

Biotechnology

(12 Core + 4 Elective = 16 Courses, 60 Credits)

The major in 'Biotechnology' will provide the education to the students that will enable them to comprehend the principles and applications of biotechnology. Students will develop knowledge for in-depth analytical and critical thinking to solve the problems related to biotech-industry, medical organizations and regulatory agencies. The opportunity to explore the different avenues of biotechnology, as framed in the major, will shape up students for their higher studies as well as open the gateway to execute their roles as academic researchers, educators, R&D-professionals and quality-control managers. Twelve core courses will be offered to the students who are taking this major for the 2nd and 3rd years of their Bachelor's programme. Each semester (semester-I and -II) of the 1st year (of this major) are four core (compulsory) courses and only from the 2nd year, elective courses will commence. There are four elective courses, which are major-specific, offered in the programme.

The theory courses of the first semester will demonstrate the basic principles and concepts of microbiology, biochemistry and biotechnology and will also decipher the intricate links between these disciplines. The lab course in biochemistry will complement the theoretical understanding with before-hand experiments.

The second semester will provide the fundamentals of cell biology, genetics and molecular biology and apply the concepts of these mother subjects to comprehend the engineering designs on genes and proteins of living things. Bioanalytical techniques, which are the tools to perform all kinds of genetic manipulations, will be taught as a lab course to the students to strengthen their understanding of measurements and mechanisms.

The third semester will offer compulsory courses that will illustrate the crucial applied concepts of genetic and protein engineering for industrial productions of commercially important substances, and communicate the applications of bioinformatics and biostatistics to fish out and evaluate biological relationships and phenomena. During this semester, students will be taught subject-specific electives, such as immunology and applications of biotechnology in the animals and plants. Through the elective courses, students will not only be able to expand their ken but also appreciate the system biology in a holistic manner.

The last semester largely comprises core courses and electives with substantial job prospects. Detailed exposure of the students to the applications of biotechnology via genetically-modified microorganisms for the productions of different types of food, for the removal of hazardous chemicals from the environment, the quality management of biomaterials made for public use, the bio-safety procedures and regulatory compliance, and the intellectual property rights will boost up their opportunity in the job market. Some of the job descriptions include Quality Control and Food Safety Professionals in the Food & Pharmaceutical Industry, Bioremediation Manager, Quarantine and Inspection Officers of the State or Central Government, Professionals in sectors of R&D (Developments of Therapeutics, Agro-products, and Fermentation Products) and Wastewater Management etc.

Overall, the major in 'Biotechnology' aims to make high quality students and researchers for whom both the pursuance of career in higher education and transition to the industry will be smooth.

The layout of the semester wise course plan is as follow:

| Core Courses: Year-II – Semester-I | Credits |
|---|--|
| <ol style="list-style-type: none"> 1. Introduction to Biotechnology 2. Introduction to Microbiology 3. Introduction to Biochemistry 4. Biochemistry – Lab | 4 Cr × 3 = 12 Credits 2 Cr (Lab) × 1 = 2 Credits Total = 14 Credits |
| Core Courses: Year-II – Semester-II | |
| <ol style="list-style-type: none"> 1. Cell Biology and Genetics 2. Molecular Biology 3. Genetic & Metabolic Engineering 4. Bioanalytical Techniques – Lab | 4 Cr × 3 = 12 Credits 2 Cr (Lab) × 1 = 2 Credits Total = 14 Credits |
| Core & Elective Courses: Year-III – Semester-I | |
| <ol style="list-style-type: none"> 1. Industrial Biotechnology & Bioprocess Engineering 2. Bioinformatics and Biostatistics 3. Elective-I 4. Elective-II | 4 Cr × 4 = 16 Credits (Total) |
| Elective Basket for I – Major-Specific (Any one of the following) | |
| <ul style="list-style-type: none"> • Plant Biotechnology • Animal Biotechnology | 4 Credit |
| Elective Basket for II – Major-Specific (Any one of the following) | |
| <ul style="list-style-type: none"> • Immunology • Epigenetics | 4 Credit |
| Core & Elective Courses: Year-III – Semester-II | |
| <ol style="list-style-type: none"> 1. Food & Dairy Biotechnology 2. Biosafety, Bioethics & IPR 3. Elective-III 4. Elective-IV | 4 Cr × 4 = 16 Credits (Total) |
| Elective Basket for III – Major-Specific (Any one of the following) | |
| <ul style="list-style-type: none"> • Medical Biotechnology • Environmental Biotechnology | 4 Credit |
| Elective Basket for IV – Major-Specific (Any one of the following) | |
| <ul style="list-style-type: none"> • Animal Models of Human Diseases • Cognitive Neuroscience | 4 Credit |
| 16 Courses, 60 Credits | |

Biotechnology Minor

Each course consists of 4 credits.

1. Introduction to Biotechnology
2. Introduction to Microbiology
3. Introduction to Cell Biology & Biochemistry
4. Plant and Animal Biotechnology
5. Environmental Biotechnology
6. Food & Dairy Biotechnology