

PG DEPARTMENT OF BIOCHEMISTRY

PROGRAMME OUTCOME

PO 1: Critical Thinking and Analytical Reasoning

Capability to analyse, evaluate and interpret evidence, arguments, claims, beliefs on the basis of empirical evidence; reflect relevant implications to the reality; formulate logical arguments; critically evaluate practices, policies and theories to develop knowledge and understanding; able to envisage the reflective thought to the implication on the society.

PO 2: Scientific Reasoning and Problem Solving

Ability to analyse, discuss, interpret and draw conclusions from quantitative/qualitative data and experimental evidences; and critically evaluate ideas, evidence and experiences from an unprejudiced and reasoned perspective; capacity to extrapolate from what one has learned and apply their competencies to solve problems and contextualise into research and apply one's learning to real life situations.

PO 3: Multidisciplinary/Interdisciplinary/Transdisciplinary Approach

Acquire interdisciplinary /multidisciplinary/transdisciplinary knowledge base as a consequence of the learning they engage with their programme of study; develop a collaborative-multidisciplinary/interdisciplinary/transdisciplinary- approach for formulating constructive arguments and rational analysis for achieving common goals and objectives.

PO 4: Communication Skills

Ability to reflect and express thoughts and ideas effectively in verbal and nonverbal way; Communicate with others using appropriate channel; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner and articulate in a specific context of communication.

PO 5: Leadership Skills

Ability to work effectively and lead respectfully with diverse teams; setting direction, formulating a goal, building a team who can help achieve the goal, motivating and inspiring team members to engage with that goal, and using management skills to guide people to the right destination, in a smooth and efficient way.

PO 6: Social Consciousness and Responsibility

Ability to contemplate of the impact of research findings on conventional practices, and a clear understanding of responsibility towards societal needs and reaching the targets for attaining inclusive and sustainable development.

PO 7: Equity, Inclusiveness and Sustainability

Appreciate equity, inclusiveness and sustainability and diversity; acquire ethical and moral reasoning and values of unity, secularism and national integration to enable to act as dignified citizens; able to understand and appreciate diversity, managing diversity and use of an inclusive approach to the extent possible.

PO 8: Moral and Ethical Reasoning

Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work and living as a dignified person in the society.

PO 9: Networking and Collaboration

Acquire skills to be able to collaborate and network with scholars in an educational institution, professional organisations, research organisations and individuals in India and abroad.

PROGRAMME SPECIFIC OUTCOME

PSO 1: Advanced Knowledge:

Graduates acquire a deep and comprehensive understanding of key concepts, theories, and principles in biochemistry, including molecular biology, enzymology, metabolism, cell signaling, and structural biology.

PSO 2: Research Skills:

MSc Biochemistry programs often emphasize the development of research skills. Graduates become proficient in designing and conducting experiments, analyzing data, and interpreting results.

PSO 3: Critical Thinking:

The program aims to cultivate critical thinking skills, enabling students to evaluate scientific literature, synthesize information, and make informed decisions in the field of biochemistry.

PSO 4: Laboratory Techniques:

Graduates have hands-on experience with a variety of laboratory techniques commonly used in biochemistry research, such as DNA sequencing, protein purification, and spectroscopy as well as imparts knowledge on the various biochemical tests that are used in laboratories devoted to healthcare.

PSO 5: Ethical Considerations:

Understanding the ethical implications of biochemistry research is essential. Graduates become aware of ethical guidelines and considerations in conducting experiments and handling data.

PSO 6: Problem Solving and Critical Analysis:

Graduates are made skilled in identifying research problems, proposing hypotheses, and developing strategies to address scientific questions or challenges in biochemistry. Graduates would be adept at reviewing and critically analysing scientific literature relevant to their field, staying informed about the latest advancements and contributing to the ongoing discourse in biochemistry.

PSO 7: Application of Knowledge:

The program should equip graduates with the ability to apply their biochemistry knowledge

in various contexts, including industry, academia, healthcare, or research and development.

COURSE OUTCOME

Course Code	Title of the Course	Course Outcome
FIRST SEMESTER		
BC010101	Biomolecules and structural Biology	<ul style="list-style-type: none">• Understand the basic concepts of biomolecules.• Analyse the structure- function relationship of biomolecules.• Know about the interactions between macromolecules
BC010102	Analytical Biochemistry and Bioinformatics	<ul style="list-style-type: none">• Understand the biochemical techniques used in research and industry.• Handle various instruments used in laboratories.• Demonstrate the insilico tools for biological data analysis.• Understand the significance and precautions to be taken during radioactivity experiments.
BC010103	Cell Biology and Genetics	<ul style="list-style-type: none">• Understand the various organelles of a cell and its functions.• Know about the different cellular receptors and signal transduction pathways.• Understand the etiology of cancer.• Aware of the genetic aspects of inheritance.
BC010104	Human Physiology and Biostatistics	<ul style="list-style-type: none">• Understand the tissues and organs of the human body.• Demonstrate the ability to differentiate physiology from the cellular and molecular level to the organ system.• Evaluate laboratory experiments in physiology.• Appraise the role of statistics in research.
BC010105	Laboratory course I	<ul style="list-style-type: none">• Develop practical skill among students to identify and quantify various biomolecules and metabolites in the given samples by following standard protocols.• Apply theoretical knowledge gained in lectures to practical situations, deepening the understanding of physiological concepts through hands-on experience.
SECOND SEMESTER		
BC010201	Metabolism and Bioenergetics	<ul style="list-style-type: none">• Introducing the major pathways of intermediary metabolism and discuss their energetics, physiological adaptation, regulation, localization and cellular compartmentalization.• Correlate the metabolic activity of tissues and organs with their function.• Discuss how derangements in metabolism leads to

BC010202	Molecular Biology and Genetic engineering	<p>diseases.</p> <ul style="list-style-type: none"> • Understand the molecular mechanisms underlying the transmission of genetic information. • Realise the different molecular tools and strategies in practice in genetic engineering. • Appreciate the applications of rDNA technology in various fields.
BC010203	Immunology	<ul style="list-style-type: none"> • Conceptualize cellular and molecular basis of the immune system. • Understand how the innate and adaptive immune responses coordinate to fight against invading pathogens. • Appreciate the structure and functions of MHC molecules and Immunoglobulins. • Understand the complement system, its activation and biological consequences of complement activation. • Differentiate between the types of antigen-antibody interaction and the different immunological assays based on the interaction. • Understand about the vaccines in use and the strategies to develop vaccines of the future. • Understand and identify the genetic defects that lead to immunodeficiency diseases and their treatment as well as the current status of gene therapy.
BC010204	General Microbiology	<ul style="list-style-type: none"> • Understand the diversity of microbial world and their interactions with the environment. • Know about the genetic materials and different genetic mechanisms in bacteria and their role in the transmission of characters. • Emphasize the importance of sterilization and disinfection and the methods used in a microbiology laboratory and premises • Categorise microorganisms based on their characteristics.
BC010205	Laboratory course II	<ul style="list-style-type: none"> • Develop proficiency in aseptic techniques, isolation, and cultivation of microorganisms. • Gain skills in using microscopy, different methods of sterilization, techniques for the identification and characterization of bacteria, viruses, and fungi. • Prepare and understand the various types of media used for microbial cultivation and perform microbial assays to determine factors such as antibiotic sensitivity and resistance. • Learn and perform various immunoassays and

understand and demonstrate the principles of antigen-antibody interactions.

- Master techniques for isolating DNA from various sources.
- Understand and perform gel electrophoresis for the separation of nucleic acids.

THIRD SEMESTER

BC010301 Enzymology

- Describe structure, functions and mechanism of action of enzymes
- Classify enzymes based on the reactions catalysed.
- Understand kinetics, inhibition and regulation of enzyme catalysed reactions.

BC010302 Plant Biochemistry

- Evaluate the phytoconstituents and their application in drug development.
- Know about phytohormones and its applications in agriculture.
- Understand the applications of plant lectins in the purification of glycans.
- Know how plants survive stress conditions and climate change.

BC010303 Molecular Endocrinology

- Understand the different cellular signals and regulation of metabolic activities.
- Understand the mechanism of action of hormones and different types of receptors.
- Analyze cellular mechanism of hormonal control in diseased condition.

BC800301 Neurobiochemistry

- Understand neurons and their functions.
- Understand the role of neurotransmitters in health and disease.
- Create an in-depth knowledge of neurodegenerative diseases.

BC010304 Laboratory course III

- Gain hands-on experience in protein isolation, purification, and quantification techniques.
- Perform enzyme assays and understand and apply principles of enzyme kinetics.
- Develop proficiency in the extraction and homogenization of plant tissues for biochemical analysis.
- Analyze plant carbohydrates, lipids using techniques such as colorimetry and enzymatic assays.

FOURTH SEMESTER

BC010401 Clinical Biochemistry

- Understand the inborn errors of metabolism, indepth.
- Analyse, evaluate and interpret the common result patterns in routine clinical biochemistry.
- Understand the importance of quality control in clinical laboratories.
- Evaluate the various molecular markers in the diagnosis of diseases.

BC800402

	Nutritional Biochemistry	<ul style="list-style-type: none"> • Understand the concept of ‘nutrition’ and the important nutrients. • Describe the causes symptoms and management of lifestyle diseases.
BC800403	Plant and Animal Cell Culture	<ul style="list-style-type: none"> • Understand the basics of Plant and animal cell culture. • Describe sources, selection, potential manipulations and challenges of using stem cells for tissue engineering. • Identify the key challenges in gene editing technology.
BC010402	Laboratory course IV	<ul style="list-style-type: none"> • Perform diagnostic tests commonly used in clinical biochemistry, including biochemical tests for blood glucose, lipid profiles, liver function, kidney function, and electrolyte balance. • Gain proficiency in the use of instrumentation for biochemical analysis. • Identify and analyze biomarkers associated with specific diseases and conditions.
BC010403	Project	<ul style="list-style-type: none"> • Describe a relevant area of career development, career coaching, coaching or work-related learning studies. • Gain proficiency in using advanced laboratory techniques and equipment relevant to biochemistry research, cultivate critical thinking skills to interpret experimental results, identify patterns, and address scientific questions or problems within the context of biochemistry. • Develop strong scientific writing skills to document research methods, results, and conclusions in the form of a thesis or research paper. • Communicate research findings effectively through oral presentations, poster presentations, and potentially through publications in scientific journals. • Collaborate with research advisors, lab colleagues, and other stakeholders involved in the project, fostering effective teamwork. • Foster innovation and creativity in designing experiments, interpreting results, and proposing novel approaches to biochemistry research questions.
BC010404	Viva Voce	<ul style="list-style-type: none"> • Evaluate the depth and breadth of the student's knowledge in biochemistry, including theoretical concepts, experimental techniques, and current advancements in the field. • Assess the student's ability to integrate knowledge from various biochemistry sub-disciplines and apply it to their specific research area. • To enable the students to attend placements and be better performers in their future.

