

M.F.Sc. Fish Biotechnology (1st Semester)

Course: FBT 503-Gene Structure and Regulation of Expression (2+1) Lecture Plan (Theory)

S. No.	Unit	Topics	Lecture Plan
1	Unit I	Gene components: Genes, Types of genes; Gene structure:	01
2		Promoters, UTRs, ORFs, exons, Introns, Termination signal,	02
3		Mono- and polycistronic genes, Gene clustering; Overlapping genes (Phi X174 virus).	01
4	Unit II	Regulation of gene expression in Prokaryotes: Operon concept: Types of operons	02
5		Lactose and tryptophan operons (Lac/Trp), Their structure and mode of regulation;	03
6		Induction of transcriptional factors by environmental and biological factors (SOS response), Bidirectional promoters.	02
7	Unit III	Regulation of gene expression in Eukaryotes: DNA protein interactions (concept of DNA foot printing, EMSA, zinc fingers, leucine zippers, helix turn helix, Z-DNA);	03
8		Transcription factors, Promoters, Enhancers, Repressors, Insulators, Attenuators, IRES,	03
9		Alternative splicing	01
10	Unit IV	RNA in gene regulation	02
11		RNA interference. Expression Profiling: Antisense RNA, MicroRNA, Ribozymes,	02
12		Micro array and Real time PCR, RNA seq	04
13	Unit V	Epigenetics: DNA methylation, Genetic imprinting, Histone modifications, Chromatin remodeling.	03
14	Unit VI	Mutagenesis: Site-directed mutagenesis and its applications, Transposon induced mutagenesis	03
Total			32

Dr. Mamta Singh
(Course Teacher)

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Course: FBT 503-Gene Structure and Regulation of Expression (2+1) Lecture Plan (Practical)

S. No.	Practical	Practical Plan
1	Preparation of buffers and reagents	01
2	Total RNA extraction	02
3	Quality checking of RNA by Agarose Gel Electrophoresis	01
4	cDNA synthesis by RT-PCR	01
5	Polymerase Chain Reaction	01
6	DNA purification from agarose gel	01
7	Retrieval of Gene information from NCBI/ENSEMBL.	02
8	BLAST analysis. In-silico identification and analysis of promoters, transcription factors and other regulatory elements.	02
9	Primer designing	02
10	T/A cloning. Screening of recombinant clones by blue white selection.	02
11	RACE-PCR.	01
	Total	15

(Dr. Mamta Singh)
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