and spectroscopic methodologies for comprehensive biological analysis along with flow cytometry.
C104.2	Acquire expertise in centrifugation and chromatography techniques.
C104.3	Develop a comprehensive understanding of electrophoretic techniques and microarray technologies for molecular analysis.
C104.4	Master spectroscopic techniques along with their applications, aiding in detailed molecular analysis.
C104.5	Explore the principles and applications of radio isotopic techniques and radiation dosimetry for diverse biological applications.

### YEAR/ SEM: I/I – MDKAB- Biostatistics

NO.	COURSE OUTCOME
C105.1	To demonstrate basic analytical techniques to generate results
C105.2	To interpret results of commonly used statistical analyses in written summaries
C105.3	To explain statistical reasoning skills accurately and contextually
C105.4	To apply statistical knowledge to design and conduct research studies



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<b>C105.5</b>	To operate statistical software packages to conduct research studies
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**YEAR/ SEM: I/I-PSSEA-Language and communication skill**

NO.	COURSE OUTCOME
<b>C106.1</b>	Develop effective verbal communication skills to express ideas clearly and persuasively in various contexts.
<b>C106.2</b>	Enhance active listening and comprehension abilities to better understand and respond to others' messages
<b>C106.3</b>	Demonstrate proficiency in written communication by composing clear and coherent documents, such as emails, reports, and presentations.
<b>C106.4</b>	Cultivate intercultural communication competence to interact sensitively and respectfully with diverse individuals and groups.
<b>C106.5</b>	Acquire critical thinking and problem-solving skills to analyze and resolve communication challenges in professional and personal settings.

**YEAR/ SEM: I/II —MDK2A- Microbiology**

NO.	COURSE OUTCOME
<b>C107.1</b>	To study about taxonomy, nomenclature and classification of microbes.
<b>C107.2</b>	To understand staining and sterilization and Characterization of microbes
<b>C107.3</b>	To have knowledge on characterization of eukaryotic cells and virus particle
<b>C107.4</b>	To know about parasites and protozoan studies in terms of medical microbiology.
<b>C107.5</b>	To understand role of microbes in industrial production

**YEAR/ SEM: I/II-MDK2B- Plant & Animal Biotechnology**

NO.	COURSE OUTCOME
<b>C108.1</b>	To complete basics of plant tissue culture and secondary metabolite production
<b>C108.2</b>	To study about gene transfer methods and plant engineering for development.



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<b>C108.3</b>	To understand hybridoma technology and vaccine technology for advance.
<b>C108.4</b>	To know about scaling up and preservation techniques in animal cell culture
<b>C108.5</b>	To demonstrate techniques in advancing animal cell culture and transgenic animals

### YEAR/ SEM: I/II –MDK2C- Genetic Engineering

NO.	COURSE OUTCOME
<b>C109.1</b>	Demonstrate proficiency in gene cloning techniques and construction of gene libraries.
<b>C109.2</b>	Apply knowledge and skills in utilizing various vectors for effective cloning and expression of genetic material.
<b>C109.3</b>	Master the techniques of cloning in yeast and eukaryotic systems and applications for synthesizing specific RNA and cloning promoters and terminators.
<b>C109.4</b>	Develop expertise in nucleic acid hybridization, molecular probes, DNA sequencing techniques, and the diverse methodologies of DNA fingerprinting and sequencing methods.
<b>C109.5</b>	Acquire proficiency in advanced molecular techniques like site-directed mutagenesis, DNA microarrays, chromosome walking, and applications in various fields.

### YEAR/ SEM: I/II —MDKAD- Tissue Engineering

NO.	COURSE OUTCOME
<b>C110.1</b>	To illustrate basics of growth and morphogenesis and tissue
<b>C110.2</b>	To provide valuable knowledge about various types of bioreactors used to engineer tissues.
<b>C110.3</b>	To understand approaches in tissue engineering models and biomaterials of TE
<b>C110.4</b>	To convey all details of artificial organs and replacement devices
<b>C110.5</b>	To gain knowledge on structural tissue engineering related bone and dental detail configuration



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**YEAR/ SEM: I/II-MDKAE- Pharmaceutical Biotechnology**

NO.	COURSE OUTCOME
<b>C111.1</b>	To demonstrate the concepts and technologies of pharmaceutical and industrial applications
<b>C111.2</b>	To study about industrial development and production process for vaccines
<b>C111.3</b>	To understand the characterization and analytical aspects of biotech drug
<b>C111.4</b>	To gain knowledge on pharmaceutical and pharmacodynamics of biotech drugs.
<b>C111.5</b>	To understand gene therapy and pharmaceutical industry applications

**YEAR/ SEM: I/II – PSSEB-Spoken and presentation skills.**

NO.	COURSE OUTCOME
<b>C112.1</b>	Develop effective verbal communication techniques to deliver clear, engaging, and persuasive presentations in various settings.
<b>C112.2</b>	Enhance public speaking confidence and reduce speaking anxiety to deliver presentations with poise and self-assurance.
<b>C112.3</b>	Master the art of structuring presentations to ensure coherent and organized delivery of ideas and information.
<b>C112.4</b>	Acquire skills in using visual aids and technology to enhance the impact and effectiveness of presentations.
<b>C112.5</b>	Receive constructive feedback and self-assessment to continuously improve and refine spoken communication and presentation abilities.

**YEAR/ SEM: I/I- MDKII-Biochemistry/ Molecular Genetics/ Molecular Cell Biology**

NO.	COURSE OUTCOME
<b>C113.1</b>	Demonstrate a comprehensive understanding of fundamental biochemistry procedures, including their principles and applications.



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<b>C113.2</b>	Evaluate and apply various techniques for the estimation and quantification of biomolecules, demonstrating proficiency in their methodologies.
<b>C113.3</b>	To use established conventions for designating blood group antigens, genes, phenotypes, and genotypes.
<b>C113.4</b>	To impart the practical knowledge in mitosis & meiosis in plants & animals & students can explain the various phases of the cell cycle and the rules that govern them.
<b>C113.5</b>	By completing this practical, students can handle various cell & molecular techniques.

### YEAR/ SEM: I/II –MDK21-Microbiology/ Plant & Animal Biotechnology/ Genetic Engineering

NO.	COURSE OUTCOME
<b>C114.1</b>	Students will acquire and demonstrate proficiency in good laboratory practices in a microbiological laboratory and be able to explain the theoretical basis and practical skills of the tools/technologies commonly used to study this field.
<b>C114.2</b>	They will be able to pursue a wide range of careers, including biological and medical research in higher education institutions as well as careers in public and global health, scientific writing, environmental organizations, and food, pharmaceuticals and biotechnology industries.
<b>C114.3</b>	To acquire academic excellence in plant sciences to pursue higher studies, research and employability.
<b>C114.4</b>	To understand the techniques employed in genetic engineering have led to the production of medically important products.
<b>C114.5</b>	To illustrate the development of genetically modified organisms.

### YEAR/ SEM: II/III –MDK3A-Bioinformatics

NO.	COURSE OUTCOME
<b>C201.1</b>	To provide knowledge and awareness of the basic principles and concepts of biology, computer science and mathematics.
<b>C201.2</b>	To give introduction to the basics of sequence alignment and analysis.
<b>C201.3</b>	To demonstrate the principles and computational methods used to search and compare DNA, RNA and proteins, cast as biological
<b>C201.4</b>	To introduce applications of computer modeling and simulation of biological macro molecules



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<b>C201.5</b>	Students will comprehend the comprehensive process of identifying potential new medicines, encompassing the principles and methods involved in drug discovery.
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### YEAR/ SEM: II/III –MDK3B- Immunology

NO.	COURSE OUTCOME
<b>C202.1</b>	This course gives an overview on the immune system including organs, cells and receptors.
<b>C202.2</b>	Analyze the relationship between antigen characteristics, cellular interactions, and resulting immune responses in antigen presentation.
<b>C202.3</b>	Demonstrate comprehension of the cellular and molecular mechanisms underlying the human immune system.
<b>C202.4</b>	Students can gain the knowledge in cellular and molecular aspects governing immunological regulation and tolerance.
<b>C202.5</b>	Students can develop ideas into useful diagnostic procedures by synthesizing and applying immunological principles for diagnostic purposes.

### YEAR/ SEM: II/III –MDK3C-Bioprocess technology

NO.	COURSE OUTCOME
<b>C203.1</b>	The course develops knowledge about fermentation process and its application.
<b>C203.2</b>	To learn about types of fermentor and reactors with its engineering.
<b>C203.3</b>	To gain knowledge about biological separation of products from bioreactors.
<b>C203.4</b>	To elucidate about all the downstream processing.
<b>C203.5</b>	To give more information about formulation of products and its storage.

### YEAR/ SEM: II/III –MDKAH-NANOBIOTECHNOLOGY

NO.	COURSE OUTCOME
<b>C204.1</b>	Comprehend the foundational principles underlying Nanotechnology.
<b>C204.2</b>	Gain insight into the utilization of Nanoparticles for drug delivery purposes.
<b>C204.3</b>	Acquire knowledge and skills in fabricating nanomaterials specifically for bone tissue grafting applications.



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<b>C204.4</b>	Enrich various techniques involved in Nanofabrication processes.
<b>C204.5</b>	Appreciate and apply the diverse applications of Nanotechnology across different fields.

**YEAR/ SEM: II/III-MENBB- LIFESTYLE DISEASE PREVENTION**

NO.	COURSE OUTCOME
<b>C205.1</b>	To identify and describe lifestyle diseases including: drug and alcohol addiction
<b>C205.2</b>	To illustrate Type 2 diabetes, and cardiovascular disease
<b>C205.3</b>	To know differentiation between controllable risk factors and uncontrollable risk factors for lifestyle diseases
<b>C205.4</b>	To describe proactive behaviours to lessen the risks of developing a lifestyle disease
<b>C205.5</b>	To engage in to lessen their risk of developing cardiovascular disease

**YEAR/ SEM: II/III– PSSEC-Life and managerial skills**

NO.	COURSE OUTCOME
<b>C206.1</b>	Understanding your strengths, weaknesses, values, beliefs, and emotions is the foundation of personality enrichment.
<b>C206.2</b>	Engage in lifelong learning to broaden your knowledge, skills, and perspectives.
<b>C206.3</b>	Develop your ability to understand and manage your emotions as well as empathize with the emotions of others.
<b>C206.4</b>	Effective communication involves active listening, clear expression, and adapting your communication style to different situations and audiences.
<b>C206.5</b>	Building self-confidence involves recognizing your achievements, setting realistic goals, and focusing on your strengths

**YEAR/ SEM: II/III– PSSEQ-Internship**

NO.	COURSE OUTCOME
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<b>C207.1</b>	Assess your interests and skills within the biotech field. Determine if you're more inclined toward research, laboratory work, data analysis, or a different aspect of biotechnology.
<b>C207.2</b>	Make the most of your internship by actively engaging in assigned tasks, asking questions, seeking mentorship, and taking the initiative to learn.
<b>C207.3</b>	Research the organization thoroughly and understand its focus areas, projects, and recent developments.
<b>C207.4</b>	Research the various subfields within biotech, such as pharmaceuticals, medical devices, agricultural biotech, bioinformatics, and more.
<b>C207.5</b>	Identify companies, research institutions, academic labs, and startups that align with your interests.

### YEAR/ SEM: II/IV-MDK4A – RESEARCH METHODOLOGY

NO.	COURSE OUTCOME
<b>C208.1</b>	To discuss different methodologies and techniques used in research work.
<b>C208.2</b>	Considerably more in-depth knowledge of the major subject/field of study, including deeper insight into current research and development work.
<b>C208.3</b>	To know analysis of variance, or ANOVA, is a statistical method that separates observed variance data into different components to use for additional tests.
<b>C208.4</b>	To know about enter and edit data. Modify a worksheet and workbook. Work with cell references. Learn to use functions and formulas.
<b>C208.5</b>	To explain basic computer skills necessary for the conduct of research.

### YEAR/ SEM: II/IV-MDKAK– STEM CELL BIOLOGY

NO.	COURSE OUTCOME
<b>C209.1</b>	To have deeper understanding about Characterization and stem cell and its various division. regulation and inactivation.
<b>C209.2</b>	To understand stem cell niche of certain origin of living organism of prokaryotic and Eukaryotic origin.
<b>C209.3</b>	To elucidate various pathways and checkpoint of stem cells
<b>C209.4</b>	To know about chromosomal regulation and inactivation.



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<b>C209.5</b>	To understand therapeutic applications and ethics of stem cell.
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### YEAR/ SEM: II/IV-PSSSED-Computing skill

NO.	COURSE OUTCOME
<b>C210.1</b>	To includes fundamental skills such as using a keyboard and mouse, navigating through operating systems (such as Windows or macOS), and understanding file management.
<b>C210.2</b>	Proficiency in using email clients to send and receive messages, manage email folders, and attach files.
<b>C210.3</b>	Understanding spreadsheet software (e.g., Microsoft Excel, Google Sheets) to organize and analyze data, create charts, and perform calculations.
<b>C210.4</b>	Organizing and managing files and folders on computers, using proper naming conventions, and understanding different file formats.
<b>C210.5</b>	Understanding the importance of protecting personal information online and following best practices for maintaining privacy.

### YEAR/ SEM: II/IV-Project

NO.	COURSE OUTCOME
<b>C211.1</b>	Evaluate personal interests and aptitudes within biotechnology, discerning preferences for research, laboratory work, data analysis, or other facets, leading to a clearer career direction.
<b>C211.2</b>	Conduct comprehensive research on organizations, grasping their focus areas, ongoing projects, and recent advancements, fostering a deeper understanding of the operational landscape within biotechnology
<b>C211.3</b>	Explore and comprehend various subfields within biotechnology, including pharmaceuticals, medical devices, agricultural biotech, bioinformatics, among others, to broaden perspectives and gain insights into diverse career pathways.
<b>C211.4</b>	Identify and analyze potential avenues for career growth, including companies, research institutions, academic labs, and startups that align with individual



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	interests and objectives, facilitating informed decisions and networking opportunities within the biotech industry.
<b>C211.5</b>	Optimize research experiences by actively participating in assigned tasks, proactively seeking knowledge, leveraging mentorship opportunities, and acquiring practical skills relevant to the biotech industry.

### YEAR/ SEM: II/III –MDK31- Bioinformatics/ Immunology/ Bioprocess technology

NO.	COURSE OUTCOME
<b>C212.1</b>	Proficiency in utilizing bioinformatics tools for sequence retrieval and alignment, fostering a deeper understanding of genetic data analysis.
<b>C212.2</b>	Application of acquired bioinformatics skills for diverse scientific applications, demonstrating versatility in employing these tools.
<b>C212.3</b>	Proficient isolation, identification, and enumeration of immune cells, enhancing skills in cellular analysis and characterization.
<b>C212.4</b>	Mastery of immunodiagnostic techniques, enabling precise and effective identification of immune-related markers or substances.
<b>C212.5</b>	Comprehensive understanding of both upstream and downstream techniques in experimental workflows, facilitating a holistic comprehension of biological processes.