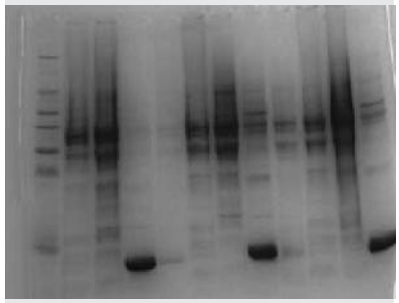

Source:
Dr. D. Vijaya Ramu, BT, VU

16BT404 GENOMICS AND PROTEOMICS

Hours Per Week :

L	T	P	C
3	-	2	4

Course Description and Objectives:

This course offers various tools available for analyzing genomes and proteomes of different organisms. The objective of this course is to enrich students with a wide array of genomic and proteomic approaches utilized for various therapeutic applications.

Course outcomes:

Upon completion of the course, the student will be able to

CO1. Identify exons and introns in a given genomic sequence to understand organization of genomes.

CO2. Subclone and express genes in prokaryotic expression vector and detect proteins in polyacrylamide gels.

CO3. Gain adequate knowledge on various tools available for annotation of genomes.

CO4. Apply concepts of Microarrays.

CO5. Comprehnd techniques of protein-separation, sequencing and identification.

SKILLS:

- ✓ *Amplify selectable marker.*
- ✓ *Design primers for amplification of screenable marker in construct.*
- ✓ *Identify exons and introns in Th1 genes of different species.*
- ✓ *Identify cSNPs between any two genes pertaining to two different breeds of chick.*
- ✓ *Expression of genes using prokaryotic systems.*

UNIT - 1 L-9

INTRODUCTION TO GENOMICS: Organization and structure of genomes; Genome size; Sequence complexity; Introns and exons; Chromosomes-isolation, chromosome micro dissection and its applications.

UNIT - 2 L-9

GENE IDENTIFICATION AND EXPRESSION: Genome annotation; Traditional routes of gene identification; Detecting open-reading frames; Software programs for finding genes; Identifying the function of a new gene; Gene ontology; Overview of comparative genomics; Determining gene function by sequence comparison and through conserved protein structure; Global expression profiling; Traditional approaches to expression profiling.

UNIT - 3 L-9

ANALYSIS OF PROTEOMICS: Introduction to Proteomics - the proteome, mining proteomes, bridging genomics and proteomics data; Analysis of proteomes - SDS-PAGE, 2D gel electrophoresis, detecting proteins; Mass spectrometry.

UNIT - 4 L-9

ANALYSIS OF GENOMICS: Micro arrays - types of micro arrays, designing a microarray experiment, applications of microarray technology; Chip array; Shotgun method.

UNIT - 5 L-9

APPLICATIONS OF GENOMICS AND PROTEOMICS: Insights from genome sequencing of various species - human, mouse, *Plasmodium falciparum*, *Saccharomyces cerevisiae* and *Mycobacterium tuberculosis*; Application of proteome analysis in drug development and toxicology; Applications of proteomics in plant genetics and breeding.

ACTIVITIES:

- *Amplification of gene by PCR.*
- *Expertise in designing primers.*
- *Analyzing exons and introns of gene.*
- *Expertise with sub-cloning of gene.*
- *Expertise with expression of gene.*

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS Total hours 30

1. *Insilico* determination of exons and introns in a gene.
2. Designing of primers employing generunner software.
3. Amplification of gene by polymerase chain reaction.
4. Sequence analysis of gene by BLAST.
5. Insilico identification of cSNPs.
6. Cloning of gene in plasmid for gene modifications.
7. Expression of gene for functional protein production.
8. Analyzing the solubility of proteins by plasmolysis.

TEXT BOOKS:

1. S. B. Primrose and R.M. Twyman, "Principles of Genome Analysis and Genomics", 7th edition, Blackwell Publishing, 2006.
2. S. Sahai, "Genomics and Proteomics, Functional and Computational Aspects" Plenum Publication, 1999.

REFERENCE BOOKS:

1. A. K. Konopka and J. C. Crabbe, "Compact Hand Book - Computational Biology", Marcel Dekker, USA, 2004.
2. S.R. Pennington and M.J. Dunn, "Proteomics: From Protein Sequence to Function", 1st edition, Academic Press, San Diego, 1996.