Bio Re Inventors
New Identity of Innovation and Technology

Industry specific skill development trainings for Biology students

Biotechnology + Bioinformatics

Conducted by

Bio Re Inventors
New Identity of Innovation and Technology

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Module 1: Analytical techniques in genomics and proteomics

Eligibility: Undergraduate/post graduate students of Biology disciplines (Botany, Zoology, Biotechnology, Microbiology, Bio analytics, Biochemistry)

Duration: 15 Days (5-6 hrs./day)

1. Plasmid DNA (vector) isolation from bacterial culture
    - Agarose gel electrophoresis
    - RFLP
    - Agarose gel electrophoresis
2. Theory on PCR and Primer design for PCR
    - Gene amplification by Polymerase chain reaction
    - Agarose gel electrophoresis to check gene amplification
    - Competent cell preparation, transformation and plating
3. Analysis of protein profile by SDS-PAGE
    - Casting a polyacryalamide gel and sample preparation and gel loading
    - Electrophoresis and staining the gel with Coomasie Blue/Silver for visualization of proteins

Bioinformatics:

- Nucleotide database (Genbank, EMBL, DDBJ)
- Sequence retrieval systems (Entrez & SRS)
- Database Search methods & tools,
- PAM & BLOSUM Matrices, Algorithms- Dot Matrix, Smith waterman, Needleman-WUNSCH algorithm, BLAST, FASTA
- Similarity, Identity Homology, Global Alignment, Local Alignment, Visual Alignment, Dynamic Programming, Heuristic approach, Assessing the Significance of Sequence Alignments

Batch: 20 participants

Fees: 7080 /- including GST.

Module 2: rDNA Techniques for cloning biotherapeutic gene

Duration: 15 Day's (5-6 hrs/day)

Eligibility: TY Bsc/ Master's students/Completed master's degree

Day Isolation of expression vector and checking the yield on agarose gel elctrophoresis

1. Digestion of Plasmid vector with specific restriction enzyme used for cloning Purification of digested vector by gel extraction method using kit
   Polymerase chain reaction of the target gene and purification

2. Digestion of PCR product with specific restriction enzyme
   - Purification of digested PCR product using kit
   - Ligation of digested vector and Insert

3. Competent *E.coli* host preparation
   Transformation of ligation mix and plating

4. Confirmation of recombinants by colony PCR
   - Theory on PCR and primer design
   - Agarose gel electrophoresis of colony PCR to confirm recombinant

Bioinformatics:

- Genome Anatomy, Prokaryotic genomes structures, Eukaryotic genomes structures, genome database
- Gene density, Gene Ontology, Gene Order (Synteny), Transposable elements, Pseudo genes, Gene Clusters, Segmental duplication, non-coding conservation, Comparative genomics, Importance of Full Genome Alignments.
- Significance of MSA, Various approaches for MSA (Progressive & Iterative alignment), Star Alignment
- Gene prediction methods, Neural Networks, Pattern Discrimination methods, Signal sites Predictions (Promoter, Splice, UTR, CpG-islands), Evaluation of Gene Prediction methods

Batch: 20 participants

Fees: 7080 /- including GST.

Module 3: Expression of recombinant protein and profile checking on SDS-PAGE

Duration: 15 day's (5-6 hrs/day)

Eligibility: TY Bsc/ Master's students/Completed master's degree

1. Competent *E.coli* expression host preparation
   - Transformation of recombinant plasmid and plating
2. Growing recombinant culture and induction (Shake flask fermentation) Cell harvest
3. Bead lysis of harvested cells to release the protein and sample preparation
   - Casting of SDS-PAGE
4. Loading the samples on SDS-PAGE and staining

Bioinformatics:

- Gene prediction methods, Neural Networks, Pattern Discrimination methods, Signal sites Predictions (Promoter, Splice, UTR, CpG-islands), Evaluation of Gene Prediction methods
- Protein prediction, Protein identification, annotation
- ExPASy proteomics tools
- Structural genomics: SCOP, CATH, DALI (visualization of structural information and viewer), structural pairwise alignment: VAST and TOPSEARCH, DALI

Batch: 20 participants

Fees: 7080 /- including GST.

Module 4: Purification of recombinant protein by Affinity chromatography

Duration: 15 Day's (5-6 hrs/day)

Eligibility: Master's students/Students with Bachelor's/master's degree

1. Casting of SDS-PAGE. Loading the protein samples and staining
2. Packing of column with affinity resin, washing and equilibration with buffer
3. Protein loading for binding to the resin and elution and Fraction collection
4. Casting of SDS-PAGE. Loading the protein samples and silver staining

- Protein quantification Basic bioinformatics

Bioinformatics:

- Gene prediction methods, Neural Networks, Pattern Discrimination methods, Signal sites Predictions (Promoter, Splice, UTR, CpG-islands), Evaluation of Gene Prediction methods
- ExPASy genomics tools
- Protein prediction, Protein identification, annotation
- ExPASy proteomics tools

Batch: 20 participants

Fees: 7080 /- including GST.

Module 5: Basic techniques in Microbiology

Duration: 15 day's (5-6 hrs/day)

Eligibility: TY Bsc/ Completed Bachelor's degree

- Basics of microbiology: Sterilization techniques, Media preparations,
- Types of staining- Monochrome staining, Gram staining, Capsule staining, Endospore staining
- Determination of TVC/CFU of a sample using spread plate and pour plate technique
- Study of growth kinetics of bacteria
- Effect of temp and pH on bacterial growth

Bioinformatics:

- Gene prediction methods, Neural Networks, Pattern Discrimination methods, Signal sites Predictions (Promoter, Splice, UTR, CpG-islands), Evaluation of Gene Prediction methods
- ExPASy genomics tools
- Microorganism specific databases
- PGT databse

Batch: 20 participants

Fees: 7080 /- including GST.

Module 6: Microbial application in Environment and Food

Duration: 15 Day's (5-6 hrs/day)

Eligibility: Bsc/ MSc/Completed Master's degree

- Isolation of bacteria, study of its colony characters and its identification upto genus level (will include performing various biochemical tests)
- Isolation of symbiotic/non-symbiotic nitrogen fixing bacteria
- Assessment of potability of water using by the MPN (most probable number) test for coliforms
- Settling velocity determination for air samples
- Rapid detection of coliforms using colony PCR
- Assessment of milk pasteurization
- Assessment of microbial contamination in health drink

Bioinformatics:

- Nucleotide database (Genbank, EMBL, DDBJ)
- Sequence retrieval systems (Entrez & SRS)
- Database Search methods & tools,
- Significance of MSA, Various approaches for MSA (Progressive & Iterative alignment), Star Alignment
- ExPASy proteomics, genomics tools

Batch: 20 participants

Fees: 7080 /- including GST.

Module 7: Techniques in Clinical Microbiology

Duration: 15 Day's (5-6 hrs/day)

Eligibility: Bsc/ MSc/Completed Master's degree

- Study of clinically important bacteria: *Proteus,/Salmonella,/Klebsiella pneumoniae, Pseudomonas aeruginosa, / Staphylococcus aureus (colony characterization and staining)*
- Specific Biochemical tests for detection of above organisms
- Rapid detection of clinically important microbes by PCR
- Determination of MIC and MBC of an antibiotic
- Kirby-Bauer disc diffusion assay and well diffusion assay of antibiotics
- Detection of infectious organism from clinical sample (isolation and identification)

Bioinformatics:

- Gene prediction methods, Neural Networks, Pattern Discrimination methods, Signal sites Predictions (Promoter, Splice, UTR, CpG-islands), Evaluation of Gene Prediction methods
- ExPASy genomics tools
- Protein prediction, Protein identification, annotation
- PGT databse
- Next generation sequencing,
- FASTq , SNP-Seq

Batch: 20 participants

Fees: 7080 /- including GST.

Module 8: Fundamental Techniques in Biochemistry

Duration: 15 Day's (5-6 hrs/day)

Eligibility: Bsc/ MSc/Completed Master's degree

- Beta amylase Enzyme activity
- Enzyme kinetics and determination of Km Vmax
- Impact of pH and temperature on enzyme activity
- Protein estimation
- Carbohydrate estimation
- Vit C estimation
- TLC

Bioinformatics:

- FindMOD, ProMOST, PhophoSitePlus, dbPTM
- SwissSideChain, SwissParam, Openstructure,
- Protein model portal, COILS, Swiss-Dock
- SWISS_target prediction,

Batch: 20 participants

Fees: 7080 /- including GST.

Module 9: Techniques in Clinical Biochemistry

Duration: 15 Day's (5-6 hrs/day)

Eligibility: Bsc/ MSc/Completed Master's degree

- Cholesterol Estimation
- Bilirubin Estimation
- Triglyceride estimation
- Protein estimation
- SGOT
- SGPT
- Beta Lactamase estimation
- Alkaline Phosphatase Estimation Sugar Estimation

Bioinformatics:

- FindMOD, ProMOST, PhophoSitePlus, dbPTM
- SwissSideChain, SwissParam, Openstructure,
- Protein model portal, COILS, Swiss-Dock
- SWISS_target prediction
- Data mining
- MEGA for phylogenetic analysis

Batch: 20 participants

Fees: 7080 /- including GST.

Sr. No.	Modules Name	Fees for per Modules

1.	Analytical techniques in genomics and proteomics	7080 /- including GST
2.	rDNA Techniques for cloning biotherapeutic gene	7080 /- including GST
3.	Expression of recombinant protein and profile checking on SDS-PAGE	7080 /- including GST
4.	Purification of recombinant protein by Affinity chromatography	7080 /- including GST
5.	Basic techniques in Microbiology	7080 /- including GST
6.	Microbial application in Environment and Food	7080 /- including GST
7.	Techniques in Clinical Microbiology	7080 /- including GST
8.	Fundamental Techniques in Biochemistry	7080 /- including GST
9.	Techniques in Clinical Biochemistry	7080 /- including GST
10.	**Complimentary Relevant Bioinformatics**	–

All modules Fees: 35,000 +GST