

B.Tech. Chemical & Biochemical Engineering

Department of Biotechnology & Bioengineering

School of Biosciences & Technology

Program Structure

| Code | Type of Course | Credits |
|------------|--|------------|
| HS | Humanities and Social Sciences including Management, Regulatory courses. | 10 |
| BSC | Basic Science courses. | 21 |
| ESC | Engineering Science Courses | 19 |
| BS | Biological Science courses including laboratory | 13 |
| PC | Professional Core Courses | 49 |
| PE | Professional Elective Courses | 16 |
| OS | Open Subjects - Electives from cross discipline technical and / or emerging subjects | 16 |
| PS | Project work, seminar and internship in industry or elsewhere | 16 |
| AU | Audit Courses (non-credit) | 0 |
| | Total | 160 |

| Sem | Course Name | L | T | P | C |
|-----|--|----|---|---|----|
| 1 | BASIC ELECTRICAL AND ELECTRONICS ENGG. | 3 | 0 | 1 | 4 |
| 1 | Engineering Chemistry | 3 | 0 | 1 | 4 |
| 1 | ELEMENTARY MATHS-1 | 3 | 0 | 0 | 3 |
| 1 | Engineering Design and Prototyping | 2 | 0 | 2 | 4 |
| 1 | Biology for Engineers | 3 | 0 | 0 | 3 |
| 1 | Physical Education & YOGA | 2 | 0 | 0 | 0 |
| | | 15 | 0 | 4 | 18 |

| Sem | Course Name | L | T | P | C |
|-----|--|----|---|---|----|
| 2 | ENVIRONMENTAL IMPACT ANALYSIS | 2 | 0 | 0 | 0 |
| 2 | ELEMENTARY MATHS- 2 | 3 | 0 | 0 | 3 |
| 2 | Engineering Physics | 3 | 0 | 1 | 4 |
| 2 | Introduction to Python Programming | 3 | 0 | 1 | 4 |
| 2 | COMMUNICATION SKILLS FOR ENGINEERS | 2 | 0 | 0 | 2 |
| 2 | Introduction to Biomedical Engineering | 3 | 0 | 0 | 3 |
| | | 16 | 0 | 2 | 16 |
| Sem | Course Name | L | T | P | C |
| 3 | CELL AND MOLECULAR BIOLOGY | 3 | 0 | 0 | 3 |
| 3 | Fluid Mechanics and Mechanical Operations | 3 | 0 | 1 | 4 |
| 3 | Industrial Microbiology | 3 | 0 | 1 | 4 |
| 3 | Mechanics of Materials | 3 | 0 | 0 | 3 |
| 3 | Innovation & ENTERPRENURSHIP | 1 | 0 | 0 | 1 |
| 3 | UNIVERSAL HUMAN VALUES | 1 | 0 | 0 | 1 |
| 3 | Professional Elective -1 | 3 | 0 | 0 | 3 |
| 3 | Open Elective -1 | 3 | 0 | 0 | 3 |
| | | 20 | 0 | 2 | 22 |
| Sem | Course Name | L | T | P | C |
| 4 | Analytical Techniques | 3 | 0 | 0 | 3 |
| 4 | Heat and MassTransfer | 3 | 0 | 0 | 3 |
| 4 | Biochemical Processes and Calculations | 3 | 0 | 1 | 4 |
| 4 | Organic Chemistry and catalysis | 3 | 0 | 1 | 4 |
| 4 | Constitution of India: Law and Engineering | 2 | 0 | 0 | 0 |
| 4 | Engineering Economics | 2 | 0 | 0 | 2 |
| 4 | Professional Elective -2 | 4 | 0 | 0 | 4 |
| 4 | Open Elective -2 | 4 | 0 | 0 | 4 |
| | | 24 | 0 | 2 | 24 |

| Sem | Course Name | L | T | P | C |
|-----|---|----|---|---|----|
| 5 | Enzyme Technology | 3 | 0 | 1 | 4 |
| 5 | Bioprocess Engineering | 3 | 0 | 1 | 4 |
| 5 | Electrochemistry | 3 | 0 | 0 | 3 |
| 5 | Chemical Reaction Engineering | 3 | 0 | 0 | 3 |
| 5 | Summer Training & Technical Seminar-1 | 0 | 0 | 1 | 1 |
| 5 | MOOCS Course -1 | 2 | 0 | 0 | 2 |
| 5 | Professional Elective -3 | 3 | 0 | 0 | 3 |
| 5 | Open Elective -3 | 3 | 0 | 0 | 3 |
| | | 18 | 0 | 2 | 23 |
| Sem | Course Name | L | T | P | C |
| 6 | Bioinstrumentation and Bioprocess Control | 3 | 0 | 0 | 3 |
| 6 | Downstream Processing | 3 | 0 | 1 | 4 |
| 6 | Good Manufacturing & Laboratory Practices | 3 | 0 | 0 | 3 |
| 6 | Intellectual property rights and Regulatory affairs | 2 | 0 | 0 | 2 |
| 6 | Indian Knowledge System | 2 | 0 | 0 | 2 |
| 6 | Statistical Analysis using R | 2 | 0 | 1 | 3 |
| 6 | Professional Elective -4 | 3 | 0 | 0 | 3 |
| | Open Elective -4 | 3 | 0 | 0 | 3 |
| | | 21 | 0 | 2 | 23 |
| Sem | Course Name | L | T | P | C |
| 7 | Membrane Application in Bioprocesses | 3 | 0 | 0 | 3 |
| 7 | Protein Genetics and Protein Engineering | 3 | 0 | 1 | 4 |
| 7 | Bioreactor Design | 3 | 0 | 1 | 4 |
| 7 | Summer Training & Technical Seminar-II | 0 | 0 | 1 | 1 |
| 7 | MOOCS Course -2 | 2 | 0 | 0 | 2 |
| 7 | Professional Elective -5 | 3 | 0 | 0 | 3 |
| 7 | Open Elective -5 | 3 | 0 | 0 | 3 |

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|------------|------------------------|-----------|----------|-----------|-----------|
| | | 15 | 0 | 2 | 20 |
| Sem | Course Name | L | T | P | C |
| 8 | Project & Dissertation | 0 | 0 | 14 | 14 |

Option for Minors:

| Sem | Minor in Pharma Tech | L | T | P | C |
|------------|---|----------|----------|----------|-----------|
| 3 | Pharmaceutical Chemistry | 3 | 0 | 0 | 3 |
| 4 | Pharmaceutics | 4 | 0 | 0 | 4 |
| 5 | Pharmacology & Toxicology | 3 | 0 | 0 | 3 |
| 6 | Clinical Trial Designing | 3 | 0 | 0 | 3 |
| 7 | Regulatory Affairs and Quality Control in Pharmaceuticals | 3 | 0 | 0 | 3 |
| | Total | | | | 16 |
| Sem | Minor in Food Tech | | | | |
| 3 | Food Processing & Preservation | L | T | P | C |
| 4 | Food Chemistry | 3 | 0 | 0 | 3 |
| 5 | Food Microbiology & Safety | 4 | 0 | 0 | 4 |
| 6 | Food Quality Control and Regulatory Affairs | 3 | 0 | 0 | 3 |
| 7 | Food Product Development | 3 | 0 | 0 | 3 |
| | Total | 3 | 0 | 0 | 3 |
| | | | | | 16 |

| Sem | Professional Elective -1 | L | T | P | C |
|------------|---------------------------------|----------|----------|----------|----------|
| 3 | Fundamentals of Cancer Biology | 3 | 0 | 0 | 3 |
| 3 | AI in Biosciences & Technology | 3 | 0 | 0 | 3 |
| 3 | Biochemistry & Biophysics | 3 | 0 | 0 | 3 |

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|-----|---|---|---|---|---|
| Sem | Open Elective -1 | L | T | P | C |
| 3 | Pharmaceutical Chemistry | 3 | 0 | 0 | 3 |
| 3 | Food Processing & Preservation | 3 | 0 | 0 | 3 |
| 3 | OOPS Using JAVA | 3 | 0 | 0 | 3 |
| Sem | Professional Elective -2 | L | T | P | C |
| 4 | Virology & Vaccine Technology | 4 | 0 | 0 | 4 |
| 4 | Epidemiology | 4 | 0 | 0 | 4 |
| 4 | Waste Water Treatment | 4 | 0 | 0 | 4 |
| Sem | Open Elective -2 | L | T | P | C |
| 4 | Pharmaceutics | 4 | 0 | 0 | 4 |
| 4 | Food Chemistry | 4 | 0 | 0 | 4 |
| 4 | Data structure using Python | 4 | 0 | 0 | 4 |
| Sem | Professional Elective -3 | L | T | P | C |
| 5 | Microbial and genetic Engineering | 3 | 0 | 0 | 3 |
| 5 | Infection Biology and Host Pathogen Interaction | 3 | 0 | 0 | 3 |
| 5 | Bifuel & Bioenergy | 3 | 0 | 0 | 3 |
| Sem | Open Elective -3 | L | T | P | C |
| 5 | Pharmacology & Toxicology | 3 | 0 | 0 | 3 |
| 5 | Food Microbiology & Safety | 3 | 0 | 0 | 3 |
| 5 | Artificial Intelligence & Robotics | 3 | 0 | 0 | 3 |
| Sem | Professional Elective -4 | L | T | P | C |
| 6 | Bioinformatics | 3 | 0 | 0 | 3 |
| 6 | Biosensors and Nanobiotechnology | 3 | 0 | 0 | 3 |
| 6 | Cell & Tissue Engineering | 3 | 0 | 0 | 3 |
| Sem | Open Elective -4 | L | T | P | C |
| 6 | Clinical Trial Designing | 3 | 0 | 0 | 3 |
| 6 | Food Quality Control and Regulatory Affairs | 3 | 0 | 0 | 3 |

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| 6 | Mobile App Development (React Native) | 3 | 0 | 0 | 3 |
| Sem | Professional Elective -5 | L | T | P | C |
| 7 | Pharmacogenomics | 3 | 0 | 0 | 3 |
| 7 | Environmental Biotechnology | 3 | 0 | 0 | 3 |
| 7 | Genomics and Proteomics | 3 | 0 | 0 | 3 |
| Sem | Open Elective -5 | L | T | P | C |
| 7 | Regulatory Affairs and Quality Control in Pharmaceuticals | 3 | 0 | 0 | 3 |
| 7 | Food Product Development | 3 | 0 | 0 | 3 |
| 7 | Database Management System for Healthcare | 3 | 0 | 0 | 3 |