**DIPLOMA IN BIOTECHNOLOGY**

**INTRODUCTION**

**Diploma in Biotechnology Engineering**is a Diploma level course. Biotechnology engineering is a branch of engineering where technology is combined with biology for research & development. Biotechnology involves a wide range of subjects such as engineering, genetics, biochemistry, microbiology and chemistry. Courses help to provide intensive and in-depth learning to the students in the field of biotechnology, beyond simulating learning understanding techniques, the course also addresses the underlying recurring problems of disciplines in today scientific and changing business world, Students develop awareness & knowledge of different organization requirement and subject knowledge through varied subjects and training methodology.

**DIPLOMA IN BIOTECHNOLOGY ENGINEERING ELIGIBILITY**

The candidates should have completed 10th class or equivalent with Mathematics or Science.

**DIPLOMA IN BIOTECHNOLOGY ENGINEERING SYLLABUS**

Syllabus of Biotechnology Engineering as prescribed by various Universities and Colleges.

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| --- | --- |
| **Sr. No.** | **Subjects of Study** |
| 1 | Introductory Biological Chemistry |
| 2 | Biophysical Chemistry |
| 3 | Cell Biology and Genetics |
| 4 | Bioenergetics and Bio-membranes |
| 5 | Animal and Plant Physiology |
| 6 | Bio-statistics and computer |
| 7 | Molecular Biology and Biotechnology |
| 8 | Animal & Plant Biotechnology |
| 9 | Industrial and Environmental Biotechnology |
| 10 | Biotechnology laboratory |
| 11 | Molecular biology laboratory |
| 12 | Microbiology |
| 13 | Human anatomy laboratory |
| 14 | Physiology laboratory |
| 15 | Environmental toxicology laboratory |

**B.TECH IN BIO-TECHNOLOGY**

**INTRODUCTION**

The B. Tech biotechnology is an undergraduate engineering course in the spectrum of engineering. The course plays a major emphasis on the biotechnology subject as a whole. **Biotechnology engineering** is a field of applied biology and chemical engineering principles that involves the use of living things in engineering, technology, medicine, and other useful applications. The B. tech biotechnology syllabus is designed in such a way to enhance students with problem-solving ability by providing them fundamental engineering subjects and apply the same in research and development of Biotechnical equipment which is widely used in medical and pharmaceutical fields. The course also provides major insights into biological components, chemical activities of organisms, and bioinformatics involved in basic Biotechnology engineering and research studies. The Biotechnology engineering subjects that are pursued in this course are Bioprocess Engineering, Animal Biotechnology, Instrumentation and Process Control, Chemical Engineering Thermodynamics, Molecular Biology, etc, which are very much essential for a skilled Biotechnology engineer. BTech Biotechnology Engineering course provides the required knowledge to the students related to ways of production of useful equipment using living organisms and biological components and involves deep research in genetics science and their applications.

**B.TECH BIOTECHNOLOGY ELIGIBILITY**

The candidates should have completed Intermediate or equivalent with Mathematics or Science with minimum 50%.

**B.TECH BIOTECHNOLOGY SYLLABUS**

 The subjects that are included in the curriculum of the course is listed in the table below:

* Human Biology
* Protein Science
* Cell Biology and Biological Systems
* Structural Biochemistry
* Food Microbiology
* Biological Chemistry
* Plant Science
* Molecular Genetics
* Metabolism
* Immunology
* Physical Chemistry
* Organic Chemistry
* Environmental Microbiology
* Genomics and Bioinformatics
* Chemistry

**B. TECH IN MOLECULAR & CELLULAR ENGINEERING**

**INTRODUCTION**

**B. Tech in Molecular & Cellular Engineering** is a well-recognized engineering course that covers the core of molecular biology and cellular biology. B. Tech in molecular & cellular engineering course not only includes the subjects of molecular and cellular biology but also includes interesting technical and other subjects like elementary mathematics, engineering graphics, computer and languages, chemical thermodynamics, etc. In B. Tech molecular & cellular engineering, you will be doing a number of industrial visits, workshops, lab practices and seminars to gain the practical knowledge of this subject that you will utilize in your future. So, if a student is keen to do B. Tech molecular & cellular engineering then it is imperative to gain extensive knowledge of molecular and cellular biology and those technologies which are used in molecular & cellular engineering.

B. Tech molecular & cellular engineering basically deals with all the subjects which are related to molecular biology and cellular biology. B. Tech in molecular & cellular engineering will let you know about the use of modern technologies for the betterment of drug production. In this B. Tech course, you will also study those B. Tech subjects which are related to biological and life science, apart from physics, mathematics and chemistry.

**B.TECH CELLULAR & MOLECULAR ELIGIBILITY**

To get admission in B. Tech molecular & cellular engineering, students must fulfill the eligibility criteria of this B. Tech course.

* You should pass 12th from science stream with the main subjects like Physics, Chemistry and Math from any recognized board or its equivalent.
* And if you talk about the percentages then you should secure at least 50-55% in their aggregate percentage.

**B.TECH CELLULAR & MOLECULAR SYLLABUS**

 The subjects that are included in the curriculum of the course is listed in the table below:

|  |  |
| --- | --- |
| 1. | Botany |
| 2. | Zoology |
| 3. | Organic Chemistry |
| 4. | Inorganic Chemistry |
| 5. | Biochemistry |
| 6. | Microbiology |
| 7. | Genomics |
| 8. | Genetics |
| 9. | Molecular Genetics |
| 10. | Molecular Biology |
| 11. | Cell Biology |
| 12. | Biotechnology |
| 13. | Plant Biotechnology |
| 14. | Animal Biotechnology |
| 15. | Immunology |
| 16. | Recombinant DNA Technology |
| 17. | Environmental Studies |

**B.TECH IN INDUSTRIAL MICROBIOLOGY**

**INTRODUCTION**

B.Tech. Industrial Microbiology or Bachelor of Technology in Industrial Microbiology is an undergraduate Biotechnology course. Industrial microbiology or microbial biotechnology encompasses the use of microorganisms in the manufacture of food or industrial products. The use of microorganisms to produce food, either human or animal, is often considered a branch of food microbiology.

The microorganisms used in industrial processes may be natural isolates; laboratory selected mutants or genetically engineered organisms. Bachelor of Science in Industrial Microbiology is of three years duration course and the syllabus is divided into six semesters.

**B.TECH INDUSTRIAL MICROBIOLOGY ELIGIBILTY**

A pass in Plus-two (12th Standard) or its equivalent, with minimum 60% or equivalent CGPA. Some of the very reputed universities and institutes conduct the entrance examinations.

**B.TECH INDUSTRIAL MICROBIOLOGY SYLLABUS**

Syllabus of Industrial Microbiology as prescribed by various Universities and Colleges.

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| --- | --- |
| **S.NO** |  **SUBJECTS** |
| 1 | Applied Physics |
| 2 | Elementary Biology |
| 3 | Environmental Studies |
| 4 | Elementary Mathematics |
| 5 | Inorganic Chemistry |
| 6 | Life Science (Botany) |
| 7 | Moral and Value Education |
| 8 | Organic Chemistry |
| 9 | Workshop Practice & Technology |
| 10 | Physical Chemistry |
| 11 | Technical Mathematics |
| 12 | Engineering Graphics |
| 13 | Analytical Chemistry |
| 14 | Basics Molecular Genetics |
| 15 | Chemical Thermodynamics |
| 16 | Electrical Engineering |
| 17 | Enzymology & Enzyme Technology |
| 18 | Basic Immunology |
| 19 | Microbial Metabolism |

**B.SC. IN BIO-TECHNOLOGY**

**INTRODUCTION**

*You will be fascinated to know that Biotech’s use fermentation and harness biocatalysts such as yeast, enzymes, etc. to become microscopic manufacturing plants, helping to fuel the world!*From breakthroughs in stem cell engineering to disease diagnosis through the point of care devices,Biotechnology opens the doors to all kinds of new discoveries. The BSc Biotechnology degree program includes a blended curriculum that encompasses the elements of Biology, Chemistry andPhysics combined with lab work, Computer Applications and Research.

**B.SC BIOTECHNOLOGY ELIGIBILITY**

The candidates should have completed Intermediate or equivalent with Mathematics or Science with minimum 50%.

**B.SC BIOTECHNOLOGY SYLLABUS**

The blog on the BSc Biotechnology syllabus is incomplete without revealing the core subjects of the course along with lab subjects and electives:

**Core Subjects**

The following is a list of core subjects covered in the BSc Biotechnology syllabus:

* Introductory Biological Chemistry
* Animal and Plant Physiology
* Recombinant DNA Technology
* DNA Typing, Proteomics and Beyond
* Biodiversity and Taxonomy
* Microbiology and Macromolecule
* Biostatistics

**Lab Subjects**

The following is the list of lab subjects for the BSc Biotechnology syllabus:

* Plant tissue culture lab
* Sterilization techniques for glassware
* Genomic DNA isolation from plants
* Paper Chromatography
* Estimation of purity of DNA

**Elective Subjects**

The following is the list of elective subjects for the BSc Biotechnology syllabus:

* Nanotechnology
* Biofertilizer Technology
* Ecology
* Biotechnology for Forensics
* Scientific Writing

**M.TECH IN BIO-TECHNOLOGY**

**INTRODUCTION**

M. Tech (Biotechnology) or Master of Technology in Biotechnology is a two-year PostGraduate degree program offered in the field of modern medical practice.

The Biotechnology course is a field of Biology that revolves around the study of living organisms and bioprocesses involved in medicine, engineering, technology, and other fields requiring bio-products. The Biotechnology course imparts knowledge about using biotechnological skills in the fields of microbial, animal, plant biology, health, agriculture, and environment.

The duration of a Master of Technology in Biotechnology is generally two years, but it may vary from institute to institute and also maybe on a part-time basis by certain institutes. This is an important and valuable course that opens many career scopes for the students. The course focuses on both the theoretical as well as on practical aspects of the subject. Its curriculum incorporates various assignments, presentations, and internships which provide hands-on industrial experience to the students.

**M.TECH BIOTECHNOLOGY ELIGIBILITY**

* Candidates should have completed their Bachelor of Engineering or Bachelor of Technology (B. Tech) degree from a recognized University.
* Must possess at least 55% aggregate marks at Graduation level.
* Some Institutes also conduct their own written tests for admission in their Institutes. Admission is based on rank obtained in the entrance test conducted for M. Tech.
* Candidates who completed a 5-year program in Science or Applied Sciences are also eligible for this course.

**M.TECH BIOTECHNOLOGY SYLLABUS**

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| --- | --- |
| **Sr. No.** | **Subjects** |
| 1 | Applied Statistics for Biotechnologists |
| 2 | Bioprocess Technology |
| 3 | Computational Biology |
| 4 | Entrepreneurship, IPR, and Bio-safety |
| 5 | Preparative and Analytical Techniques in Biotechnology |
| 6 | Animal Biotechnology |
| 7 | Advanced Genetic Engineering |
| 8 | Bio-separation Technology |
| 9 | Bioinformatics |
| 10 | Nanobiotechnology |
| 11 | Immuntechnology |
| 12 | Zoology |

**M.TECH IN BIO-INFORMATICS**

**INTRODUCTION**

M. Tech. Bioinformatics or Master of Technology in Bioinformatics is a postgraduate Bioinformatics course. Bioinformatics is the application of statistics and computer science to the field of molecular biology. The program provides competence in computational biology/bioinformatics by providing training in the areas of molecular biology, information technology, statistics and bioinformatics. The program also offers hands-on expertise in the essential multi-disciplinary fields of genomics, proteomics, protein engineering, metabolic pathway engineering, Pharmacogenomics, the discovery of new drugs and vaccines, molecular diagnostic kits, Agro-biotechnology that comprise the core of Bioinformatics.

**M.TECH BIOINFORMATICS ELIGIBILITY**

Aspiring students should have a B.E./B.Tech. in CS/IT/Biotech/Bioinformatics or Master's degree in Programming/Maths/Sciences.

**M.TECH BIOINFORMATICS SYLLABUS**

|  |  |
| --- | --- |
| **Sr. No.** | **Subjects of Study** |
| 1 | Advanced Biochemistry and Immunology |
| 2 | Algorithms for Bioinformatics |
| 3 | Bioinformatics – Techniques and Applications |
| 4 | Numerical and Biostatistical Methods |
| 5 | Applications of Mat-lab in Bioinformatics |
| 6 | Functional Genomics and Proteomics |
| 7 | Structural Bioinformatics |
| 8 | Interdisciplinary Elective |
| 9 | Industrial Training |

**M.SC IN BIO-TECHNOLOGY**

**INTRODUCTION**

M. Sc in Biotechnology is a two-year long postgraduate course in the field of Science. The course covers subjects like Immunology, Environmental Biotechnology, Advanced Biological Chemistry, Molecular Biology, Animal Biotechnology. Any student who has completed his/her undergraduate degree in B.Sc. in any specialization with an aggregate of 50 per cent marks can opt for pursuing the course. Biotechnology has become one of the most popular science courses among students in recent years Industrial and Medical Biotechnology courses have become quite popular among engineering and science students.

**M.SC BIO-TECHNOLOGY ELIGIBILITY**

For any student to successfully secure admission to M. Sc in Biotechnology, it is crucial to adhere to the eligibility criteria of the colleges/universities. An aspirant must have a bachelor’s degree with a minimum aggregate score of 50 per cent from a recognized university. Apart from this candidates must also have a 10+2 with a minimum aggregate of 50 per cent marks from a recognized board. The candidates might also have to appear for entrance examinations like DUET, JNUEE, BHU PET and others.

**M.SC BIO-TECHNOLOGY SYLLABUS**

The subjects that are included in the curriculum of the course is listed in the table below:

·   Microbiology
·   Biochemistry
·   Cell Biology
·   Biomolecules
·   Biophysical Chemistry
·   Laboratory work
·   Virology
·   Molecular Biology & Molecular Genetics
·   Bioprocess Technology
·   Environmental Biotechnology

·   Animal Cell Biotechnology
·   Molecular Biology of Eukaryotic Systems
·   Genetic Engineering & its Applications
·   Computational Biology & Bioinformatics

**PH.D IN BIOTECHNOLOGY**

**INTRODUCTION**

PhD Biotechnology is a Doctorate course in Biotechnology which generally takes 3-5 years to complete. In this course, students would have to study subjects like Research Methodology, Scientific Communication, Recent Trends in Biotechnology, etc.

A student who has completed Post Graduation in Biotechnology from a recognized University with minimum aggregate marks of 55% (for general category) or 50% (for SC, ST and OBC candidates) is eligible for this course.

Admission process for PhD Biotechnology is based on entrance exams like CSIR-UGC NET, UGC NET, etc. The colleges also conduct a group discussion and personal interview round after the entrance exams for the final shortlisting of candidates.

The average fees for pursuing PhD Biotechnology is INR 50,000 to INR 4,00,000 and the fees may vary from college to college. Many top colleges offer this course. Some of the top PhD Biotechnology colleges have been tabulated in the table below. During this course, the candidates will have to perform research in one of the major Biotechnology topics which include Molecular Biology, Bioinformatics and Biostatistics, Protein Biotechnology, Genomics, etc.

**PH.D BIOTECHNOLOGY ELIGIBILITY**

* A Master’s degree is required to gain admission to a doctoral program. In some subjects, doing a Masters in Philosophy (M.Phil.) is a prerequisite to start Ph.D.
* In cases, where the admission at the M.Phil. has been conducted through an entrance examination and course work has been prescribed at the M.Phil. level, such M.Phil. candidates when admitted to the Ph.D. programmes shall not be required to undertake entrance examination or course work and it shall be considered to have complied with the UGC (Minimum standards and procedure for award M.Phil./Ph.D. Degree).
* In other cases, where a candidate has done M.Phil. from one university and moves to another university for Ph.D., the new university may give credit and exempt for the course work done in the previous university. However, such a candidate will have to appear in the entrance test as applicable to a fresh candidate directly joining Ph.D. This procedure will apply in case of those candidates who have also obtained Ph.D. degree from abroad.
* For some prestigious Universities, a candidate is required to qualify the all India level examination such as ‘National Eligibility Test’ (NET) for Lectureship conducted by University Grants Commission. Candidates appearing in the final year of qualifying degree examination are eligible to apply. However, they must submit attested copies of qualifying degree certificates/final transcripts.

**PH.D BIOTECHNOLOGY SYLLABUS**

Syllabus of Biotechnology as prescribed by various Universities and Colleges.

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| **Sr. No.** | **Subjects**  |
| 1 | Research Methodology |
| 2 | Scientific Communication |
| 3 | Recent Trends in Biotechnology |