Dated: 08 Jan, 2016

COURSE HANDOUT (PART-II)

In addition to part I (general handout for all courses appended to the timetable) this portion gives further specific details regarding the course.

Course No : **BIO F243**
Course Title **: Genetics**
Instructor-In charge : **S K Verma**
Manoj Kannan

1. Scope and objective of the course:
The course aims at presenting modern concepts of genetics , continuity and variation in living organisms. Starting from classical genetics, an introduction to molecular, microbial and human genetics would also be provided.

2. Text Book:
TB: Tamarin, Robert H. *Principles of Genetics* (7th edition). New Delhi: Tata McGraw-Hill, 2002.

3. Reference Books:
RB1: Freifelder, David. *Microbial Genetics* (2nd edition). New Delhi: Narosa Publishing House, 2009.
RB2: Cummings, Michael R. *Human Genetics* (India edition). New Delhi: Cengage Learning India Pvt. Ltd., 2009.
RB3: Hartwell, Leland *et. al. Genetics: From Genes to Genomes* (International edition). New York: McGraw-Hill, 2004.

4. Course Plan:

Lec #	Learning objective	Topics to be covered	Ref.
1	Introduction to genetics	Brief overview of Modern Genetics	Chap. 1 (TB)
2-5	Basic modes of heredity	Mendelian genetics: Laws of inheritance Gene interaction, multiple allelism, inborn errors of metabolism, one-gene-one enzyme hypothesis	Lecture Notes, Chap. 2 (TB)
6-9	Linkage and Mapping in Eukaryotes	Diploid Mapping; Two point test cross, Three point test cross, Haploid Mapping(tetrad analysis), Somatic Crossing Over	Chap. 6 (TB) Lecture Notes
8-11	Bacterial genetics (Linkage and mapping in Prokaryotes)	Bacterial Transformation: detection, competence, DNA uptake and transformation mapping. Bacterial conjugation: Hfr Transfer, recombination in recipient cells, conjugation mapping	Chap.13,14 (TB) + RB1

12-14	Phage Genetics	Genetic recombination in phages; Fine structure of T4rII locus; Transduction: DNA transfer, co-transduction, linkage mapping, mapping by co-transduction.	Chap.7,15,16,18(TB) + RB1
15-17	Chemistry of Genes	Nucleic acids & structure; Supercoiling; DNA replication in pro & eukaryotes	Chap.9 (TB) Lecture Notes
18-19	Organization of genetic material in Eukaryotes	DNA packaging; Repetitive & unique sequences; Split genes & overlapping genes, Transposable genetic elements	Chap.15 (TB) Lecture Notes
20-21	Cytogenetics	Structure of chromosome; Variation in chromosome no.& structure	Chap.8 (TB) Lecture Notes
22-24	DNA mutation, repair & recombination	Types of mutations; DNA repair mechanism(mainly prokaryotes); Recombination: double stranded break models	Chap.12 (TB) Lecture Notes
25-28	Expression of Gene	Transcription in Prokaryotes & Eukaryotes; RNA splicing; RNA editing; Translation in prokaryotes & eukaryotes	Chap.10,11 (TB) Lecture Notes
29-31	Regulation of gene expression in Prokaryotes	Operon model, *lac* & *trp* operons; Lytic & lysogenic cycles in phage-λ; Post transcriptional regulation	Chap.14 (TB)
32-34	Regulation of gene expression in Eukaryotes	Transcription control, Chromatin modelling & specific transcription factors; DNA methylation; Histone modification	Chap.16 (TB)
35-36	Non-nuclear inheritance	Maternal effect & Cytoplasmic Inheritance	Chap.17 (TB)
37-40	Human Genetics	Cancer genetics; Immunogenetics; Pedigree & Sex-linked inheritance; Human genome project & genomics	Chap.5,16 (TB) Chap.15(RB2) Chap. 10(RB3) Lecture Notes

5. Evaluation Scheme:

Component	Duration	Weight (%)	Date and Time	Remarks
MID-SEM exam	90 Min	30	-	OB
Presentation		10	Mostly during Tutorial Hrs	
Tutorial Quizzes& Class Tests (several)		20	Distributed throughout the Sem during class and tutorial hrs.	CB
Comprehensive Exam	3 hrs	40	16/5 FN	Partly OB

Chamber consultation hour: To be announced in the class.

Notices: All notices will be displayed on the Dept. of Biological Sciences notice board.

Make-up policy: Make-up will be granted only if candidate is hospitalized and in genuine cases as decided by the IC. No make-up will be granted in quizzes under any circumstances.

Instructor-in- charge
BIO F243