

B.Tech. Biotechnology

B.Tech. Biotechnology Curriculum

1st Year 1st Semester

| 3-week Orientation Programme | | | | | | | | |
|------------------------------|-------------|---------------|--|--------------------|---|---|-------|---------------|
| A. THEORY | | | | | | | | |
| Sl No | Course Code | Field | Course Title | Contact Hours/Week | | | | Credit Points |
| | | | | L | T | P | Total | |
| 1 | CHM1001 | Basic Science | Chemistry I | 3 | 0 | 0 | 3 | 3 |
| 2 | MTH1101 | Basic Science | Mathematics I | 3 | 1 | 0 | 4 | 4 |
| 3 | CSE1001 | Engg. Science | Programming for Problem Solving | 4 | 0 | 0 | 4 | 4 |
| 4 | ELE1001 | Engg. Science | Basic Electrical Engineering | 3 | 1 | 0 | 4 | 4 |
| 5 | HUM 1001 | Humanities | English for Technical Writing | 2 | 0 | 0 | 2 | 2 |
| Total of Theory | | | | 15 | 2 | 0 | 17 | 17 |
| B. PRACTICAL/ LABORATORY | | | | | | | | |
| 1 | CHM 1051 | Basic Science | Chemistry I Laboratory | 0 | 0 | 2 | 2 | 1 |
| 2 | CSE1051 | Engg. Science | Programming for Problem Solving Laboratory | 0 | 0 | 3 | 3 | 1.5 |
| 3 | ELE1051 | Engg. Science | Basic Electrical Engineering Laboratory | 0 | 0 | 2 | 2 | 1 |
| 4 | HUM1051 | Humanities | English for Technical Writing Laboratory | 0 | 0 | 2 | 2 | 1 |
| Total of Practical | | | | 0 | 0 | 9 | 9 | 4.5 |
| Total of Semester | | | | 15 | 2 | 9 | 26 | 21.5 |

B.Tech. Biotechnology

1st Year 2nd Semester

| A. THEORY | | | | | | | | |
|---------------------------------|----------------|---------------|--|--------------------|---|----|-----------|---------------|
| Sl No | Course Code | Field | Course Title | Contact Hours/Week | | | | Credit Points |
| | | | | L | T | P | Total | |
| 1 | PHY1001 | Basic Science | Physics I | 3 | 0 | 0 | 3 | 3 |
| 2 | MTH1201 | Basic Science | Mathematics II | 3 | 1 | 0 | 4 | 4 |
| 3 | ECE1001 | Engg. Science | Introduction to Electronic Devices and Circuits | 3 | 0 | 0 | 3 | 3 |
| 4 | HUM1002 | Humanities | Universal Human Values and Professional Ethics | 2 | 1 | 0 | 3 | 3 |
| Total of Theory | | | | 11 | 2 | 0 | 13 | 13 |
| B. PRACTICAL/ LABORATORY | | | | | | | | |
| 1 | PHY1051 | Basic Science | Physics I Laboratory | 0 | 0 | 2 | 2 | 1 |
| 2 | ECE1051 | Engg. Science | Introduction to Electronic Devices and Circuits Laboratory | 0 | 0 | 2 | 2 | 1 |
| 3 | MEC1051 | Engg. Science | Workshop/ Manufacturing Practices | 1 | 0 | 3 | 4 | 2.5 |
| 4 | MEC1052 | Engg. Science | Engineering Graphics & Design | 1 | 0 | 3 | 4 | 2.5 |
| Total of Practical | | | | 2 | 0 | 10 | 12 | 7 |
| Total of Semester | | | | 13 | 3 | 10 | 25 | 20 |

B.Tech. Biotechnology

2nd Year 1st Semester

| A. THEORY | | | | | | | | |
|---------------------------------|----------------|---------------|------------------------------------|--------------------|----------|----------|-----------|---------------|
| Sl No | Course Code | Field | Course Title | Contact Hours/Week | | | | Credit Points |
| | | | | L | T | P | Total | |
| 1 | EVS2016 | Audit Course | Environmental Sciences | 2 | 0 | 0 | 2 | 0 |
| 2 | BTC2101 | Prof. Core | Chemistry of Biomolecules | 3 | 0 | 0 | 3 | 3 |
| 3 | BTC2102 | Prof. Core | Thermodynamics & Kinetics | 3 | 0 | 0 | 3 | 3 |
| 4 | BTC2103 | Biol. Science | Biochemistry | 3 | 0 | 0 | 3 | 3 |
| 5 | BTC2104 | Biol. Science | Microbiology | 3 | 0 | 0 | 3 | 3 |
| 6 | MTH2101 | Basic Science | Mathematical & Statistical Methods | 3 | 0 | 0 | 3 | 3 |
| 7 | CSE2005 | Engg. Science | Data Structure | 3 | 0 | 0 | 3 | 3 |
| Total of Theory | | | | 20 | 0 | 0 | 20 | 18 |
| B. PRACTICAL/ LABORATORY | | | | | | | | |
| 1 | BTC2151 | Prof. Core | Biomolecular Chemistry Lab | 0 | 0 | 2 | 2 | 1 |
| 2 | BTC2153 | Biol. Science | Biochemistry Lab | 0 | 0 | 2 | 2 | 1 |
| 3 | BTC2154 | Biol. Science | Microbiology Lab | 0 | 0 | 3 | 3 | 1.5 |
| 4 | CSE2055 | Engg Science | Data Structure Lab | 0 | 0 | 2 | 2 | 1 |
| Total of Practical | | | | 0 | 0 | 9 | 9 | 4.5 |
| C. SESSIONAL | | | | | | | | |
| 1. | BTC2191 | Engg. Science | Idea Lab and Design Thinking | 0 | 0 | 2 | 2 | 1 |
| Total of Sessional | | | | 0 | 0 | 2 | 2 | 1 |
| Total of Semester | | | | 20 | 0 | 9 | 31 | 23.5 |

B.Tech. Biotechnology

2nd Year 2nd Semester

| A. THEORY | | | | | | | | |
|---------------------------------|----------------|------------------|---|--------------------|----------|----------|-----------|---------------|
| Sl No | Course Code | Field | Course Title | Contact Hours/Week | | | | Credit Points |
| | | | | L | T | P | Total | |
| 1 | BTC2201 | Prof. Core | Transfer Operation-I | 3 | 0 | 0 | 3 | 3 |
| 2 | BTC2202 | Prof. Core | Industrial Microbiology & Enzyme Technology | 3 | 0 | 0 | 3 | 3 |
| 3 | BTC2203 | Biol. Science | Molecular Biology | 3 | 0 | 0 | 3 | 3 |
| 4 | BTC2231 | Prof. Elective-1 | Bioethics & IPR | 3 | 0 | 0 | 3 | 3 |
| | BTC2232 | | Industrial Stoichiometry | | | | | |
| 5 | CSE3207 | Engg. Science | RDBMS Concept and Computer Networking | 3 | 0 | 0 | 3 | 3 |
| Total of Theory | | | | 18 | 0 | 0 | 18 | 15 |
| B. PRACTICAL/ LABORATORY | | | | | | | | |
| 1 | BTC2251 | Prof. Core | Transfer Operation-I Lab | 0 | 0 | 2 | 2 | 1 |
| 2 | BTC2252 | Prof. Core | Enzyme Technology & Fermentation Technology Lab | 0 | 0 | 2 | 2 | 1 |
| 3 | BTC2253 | Biol. Science | Molecular Biology Lab | 0 | 0 | 2 | 2 | 1 |
| 4 | CSE3257 | Engg Science | RDBMS Concept lab | 0 | 0 | 2 | 2 | 1 |
| Total of Practical | | | | 0 | 0 | 8 | 8 | 4 |
| Total of Semester | | | | 18 | 0 | 8 | 26 | 19 |

B.Tech. Biotechnology

3rd Year 1st Semester

| A. THEORY | | | | | | | | |
|--------------------------|-------------|---------------------------------|--|--------------------|---|----|-------|---------------|
| Sl No | Course Code | Field | Course Title | Contact Hours/Week | | | | Credit Points |
| | | | | L | T | P | Total | |
| 1 | INC3016 | Audit Course | Indian Constitution and Civil Society | 2 | 0 | 0 | 2 | 0 |
| 2 | BTC3101 | Biol. Science | Genetics | 3 | 0 | 0 | 3 | 3 |
| 3 | BTC3102 | Prof. Core | Bioinformatics | 3 | 0 | 0 | 3 | 3 |
| 4 | BTC3103 | Prof. Core | Recombinant DNA Technology | 3 | 0 | 0 | 3 | 3 |
| 5 | BTC3104 | Prof. Core | Transfer Operation-II | 3 | 0 | 0 | 3 | 3 |
| 6 | BTC3131 | Prof. Elective 2 | Food Biotechnology | 3 | 0 | 0 | 3 | 3 |
| | BTC3132 | | Environmental Biotechnology | | | | | |
| | BTC3133 | | Bioprocess& Process Instrumentation | | | | | |
| 7 | | Emerging Area / Open Elective 1 | Open Elective 1* | 3 | 0 | 0 | 3 | 3 |
| Total of Theory | | | | 20 | 0 | 0 | 20 | 18 |
| B. PRACTICAL/ LABORATORY | | | | | | | | |
| 1 | BTC3151 | Biol. Science | Genetics lab | 0 | 0 | 2 | 2 | 1 |
| 2 | BTC3152 | Prof. Core | Bioinformatics lab | 0 | 0 | 2 | 2 | 1 |
| 3 | BTC3153 | Prof. Core | Recombinant DNA Technology lab | 0 | 0 | 2 | 2 | 1 |
| 4 | BTC3154 | Prof. Core | Transfer Operation-II lab | 0 | 0 | 2 | 2 | 1 |
| 5 | BTC3161 | Prof. Elective 2 | Food Biotechnology Lab | 0 | 0 | 2 | 2 | 1 |
| | BTC3162 | | Environmental Biotechnology Lab | | | | | |
| | BTC3163 | | Bioprocess & Process Instrumentation Lab | | | | | |
| Total of Practical | | | | 0 | 0 | 10 | 10 | 5 |
| Total of Semester | | | | 20 | 0 | 10 | 30 | 23 |

* To be offered by Open Elective-1 by other departments

B.Tech. Biotechnology

3rd Year 2nd Semester

| A. THEORY | | | | | | | | |
|--------------------------|-------------|-----------------------------------|--|--------------------|---|---|-------|---------------|
| Sl No | Course Code | Field | Course Title | Contact Hours/Week | | | | Credit Points |
| | | | | L | T | P | Total | |
| 1 | HUM3201 | Humanities | Economics for Engineers | 3 | 0 | 0 | 3 | 3 |
| 2 | BTC3201 | Prof. Core | Immunology | 3 | 0 | 0 | 3 | 3 |
| 3 | BTC3202 | Prof. Core | Bioseparation Technology | 3 | 0 | 0 | 3 | 3 |
| 4 | BTC3203 | Prof. Core | Plant Biotechnology | 3 | 0 | 0 | 3 | 3 |
| 5 | BTC3231 | Prof. Elective 3 | Molecular Modelling and Drug Designing | 3 | 0 | 0 | 3 | 3 |
| | BTC3232 | | Biophysics of Macromolecules | | | | | |
| | BTC3233 | | Biosensors and Diagnostics | | | | | |
| 6 | BTC3221 | Emerging Area/ Open Elective 2 | Animal Cell Culture & Animal Biotechnology | 3 | 0 | 0 | 3 | 3 |
| | BTC3222 | | Basics of Nanotechnology | | | | | |
| Total of Theory | | | | 18 | 0 | 0 | 18 | 18 |
| B. PRACTICAL/ LABORATORY | | | | | | | | |
| 1 | BTC3251 | Prof. Core | Immunology lab | 0 | 0 | 2 | 2 | 1 |
| 2 | BTC3252 | Prof. Core | Bioseparation Technology Lab | 0 | 0 | 2 | 2 | 1 |
| 3 | BTC3253 | Prof. Core | Plant Tissue Culture Lab | 0 | 0 | 2 | 2 | 1 |
| Total of Practical | | | | 0 | 0 | 6 | 6 | 3 |
| C. SESSIONAL | | | | | | | | |
| 1. | BTC3291 | Seminar | Term paper & Seminar | 0 | 0 | 2 | 2 | 1 |
| Total of Sessional | | | | 0 | 0 | 2 | 2 | 1 |
| Total of Semester | | | | 18 | 0 | 8 | 26 | 22 |

Open Elective-2 papers offered by the Department of Biotechnology (for other departments)

| A. THEORY | | | | | | | | |
|-----------------|-------------|-----------------|-------------------------|--------------------|---|---|-------|---------------|
| Sl No | Course Code | Field | Course Title | Contact Hours/Week | | | | Credit Points |
| | | | | L | T | P | Total | |
| 1 | BTC3223 | Open Elective 2 | Introduction to Biology | 3 | 0 | 0 | 3 | 3 |
| 2 | BTC3224 | | Biopolymer | 3 | 0 | 0 | 3 | 3 |
| 3 | BTC3225 | | Computational Biology | 3 | 0 | 0 | 3 | 3 |
| Total of Theory | | | | | | | 3 | 3 |

B.Tech. Biotechnology

4th Year 1st Semester

| A. THEORY | | | | | | | | |
|--------------------------|-------------|-----------------------------------|--|--------------------|---|----|-------|---------------|
| Sl No | Course Code | Field | Course Title | Contact Hours/Week | | | | Credit Points |
| | | | | L | T | P | Total | |
| 1 | HUM4101 | Humanities | Principles of Management | 3 | 0 | 0 | 3 | 3 |
| 2 | BTC4201 | Prof. Core | Bioreactor Design and Analysis | 3 | 0 | 0 | 3 | 3 |
| 3 | BTC4131 | Prof. Elective 4 | Biomaterials | 3 | 0 | 0 | 3 | 3 |
| | BTC4132 | | Biofertilizers and Biopesticides | | | | | |
| | BTC4133 | | Post-harvest Technology | | | | | |
| | BTC4134 | | Medical & Pharmaceutical Biotechnology | | | | | |
| 4 | BTC4121 | Emerging Area/ Open Elective 3 | Proteomics and Protein Engineering | 3 | 0 | 0 | 3 | 3 |
| | BTC4122 | | Human Genomics | | | | | |
| | BTC4123 | | Biomedical Engineering | | | | | |
| 5 | | Emerging Area/ Open Elective 4 | Open Elective 4 | 3 | 0 | 0 | 3 | 3 |
| 6 | BTC4141 | Prof. Elective 5 | Renewable Energy Technology | 3 | 0 | 0 | 3 | 3 |
| | BTC4142 | | Tissue Engineering | | | | | |
| | BTC4143 | | Metabolic Engineering | | | | | |
| Total of Theory | | | | 18 | 0 | 0 | 18 | 18 |
| B. PRACTICAL/ LABORATORY | | | | | | | | |
| 1 | BTC4251 | Prof. Core | Bioreactor Design lab | 0 | 0 | 2 | 2 | 1 |
| Total of Practical | | | | 0 | 0 | 2 | 2 | 1 |
| B. SESSIONAL | | | | | | | | |
| 1 | BTC4191 | Internship | Industrial Training / Internship | 4 to 6 weeks | | | | 2 |
| 2 | BTC4195 | Project | Project 1 | 0 | 0 | 8 | 8 | 4 |
| Total of Sessional | | | | 0 | 0 | 8 | 8 | 6 |
| Total of Semester | | | | 18 | 0 | 10 | 28 | 25 |

Training in a suitable industry, R&D Organization, Reputed Laboratory or Research Institute for 4 to 6 weeks to be arranged during summer vacation.

Open Elective-4 papers offered by the Department of Biotechnology (for other departments)

| A. THEORY | | | | | | | | |
|-----------------|-------------|-----------------|---|--------------------|---|---|-------|---------------|
| Sl No | Course Code | Field | Course Title | Contact Hours/Week | | | | Credit Points |
| | | | | L | T | P | Total | |
| 1 | BTC4126 | Open Elective 4 | Biology for Engineers | 3 | 0 | 0 | 3 | 3 |
| 2 | BTC4127 | | Biosensor | 3 | 0 | 0 | 3 | 3 |
| 3 | BTC4128 | | Bioenergy and other Non-conventional Energy | 3 | 0 | 0 | 3 | 3 |
| Total of Theory | | | | | | | 3 | 3 |

B.Tech. Biotechnology

4th Year 2nd Semester

| A. SESSIONAL | | | | | | | | |
|--------------------|-------------|---------|-------------------------|--------------------|---|----|-------|---------------|
| Sl No | Course Code | Field | Course Title | Contact Hours/Week | | | | Credit Points |
| | | | | L | T | P | Total | |
| 1 | BTC4295 | Project | Project-II | 0 | 0 | 16 | 16 | 8 |
| 2 | BTC4297 | Viva | Comprehensive Viva Voce | - | - | - | - | 1 |
| Total of Sessional | | | | 0 | 0 | 16 | 16 | 9 |
| Total of Semester | | | | 0 | 0 | 16 | 16 | 9 |

Credit Point Summary for B.Tech from 2023-2024

| Sl. No. | Course Type | Credit |
|---------|--|------------|
| 1. | Humanities and Social Sciences including Management Courses | 12 |
| 2. | Basic Science Courses | 19 |
| 3. | Engineering Science Courses including Workshop, Drawing, Basics of Electrical / Mechanical / Computer etc. | 28.5 |
| 4. | Biological Science courses including laboratory | 16.5 |
| 5. | Professional Core Courses | 43 |
| 6. | Professional Elective Courses relevant to chosen Specialization / Branch | 16 |
| 7. | Open Subjects – Electives from other Technical and/or Emerging Subjects | 12 |
| 8. | Project Work, Seminar and Internship in industry or elsewhere | 16 |
| 9. | Audit Courses [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Traditional Knowledge] | Non-credit |
| | Total | 163 |