

Minor - syllabus - Effective from
2026-27

Subject: Biotechnology (Minor Elective)

Course Title: Basic Biotechnology

Course Code: B100203T

Credits 06 - Semester - II

Total Lectures: 60 (18 Lectures/Unit)

Maximum marks: 75+25

Unit	Topic
I	Introduction to Biotechnology 1. Definition and concept of biotechnology 2. Historical development of biotechnology 3. Traditional biotechnology (fermentation, selective breeding) 4. Modern biotechnology and its features 5. Interdisciplinary nature of biotechnology 6. Scope and applications of biotechnology 7. Ethical, legal, and social issues in biotechnology 8. Role of biotechnology in sustainable development
II	Cell Biology and Biomolecules 1. Cell theory and classification of cells 2. Prokaryotic and eukaryotic cell structure 3. Structure and functions of cell organelles 4. Cell membrane structure and transport mechanisms 5. Biomolecules: carbohydrates, lipids, proteins, and nucleic acids 6. Enzymes: nature, classification, and specificity 7. Factors affecting enzyme activity 8. Importance of enzymes in biotechnology
III	Genetics and Molecular Biology 1. Introduction to genetics and heredity 2. Mendel's experiments and laws of inheritance 3. Structure of DNA and RNA 4. DNA replication 5. Transcription and translation 6. Genetic code and its properties 7. Regulation (Basic Concept)


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IV	Microbiology technology 1. Introduction to microorganisms 2. Classification of microorganisms 3. Structure of bacteria and viruses 4. Beneficial and harmful microorganisms 5. Sterilization techniques and aseptic handling 6. Introduction to different culture media 7. Microbial culture techniques
V	Techniques in Biotechnology 1. Isolation of DNA from plant and microbial sources 2. Gel electrophoresis (principle and applications) 3. Polymerase chain reaction (PCR): basic concept 4. Introduction to Chromatography 5. Introduction to Microscopy 6. Introduction to X Ray Diffraction 7. Spectroscopy (UV-Visible)

Suggested Readings:

- Lehninger Principles of Biochemistry by David L. Nelson & Michael M. Cox
- Biochemistry by Jeremy M. Berg, John L. Tymoczko, and Lubert Stryer
- Prescott's Microbiology by Joanne Willey, Linda Sherwood, Christopher Woolverton
- Manual of Industrial Microbiology and Biotechnology by Richard H. Baltz, Julian E. Davies & Arnold L. Demain
- Principles and Techniques of Biochemistry and Molecular Biology by Keith Wilson and John Walker
- Dubey RC. (2014) A Textbook of Biotechnology(5th edition) S Chand and Company Ltd.
- Satyanarayana U (2020). Biotechnology. Books and Allied (P) Ltd
- Karp, G. Cell and Molecular Biology. Concepts and experiments. John Harris, D., Wiley & sons, New York

Suggested Continuous Internal Evaluation (CIE) methods

Total marks: 25

10 marks for Test

10 marks for presentation

Assignment 05 marks for Class interactions

Note: The marks allotted for continuous internal assessment (25 marks) will be evaluated on the basis of class test, presentation and interaction

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Course Title: Applied Biotechnology

Course Code: B100403T

Credits 06

Semester - III

Total Lectures: 60 (18 Lectures/Unit)

Maximum marks: 75+25

Unit	Topic
I	Recombinant DNA Technology 1. Introduction to genetic engineering 2. Tools of recombinant DNA technology 3. Restriction enzymes and their types 4. Introduction to Cloning vectors 5. Role of DNA Ligase 6. Steps in gene cloning 7. Selection and screening of recombinants 8. Applications of recombinant DNA technology
II	Metabolism 1. Carbohydrates- Gluconeogenesis, Glycolysis, TCA, 2. Fatty acids-oxidation of Saturated, Unsaturated fatty acids 3. Oxidation of amino acids and urea cycle
III	Plant and Animal Biotechnology 1. Basic introduction to Plant tissue culture 2. Genetically modified (GM) crops 3. Methods of plant genetic transformation 4. Applications of plant biotechnology in agriculture 5. Basic introduction to Animal cell culture techniques 6. Transgenic animals and their application 7. Ethical issues in plant and animal biotechnology
IV	Application of Biotechnology 1. Bioremediation 2. Sewage and solid waste treatment 3. Vaccines production using Biotechnology 4. Alcohol and organic acid and its production 5. Gene therapy 6. Production of fermented food

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	7. Single Cell Protein
V	Bioinformatics and Future Prospects of Biotechnology 1. Introduction to bioinformatics 2. Introduction to biological databases 3. Introduction to Sequences, alignments (BLAST) and multiple sequence alignment (CLUSTAL W) 4. Role of computers in biological research 5. Applications of bioinformatics in biotechnology

Suggested Readings:

- Glick, B. R., & Pasternak, J. J. (2010). Molecular Biotechnology: Principles and Applications of Recombinant DNA.
- Washington, D.C.: ASM Press. 8. Brown, T. A. (2006). Gene Cloning and DNA Analysis: an Introduction. Oxford: Blackwell Pub. Industrial Microbiology by L.E. Casida
- Plant Biotechnology by B.D. Singh & A. Choudhury
- Plant Tissue Culture: Theory and Practice by S.S. Bhojwani & M.K. Razdan
- Culture of Animal Cells: A Manual of Basic Technique and Specialized Applications by R. Ian Freshney
- Biotechnology of Animal Reproduction by M. M. Mukherjee
- Ghosh Z. Mallick B. (2008). Bioinformatics: Principles and Applications. OUP India

Suggested Continuous Internal Evaluation (CIE) methods

Total marks: 25

10 marks for Test

10 marks for presentation

Assignment 05 marks for Class interactions

Note: The marks allotted for continuous internal assessment (25 marks) will be evaluated on the basis of class test, presentation and interaction

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