

M.Tech. in Biotechnology

University-Style Syllabus (2 Years / 4 Semesters)

Programme Duration: 2 Years (4 Semesters)

Programme Level: Postgraduate (M.Tech.)

Semester I

Subject Code	Subject	L	T	P	Credits
MBT101	Advanced Cell and Molecular Biology	3	1	0	4
MBT102	Biochemistry and Enzyme Technology	3	1	0	4
MBT103	Genetic Engineering	3	0	2	4
MBT104	Research Methodology and Biostatistics	2	0	2	3
MBT105	Biotechnology Laboratory – I	0	0	4	2
MBT106	Seminar – I	0	0	2	1

Total Credits: 18

Semester II

Subject Code	Subject	L	T	P	Credits
MBT201	Bioinformatics	3	1	0	4
MBT202	Bioprocess Engineering	3	0	2	4
MBT203	Immunology and Immunotechnology	3	0	2	4

Subject Code	Subject	L	T	P	Credits
MBT204	Industrial Biotechnology	3	0	2	4
MBT205	Biotechnology Laboratory – II	0	0	4	2
MBT206	Seminar – II	0	0	2	1

Total Credits: 19

Semester III

Subject Code	Subject	L	T	P	Credits
MBT301	Genomics and Proteomics	3	1	0	4
MBT302	Environmental Biotechnology	3	0	2	4
MBT303	Pharmaceutical Biotechnology	3	0	2	4
MBT304	Elective – I	3	0	0	3
MBT305	Dissertation Phase – I	0	0	12	8

Elective – I (Choose One)

- MBT311 – Agricultural Biotechnology
- MBT312 – Medical Biotechnology
- MBT313 – Nano biotechnology
- MBT314 – Food Biotechnology
- MBT315 – Stem Cell Technology

Total Credits: 23

Semester IV

Subject Code	Subject	L	T	P	Credits
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Subject Code	Subject	L	T	P	Credits
MBT401	Dissertation Phase – II	0	0	24	16
MBT402	Viva Voce	0	0	2	2
MBT403	Industrial Internship	0	0	8	4

Total Credits: 22

Laboratory Courses

Code	Laboratory
MBT105	Biotechnology Laboratory – I
MBT205	Biotechnology Laboratory – II
MBT305	Research and Dissertation Work
MBT401	Dissertation and Project Implementation

Detailed Unit-Wise Syllabus

MBT101 – Advanced Cell and Molecular Biology

Unit I

- Cell Structure and Function
- Cell Cycle and Cell Signaling

Unit II

- DNA Replication
- Transcription and Translation

Unit III

- Gene Regulation
- Recombinant DNA Technology

Unit IV

- Molecular Genetics
- Epigenetics

Unit V

- Applications in Modern Biotechnology
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MBT102 – Biochemistry and Enzyme Technology

Unit I

- Biomolecules and Metabolism

Unit II

- Enzyme Kinetics
- Enzyme Inhibition

Unit III

- Enzyme Immobilization

Unit IV

- Industrial Applications of Enzymes

Unit V

- Biocatalysis
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MBT201 – Bioinformatics

- Biological Databases
- Sequence Alignment
- Genome Analysis
- Protein Structure Prediction
- Computational Biology Tools

MBT202 – Bioprocess Engineering

- Bioreactor Design
 - Fermentation Technology
 - Downstream Processing
 - Process Control
 - Industrial Applications
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Practical List

Students should perform practical exercises such as:

- DNA Isolation and Purification
 - PCR and Gel Electrophoresis
 - Gene Cloning Techniques
 - Enzyme Assays
 - Cell Culture Techniques
 - Protein Purification
 - Bioinformatics Analysis using BLAST
 - Fermentation Experiments
 - Bioreactor Operation
 - Immunological Techniques (ELISA)
 - Genomics and Proteomics Analysis
 - Industry-Oriented Biotechnology Project
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Examination Scheme

Component	Marks
End Semester Examination	70
Internal Assessment	30
Practical Examination	100
Seminar	100

Component	Marks
Dissertation	300
Viva Voce	100

Recommended Reference Books

- Molecular Biology of the Cell
- Lehninger Principles of Biochemistry
- Bioprocess Engineering Principles
- Molecular Biotechnology
- Bioinformatics: Sequence and Genome Analysis

Programme Outcomes

Upon successful completion of the programme, graduates will be able to:

1. Apply advanced molecular biology and genetic engineering techniques to biotechnology applications.
2. Design and optimize bioprocesses for industrial, pharmaceutical, agricultural, and environmental sectors.
3. Analyze biological data using bioinformatics and computational tools.
4. Develop innovative biotechnology products and processes with ethical and regulatory awareness.
5. Conduct independent research in biotechnology and allied interdisciplinary fields.
6. Apply laboratory and analytical techniques for genomics, proteomics, and molecular diagnostics.
7. Lead biotechnology research, development, and industrial projects.
8. Pursue doctoral research or advanced professional careers in Biotechnology, Life Sciences, Pharmaceuticals, Healthcare, and Bioengineering.