**B.Sc., BIOTECHNOLOGY**

**I YEAR – I SEMESTER**

**COURSE CODE: 7BBTA1**

**ALLIED COURSE - I - FOOD PROCESSING TECHNOLOGY**

**Unit - I**

Food as a substrate for microbes, General principles – underlying food spoilage and contamination – Microbiology of cereals, vegetables, fruits, egg and poultry products, meat, fish, sea foods and canned foods

**Unit - II**

Food production technology- single cell protein – yeast, mushroom, fermentative production of food and alcoholic beverages, Genetically manipulated crop. Preservation technology – canning, dehydration, ultrafiltration, sterilization, irradiation etc.

**Unit - III**

Technology for improved process – Enzymes in bakery and cereal products, Enzyme in fat / oil industries, Protease in cheese making and beverage production.

**Unit - IV**

Food quality and control – Analysis of food, Major ingredients present in different products, Food additives colour, flavours, vitamins.. Microbial safety and food products, chemical safety of food products, heavy metals, fungal toxins, pesticide and herbicide and contamination

**Unit - V**

Food borne diseases – food poisoning – infective and toxic bacterial and non – bacterial food borne diseases and their diagnosis – food sanitation and its control measures

**Books for Reference:**

1. Risk Management for Food Allergy (Food Science and Technology) –8 Jan (2014)by [Charlotte Madsen](http://www.amazon.in/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=Charlotte+Madsen&search-alias=stripbooks), [Rene Crevel](http://www.amazon.in/s/ref%3Ddp_byline_sr_book_2?ie=UTF8&field-author=Rene+Crevel&search-alias=stripbooks) (Editor), [Clare Mills Dr.](http://www.amazon.in/s/ref%3Ddp_byline_sr_book_3?ie=UTF8&field-author=Clare+Mills+Dr.&search-alias=stripbooks) [Steve Taylor](http://www.amazon.in/s/ref%3Ddp_byline_sr_book_4?ie=UTF8&field-author=Steve+Taylor&search-alias=stripbooks) .
2. The Complete Technology Book on Bakery Products (Baking Science with Formulation & Production) - 3rd Edition Paperback – (2014) by [NIIR Board of Consultants & Engineers](http://www.amazon.in/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=NIIR+Board+of+Consultants+%26+Engineers&search-alias=stripbooks)

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**I YEAR – II SEMESTER**

**COURSE CODE: 7BBTA2**

**ALLIED COURSE - II - BIOINFORMATICS**

**Unit - I**

Database: Concept, architecture, features – management – security – collection and storage.

**Unit - II**

 Biological Databases – sequence, structure – genomics, pathway, biodiversity, formats: access; annotation

**Unit - III**

 Nucleic acid sequence analysis: DNA sequencing, assembly, restriction mapping, primer design, ORF prediction, transcriptional and translational signals, gene identification.

**Unit - IV**

Protein sequence analysis: composition, molecular weight, PI, extinction coefficient, and peptide mapping

**Unit - V**

Sequence comparison and database searching: scoring matrices: pair wise alignment – dot plot, global, local, multiple sequence alignment; BLAST and FASTA searches

**Books for Reference:**

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| --- |
| 1. [Bioinformatics Algorithms (Vol. 1) (2015) [Phillip Compeau](http://www.bioinformatics.org/wiki/Phillip_Compeau) and [Pavel Pevzner](http://www.bioinformatics.org/w/index.php?title=Pavel_Pevzner&action=edit&redlink=1) 2nd Edition](http://www.bioinformatics.org/wiki/Bioinformatics_Algorithms%3A_An_Active_Learning_Approach_%28Vol._1%29)
 |
| 1. [Bioinformatics Algorithms (Vol.2 ) (2015) [Phillip Compeau](http://www.bioinformatics.org/wiki/Phillip_Compeau) and [Pavel Pevzner](http://www.bioinformatics.org/w/index.php?title=Pavel_Pevzner&action=edit&redlink=1) 2nd Edition](http://www.bioinformatics.org/wiki/Bioinformatics_Algorithms%3A_An_Active_Learning_Approach_%28Vol._1%29)
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**I YEAR – I/II SEMESTER**

**COURSE CODE: 7BBTAP1**

**ALLIED PRACTICAL - I - LAB IN FOOD PROCESSING TECHNOLOGY & BIOINFORMATICS**

1. Enumeration of Microorganism from bread
2. Microbial examination of curd
3. Resazurin test to assess the quality of milk
4. Identification of microbes from fruits
5. Identification of microbes from vegetables
6. Isolation of Staphylococci in food grains
7. Searching of gene and protein sequence & accessing information from web and databases
8. Sequence alignment by BLAST
9. Information from genomes FASTA

**Books for Reference:**

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| --- |
| 1. [Bioinformatics Algorithms (Vol. 1) (2015) [Phillip Compeau](http://www.bioinformatics.org/wiki/Phillip_Compeau) and [Pavel Pevzner](http://www.bioinformatics.org/w/index.php?title=Pavel_Pevzner&action=edit&redlink=1) 2nd Edition](http://www.bioinformatics.org/wiki/Bioinformatics_Algorithms%3A_An_Active_Learning_Approach_%28Vol._1%29)
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| 1. [Bioinformatics Algorithms (Vol.2 ) (2015) [Phillip Compeau](http://www.bioinformatics.org/wiki/Phillip_Compeau) and [Pavel Pevzner](http://www.bioinformatics.org/w/index.php?title=Pavel_Pevzner&action=edit&redlink=1) 2nd Edition](http://www.bioinformatics.org/wiki/Bioinformatics_Algorithms%3A_An_Active_Learning_Approach_%28Vol._1%29)
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**II YEAR – III SEMESTER**

**COURSE CODE: 7BBTA3**

**ALLIED COURSE - III - MOLECULAR DIAGNOSTICS TECHNIQUES**

**Unit - I**

Isolation and Purification of Nucleic acids – Principles and Methods. Hybridization – Southern, Northern and Western.

**Unit - II**

Nucleic acid amplification methods and types of PCR: Reverse Transcriptase – PCR, Real-Time PCR, Inverse PCR, Multiplex PCR, Nested PCR, Long-PCR, PCR-ELISA.

**Unit - III**

Applications of PCR: RFLP, SNP technique and applications.

**Unit - IV**

PCR in forensic science- AmpFLP, STR, Multiplex PCR-Determination of Paternity- Human identification and sex determination. Diagnostics based on DNA chips and Micro-arrays.

**Unit - V**

DNA/gene sequencing: Maxam and Gilbert’s Method, Sanger’s di-deoxy method, Automated DNA sequencing – Principles, Methods and Instrumentation.

**Books for Reference:**

1. Molecular Diagnostics: Fundamentals, Methods and Clinical Applications (2014) by [Lela Buckingham](http://www.amazon.in/Lela-Buckingham/e/B00JAMTFPK/ref%3Ddp_byline_cont_book_1)
2. Techniques In Molecular Diagnostics(2016) by Saikia Kumar
3. Lewin’s Genes XI (2013) by Joselin E.Krebs, Stephen T.Kilpatrick, Elliot S.Goldstein, Jones and Bartlett Publishers, Inc.
4. Tietz textbook of Clinical Chemistry and Molecular Diagnostics (2012) by Carl A.Burtis. Elsevier publication.

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**II YEAR – IV SEMESTER**

**COURSE CODE: 7BBTA4**

**ALLIED COURSE - IV – ENVIRONMENTAL BIOTECHNOLOGY**

**Unit - I**

Components of Environment – Hydrosphere, lithosphere, atmosphere and biosphere – definitions with examples; Interaction of man and environment.

**Unit - II**

Global Environmental Problems – Green House Effect, Acid rain, El Nino, Ozone depletion, deforestation, desertification, salination, biodiversity loss; chemical and radiation hazards.

**Unit - III**

Environmental pollution and degradation – Pollution of air, water and land with reference to their causes, nature of pollutions, impact and control strategies; Waste water (sewage and industrial effluents) treatments: Primary, Secondary (Trickling Filter, Activated Sludge) and Tertiary treatments.

**Unit - IV**

Bioremediation: In situ-Ex situ-solid phase (Composting) – Slurry phase (aerated lagoons) –Factors affecting bioremediation. Bioremediation of textile and tannery effluents.

**Unit - V**

Environmental Management – Concept of health and sanitation, environmental diseases – infectious (water and air borne) and pollution related, spread and control of these diseases, health hazards due to pesticide and heavy metal pollution.

**Books for Reference:**

1. Environmental Science (2015) by Gary. S. Thorpe. Published by Barron’s Educational Series.
2. Environmental Biotechnology – (2012) by [Bruce E. Rittmann Perry L. McCarty](http://www.amazon.in/s/ref%3Ddp_byline_sr_book_1?ie=UTF8&field-author=Bruce+E.+Rittmann+Perry+L.+McCarty&search-alias=stripbooks).

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**II YEAR – III/IV SEMESTER**

**COURSE CODE: 7BBTAP2**

**ALLIED PRACTICAL - LAB IN MOLECULAR DIAGNOSTIC TECHNIQUE & ENVIRONMENTAL BIOTECHNOLOGY**

1. DNA fingerprinting using RFLP
2. Western Blotting
3. Cellulose acetate paper electrophoresis
4. Determination of Lipid profile in Blood sample
5. PCR (Demonstration)
6. Isolation of airborne microorganism
7. Isolation of Coliforms from sewage
8. Microbial degradation of cellulose
9. Oligodynamic action of heavy metals on microbes
10. Effect of high salt concentration on microbial growth

**Books for Reference:**

# Textbook of Medical Laboratory Technology (Set of 2 Volumes): Clinical Laboratory Science and Molecular Diagnosis 3rd Edition  (English, Hardcover, Praful B. Godkar, Darshan P. Godkar) 3rd, (2014)

1. Tietz textbook of Clinical Chemistry and Molecular Diagnostics (2012) by Carl A.Burtis. Elsevier publication.

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