ख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)
Khwaja Moinuddin Chishti Language University, Lucknow, U.P. (India)
U.P. STATE GOVERNMENT UNIVERSITY,
(Recognised Under Section 2(f) & 12(B) of the UGC Act, 1956 & B.Tech. Approved by (AICTE)

FACULTY OF ENGINEERING & TECHNOLOGY

KHWAJA MOINUDDIN CHISHTI LANGUAGE UNIVERSITY, LUCKNOW, UTTAR PRADESH

B.TECH. BIOTECHNOLOGY

Curriculum Structure

FIRST YEAR
(I & II Semesters)

SEMESTER- I

Subject – Introduction to Biotechnology - I

Course Outcome (CO): -	
CO 1:	Understand and apply biotechnology concepts and their real-world applications across various industries.
CO 2:	Explain cellular structures and functions of prokaryotic and eukaryotic cells, including plant and animal cells.
CO 3:	Analyze biochemical molecules, their structures, functions, and the role of enzymes in metabolic processes.
CO 4:	Describe molecular biology principles, including DNA/RNA structures, gene functions, and genetic engineering techniques.

Course Content:

Unit I

Overview of Biotechnology: Definition, Scope and Applications of Biotechnology.

Unit II

Fundamentals of Biology: Hierarchy of living organisms, Concept of cell; Cellular architecture of prokaryotic & eukaryotic cells, plant cells and animal cells, structure and function of plasma membrane, cell organelles and their function.

Unit III

Basics of Biochemistry: Basic chemical constituents of living body, biomolecules, types, structure and function of macromolecules, general characteristics and classification of enzymes.

Unit IV

Fundamentals of Molecular Biology: Nucleic Acids as genetic material, genes, types of DNA and RNA, their structure and function, Central Dogma of Molecular Biology, Concepts of genetic engineering.

Unit V

Basic Techniques: Principles, Methods and Types of Electrophoresis and Centrifugation, Roles of Staining, Chromatography, Autoradiography, microscopy in cellular studies.

Text Books / References:

1. Concepts of Biotechnology by D. Balasubramanian, C.F.A. Bryce, K. Jayaraman et al., Universities Press (2004)
2. Biotechnology: Expending Horizons by B. D. Singh, Kalyani Publisher (2015).

Practical

1. Introduction to Glassware / Equipment & pipetting Method.
2. Preparation of Buffer Solutions.
3. Standardization of pH meter.
4. General Tests of carbohydrates, Proteins / Lipids.
5. Enzymatic Activity on Starch.
6. Estimation of ketone bodies, bile salts / bile pigments.
7. Quantitative Estimation of Biomolecules (Carbohydrates / Proteins / DNA).

SEMESTER- II

Subject – Introduction to Biotechnology - II

Course Outcome (CO): -	
CO 1:	Identify and explain the structure, function, and diversity of prokaryotic and eukaryotic cells.
CO 2:	Discuss the history, applications, and roles of microorganisms in industrial and pharmaceutical processes.
CO 3:	Understand and analyze metabolic pathways, including carbohydrate, lipid, and protein metabolism, and their roles in energy production.
CO 4:	Explain cellular respiration processes, including glycolysis, Kreb's cycle, and ATP synthesis, and their integration with metabolic pathways.

Course Content:

Unit I

Structure and Function of Prokaryotic and Eukaryotic Cells: Size, Shape, and arrangement of bacterial cells, their structure and function.

Unit II

History and Applications of microorganisms: Types of microbes, Basic concept of domain bacteria, proteobacteria, non-proteobacteria Gram Negative and Gram Positive, lichens, algae, protozoa, helmninthes, viral structures, viral multiplication, role of microorganisms in the production of industrial chemicals and pharmaceuticals.

Unit III

Metabolic reactions: Carbohydrate metabolism and energy production, Lipid & protein catabolism, Energy production mechanism, metabolic diversity & pathways of energy use, integration of metabolism.

Unit IV

Source and Utilization of energy: Structure of mitochondria, cellular respiration, factors affecting respiration, linkage of carbohydrate metabolism to other metabolic compounds, Glycolysis, Acetyl Co-A formation, Kreb's cycle, Electron Transport system and Oxidative Phosphorylation, ATP synthesis.

Unit V

Basic Concepts of Immunology and Diseases: Immunity, Types and Function of Immune Cells, Vaccines, Sexually Transmitted Diseases, Cancer, AIDS and Diabetes mellitus.

Text Books / References:

1. Biochemistry by U. Satyanarayana and U. Chakrapani, Books & Allied, Elsevier India (2017).
2. Microbiology by M. J. Pelczar, E.C.S. Chan and N.R. Kreig, McGraw Hill (2005).

Practical

1. Identification of structure of prokaryotic and eukaryotic cells.
2. Identification of bacterial morphology.
3. Analysis of metabolic pathways using open-source server.
4. Gram staining of bacterial samples.
5. Blood group testing.