## 1. Bioinformatics (Module 1)

- Introduction of bioinformatics, Application of bioinformatics,
- Scope of bioinformatics, Uses & Importance of bioinformatics,
- Sequence database similarity searching tools: FASTA,
- BLAST (BLASTP, BLASTN, BLASTX, TBLASTX, TBLASTN),
- Multiple sequence alignment tool: ClustalW,
- Primary & secondary analysis of protein
- Introduction of Biological databases: Primary databases & Secondary databases, Sequence databases (GenBank, EMBL, DDBJ), Protein structure, classification and family databases (PDB, CATH, SCOP, Pfam, PIR, PROSITRE, Swiss-Prot),
- Detailed Understanding of Phylogenetic Analysis.

## 2. Microbiology (Module 2)

- Basic of Microbiology,
- Good laboratory practices (GLP),
- Concept of basic calculation,
- Basic principles, standard operating procedure (SOP) and application of instruments,
- Types of media, Difference between gram positive and gram-negative bacteria,
- Serial Dilution techniques,
- Isolation of bacteria from soil sample,
- Isolation of pure bacterial colonies,
- Gram staining technique for bacteria,
- Motility check with hanging drop method,
- Lactophenol Cotton Blue (LPCB) staining for fungus,
- Methylene Blue Reductase Test in Milk.

## 3. Molecular Techniques (Module 3)

- Basic of Molecular Biology,
- Good laboratory practices (GLP),
- Overview of genomic DNA,
- Basic instrument handling,
- Basic concept of Percentage, Basic concept of Molarity and Normality,

- Micropipette handling (forward and reverse pipetting techniques),
- Principal, SOP and application of spectrophotometer,
- Extraction of genomic DNA from onion/banana,
- Extraction of genomic DNA from Bacteria,
- Extraction of genomic DNA from Plant,
- Qualitative Analysis of DNA-Agarose Gel Electrophoresis,
- Quantitative Estimation of the DNA through UV-VIS spectrophotometer.

## 4. Natural Product Research (Module 4)

- Basics concepts of Natural Product Research,
- General and safety rules for working in Lab,
- Concept of basic calculation,
- Preparation of standardized extracts through maceration,
- Introduction about phytochemicals,
- Qualitative Phytochemical analysis (saponin, tannin, flavonoids and alkaloids) of herbal extracts,
- Qualitative Phytochemical analysis (saponin, tannin, flavonoids and alkaloids) of herbal extracts,
- Types of media, Media preparation and antimicrobial susceptibility tests (AST) of plant extracts against bacteria,
- Basic concept of Minimum Inhibitory Concentration test,
- Basics of chromatography,
- Thin layer chromatography (TLC) of crude extracts,
- Antioxidant Potential analysis of Bioactive extracts.

## 5. Food Technology (Module 5)

- Basic of food technology,
- Good laboratory practices (GLP),
- Demonstration of instruments,
- Concept of basic calculation,
- Micropipette handling (forward and reverse pipetting techniques),
- To extracts caffeine using polar-nonpolar solvent extraction technique and its confirmatory test,

- Quality analysis of different Fruit Juices (pH, total moisture, solid content),
- overview of adulteration and this disadvantages according to FSSAI guidelines,
- Adulterant analysis in different brands of milk (Starch test, water test, formalin test, soap test and sulphate),
- Spectrophotometric Quantification of carbohydrates in different food samples,
- Quality analysis of turmeric powder (Metanil yellow, yellow lead salt and starch test),
- Basic concept of chromatography, Thin Layer Chromatography (TLC).

## 6. Biochemistry (Module 6)

- Basic of Biochemistry,
- Good laboratory practices (GLP),
- Micropipette handling (forward and reverse pipetting techniques),
- To perform the isoelectric precipitation of casein present in milk,
- To Estimate the Saponification value in fats/oils,
- Qualitative analysis of carbohydrates,
- Analysis of lactose by mucic test and microscopic view of mucic acid crystals,
- Biuretic reaction for detection of peptide bond,
- Principal of DNS reagent, Principle,
- SOP and application of spectrophotometer,
- Quantitative estimation of Carbohydrate by DNS Method,
- standard graph preparation and data interpretation.