

Topics Covered:

MODULE 1

- What is Biotechnology?
- Applications of biotechnology
- How does modern biotechnology work?
- Healing, Fueling, Feeding: How Biotechnology is Enriching Your Life
- Pharmaceutical Microbiology
- Isolation of micro-organisms, Serial dilution, Spreading, Streaking (Pc)
- Development of Pure cultures (Pc)
- Staining of bacterial cell (Pc)
- Concepts of Probiotics and its formulation (Pc)

MODULE 2

- Validation in Biotechnology
- Technology Transfer and Commercialisation
- Emerging Issues In Biotechnology And Intellectual Property Rights
- Industrial Microbiology
- Isolation and screening of enzyme-producing micro organisms from natural sources (Pc)
- Production of enzyme (Pc)
- Enzyme assay (Pc)
- Optimization of enzyme production (Pc)
- Assignments and Tests

MODULE 3

- Clinical and Molecular Diagnostics
- Clinical Trials Design and Conduct

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- Biotechnology for the 21ST Century
- Concerns about biotechnology
- Advanced Molecular Biology
- Isolation of Bacterial Genomic DNA (Pc)
- Isolation of Plasmid using Alkaline Lysis method (Pc)
- Isolation Plant DNA using CTAB method (Pc)
- Qualitative and quantitative analysis of DNA (Pc)
- Preparation of competent cells (Pc)
- Amplification of genomic DNA using PCR (Pc)
- Analysis of PCR products (Pc)
- Assignments and Tests

MODULE 4

- Biosafety & Bioethics
- QA/QC for the Pharmaceutical and Biotechnology Industries
- Introduction to Food Safety
- Consumer and Food Industry Perspectives
- Introduction to Herbal Drugs
- Industrial Applications
- Herbal Technology- Challenges and Opportunities for India
- Preparation of Herbal Drug (Pc)
- Comparison of MIC values of different drugs (Pc)
- QC/ QC analysis of drugs (Pc)
- Assignments and Tests

MODULE 5

- Introduction to Plant Tissue Culture
- Applications of Plant cell culture and tissue culture to Agriculture & Industry
- Molecular Farming in Plants: Recent Advances and Future Prospects
- Preparation of MS media (Pc)

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- Meristem culture – fundamentals and practical (Pc)
- Seed culture –fundamentals and practical (Pc)
- Secondary metabolites from Plant tissue culture (Pc)
- Transgenic plants and genetically modified crops
- Callus culture –fundamentals and practical (Pc)
- Assignments and Tests

MODULE 6

- Introduction to Food Biotechnology
- Determination of Vitamin C concentration in commercial products by Redox titration (Pc)
- Spectrophotometric determination of total Vitamin C in fruits and vegetables (Pc)
- To measure di-esterase activity of honey (Pc)
- To measure physio-chemical properties of flour (Pc)
- Determination of acid value and free fatty acid in oils and fats (Pc)
- Sugar estimation by Lane and Eynon method (Pc)
- Assignments and Tests

MODULE 7

- Introduction to Bioinformatics, Applications, its current and future scenario
- Bioinformatics : Tools and genome analysis (Pc)
- Protein Bioinformatics (Pc)
- Cancer Drug Discovery and its managerial aspects (Pc)
- Introduction to biological databases and its types
- Data and text mining from various biological databases. (Pc)
- Overview of sequence alignment (Pc)
- Basics of DNA sequencing (Pc)
- Assignments and Tests

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MODULE 8

- Biology of HIV and AIDS
- Cancer Biology
- Immunology of Infectious Diseases
- Microarrays and Analysis (Pc)
- Molecular Phylogenetic Techniques (Pc)
- Assignments and Tests

MODULE 9

- Live Project

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Table of Content

S.No.	Course/Topic	Form	No. of hours required
1	Pharmaceutical Microbiology	L, P, Pc	18
2	Industrial Microbiology	L, P, Pc	15
3	Advanced Molecular Biology	L, P, Pc	21
4	Herbal Drug Formulation and QC/QA analysis of Drugs	L, Pc	9
5	Transgenic plants and Plant Tissue Culture, Molecular Farming in Plants: Recent Advances and Future Prospects	L, Pc	9
6	Food Biotechnology	L	15
7	Bionformatics	L	15
8	Microarrays and Analysis	L	18
9	Live Project	Pc	30

Abbreviations-

L- Lecture

P- Presentation

Pc- Practical

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Salient Features:

This certificate offers the opportunity to learn critical aspects of biotechnology product development, including how to create a new enterprise, finance, marketing, and other areas of commercialization. This certificate is ideal for students planning to engage in the enterprise of biotechnology beyond the science. The course also provides hands on training in various fields of biotechnology. You can also take part in online discussions forums for some of the modules. The Certificate Program in Biotechnology is designed to give students the background needed for entry into biotechnology and for advanced study, and it gives recognition for specialization in the field.

Course Objectives:

Students who complete the Certificate in Biotechnology will be able to demonstrate:

- Proficiency in communicating and applying the scientific principles that form the foundations of the biotechnology field.
- Resourcefulness in researching and evaluating relevant and scientifically sound information from a variety of databases and academic sources.
- Competence in identifying appropriate career and continuing education goals based on prior education and work experience; self-assessment of academic, technical, and professional skills; and knowledge of the biotechnology industry.

Course Outcome:

On the successful completion of this course, a Certificate in Biotechnology will be awarded.

Career Prospects:

India's biotechnology industry has been growing towards new heights in conjunction with the recent economic outburst. The country has the potential to revolutionize biopharmaceutical and healthcare sectors. With the growth in the customer base and more investments taking place in the biotech sector, the biotech industry is expected to grow to around Rs 440,000 crores (US\$ 70.84 billion) by the year 2020.

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India, with a share of over 2 per cent in the global biotechnology industry, is set to become one of the world's largest biotechnology hubs, especially due to the rapid development of the contract research outsourcing (CRO) and the contract research manufacturing markets in the country.

Employability Enhancement Programme:

The Employability Enhancement Programme is a course designed to increase your employability. The competition in the Biotech industry is fierce, moreover good jobs are limited in number. Giving a job interview is a skill in itself. This skill set includes certain aspects of personality development in addition to preparing you for technical and aptitude tests. The programme focuses on four major areas that need attention for an interview.

These areas are:

- Personality development
- Communication skills
- Interview skills
- Aptitude and speaking skills

We will also work upon the development of professional skills in you like:

- Team work
- Crisis handling
- Project management

This program is aimed at helping you master the art of giving an interview through a standard job screening process.

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