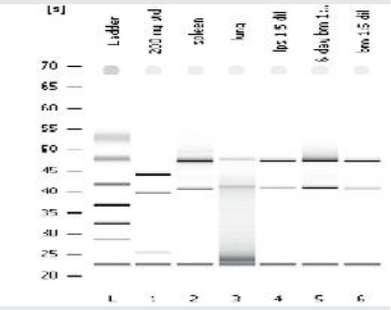

Source:
Dr. D. Vijaya Ramu, BT, VU

16BT208 MOLECULAR BIOLOGY

Hours Per Week :

L	T	P	C
3	-	2	4

Total Hours :

L	T	P
45	-	30

WA/RA	SSH/HSH	CS	SA	S	BS
60	50	-	8	2	2

Course Description and Objectives:

This course describes the structure, synthesis and processing of nucleic acids and protein synthesis in prokaryotes and eukaryotes. The objective of this course is to impart the concepts of genetic materials, central dogma, mutations and DNA repair.

Course Outcomes:

The student will be able to:

- learn the structure of genetic materials
- understand the concepts of central dogma of life.
- understand biochemical synthesis and molecular processes that occur during cell growth.
- acquire concepts of genetic code.

SKILLS:

- ✓ *Determining purine-pyrimidine complementation.*
- ✓ *Handling of micro-pipette.*
- ✓ *Setting up chemical reactions in micro-volumes.*
- ✓ *Handling reagents, enzymes and biochemicals related to molecular biology.*

UNIT - 1 **L-9**

STRUCTURE OF DNA AND RNA: Discovery-structure of DNA; B, A and Z models; Denaturation and melting curves; m-RNA, r-RNA, t-RNA structures.

UNIT - 2 **L-9**

DNA REPLICATION: Models of DNA replication: semi-conservative model, mitochondrial (D-loop), viral DNA (Rolling circle); Single stranded- DNA phages (M13, phi-174); Mechanism of DNA replication in *E.coli* (bi- directional); Inhibitors of DNA replication; Enzymes involved in replication; Eukaryotic telomeres.

UNIT - 3 **L-9**

RNA BIOSYNTHESIS AND POST TRANSCRIPTIONAL PROCESSING: Transcription apparatus; Mechanism of transcription in prokaryotes and eukaryotes; RNA polymerases and proteins involved in transcription; Inhibitors of transcription; Post transcriptional processing of mRNA.

UNIT - 4 **L-9**

PROTEIN BIOSYNTHESIS IN PROKARYOTES AND EUKARYOTES: The genetic code and Wobble Hypothesis; Protein synthesis in prokaryotes and eukaryotes; Differences between prokaryotic and eukaryotic protein synthesis; Post translation modifications; Inhibitors of protein synthesis.

UNIT - 5 **L-9**

MUTAGENESIS: Types of mutagens and their actions; Types of mutations- spontaneous, induced and lethal; Characteristics of mutations and applications; Site- directed mutagenesis and reverse genetics; DNA damage and repair mechanisms; Nucleotide excision repair mechanisms; Mismatch repair mechanism and base excision repair mechanism.

LABORATORY EXPERIMENTS

LIST OF EXPERIMENTS Total hours: 30

1. Isolation of genomic DNA from plants.
2. Isolation of genomic DNA from animals.
3. Isolation of genomic DNA from bacteria.
4. Quantification of DNA by UV Spectrophotometer.
5. Isolation of RNA.
6. Quantification of RNA by UV Spectrophotometer.
7. Agarose gel electrophoresis to visualize and quantify DNA isolated from bacteria, plants or animals.
8. SDS-PAGE technique for separation of proteins.
9. Staining of PAGE gels with Coomassie brilliant blue.
10. Staining of PAGE gels with silver nitrate.

TEXT BOOKS :

1. D. Freifelder, "Molecular Biology", 2nd Edition, Narosa Publishing Home 1987.
2. Channarayappa, "Molecular Biotechnology: Principles and Practices", 1st Edition, Universities Press, 2006.
3. M.R.Green and J. Sambrook. "Molecular Cloning: A Laboratory Manual", 4th Edition, Cold Spring Harbor Lab. 2013.

REFERENCE BOOKS:

1. H.Lodish, A. Berk, S.L. Zipursky, P. Matsudaira, D. Baltimore and J. Darnell, "Molecular Cell Biology", 6th edition, W.H. Freeman & Company, 2007.
2. J.E. Krebs, E.S. Goldstein, S.T. Kilpatrick, "Lewin's Genes XI", 11st Edition, 2015.

ACTIVITIES:

- *Model the double-helix of DNA using ball and stick kit.*
- *Identify complements, palindromes, loops and bends.*
- *Predict DNA complexity by gel electrophoresis.*
- *Amplify gene using PCR.*