

COURSE TITLE	FUNDAMENTAL MOLECULAR BIOLOGY
COURSE CODE	02MB0463
COURSE CREDITS	4

Objective:

- 1 To develop a better understanding of Molecular biology's fundamentals, emphasizing on key areas of current biology.

Course Outcomes: After completion of this course, student will be able to:

- 1 Develop a profound understanding of the fundamental principles of molecular biology.
- 2 Comprehend the scientific basis of the current understanding in the broad domain of molecular biology.
- 3 Understand the ways to manipulate biological systems at the molecular level for scientific or technological gains.
- 4 Devise suitable strategies using the knowledge in molecular biology to solve technical problems.

Pre-requisite of course:N.A.

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
4	0	0	50	30	20	0	0

Contents : Unit	Topics	Contact Hours
1	Nucleic Acid Structure And Genome Organization DNA as a genetic material, DNA structure, DNA topology, supercoiling, topoisomerases I and II, C-value paradox, structure of mRNA, rRNA and tRNA; DNA packaging, structure of chromatin and chromosomes, DNA-protein interactions, interrupted genes, gene families, unique and repetitive DNA, transposons	14
2	DNA replication, recombination and repair DNA replication in prokaryotes and eukaryotes; enzymes involved and mechanism of replication, regulation of replication, role of telomerases, Replication of extra-chromosomal DNA, inhibitors of replication., Homologous and site specific Recombination, Mechanism of recombination, DNA Mutation and repair: Spontaneous and Induced mutations, Physical and Chemical mutagenesis, Molecular mechanisms of mutagenesis – Transition, Transversion, Frame Shifts, mis-sense and non-sense mutations, Photo-reactivation, Excision Repair, Mismatch Repair, Post-replication Repair, SOS Repair.	16

Contents : Unit	Topics	Contact Hours
3	Transcription Organization of transcriptional units, transcription factors, transcription activators and repressors, RNA polymerases. Prokaryotic transcription, eukaryotic transcription - initiation, elongation and termination events (Rho dependent, Rho independent termination) post transcriptional modifications, RNA transport, RNA splicing and processing, mRNA stability and localization, catalytic RNA, non-coding RNAs	14
4	Translation and gene regulation Ribosomal structural components, Genetic code, Translation process in prokaryotes and eukaryotes: Initiation, elongation and termination; translational proof reading, post translational modification of proteins, translational inhibitors. , Operon concept, regulation of operon ex., lac, his and trp operons, eukaryotic transcription regulation	16
Total Hours		60

Textbook :

- 1 Genes IX, Benjamin Lewin, Jones and Bartlett Publishers Inc., 2008
- 2 Molecular Biology of the Cell, 4th Edition, , Bruce Alberts, Dennis Bray, Julian Lewis, Martin Raff, Keith Roberts, and James D. Watson, Garland Publishing., 2004

References:

- 1 Molecular Biology of the Gene, 5th Edition, , Molecular Biology of the Gene, 5th Edition, , Watson James D., Tania Baker, Stephen P. Bell, Alexander Gann, Michael Levine, Richard Lodwick, Pearson Education, Inc. and Dorling Kindersley Publishing, Inc., 2004
- 2 Molecular Biology, 4th Edition, , Molecular Biology, 4th Edition, , Weaver R., McGraw Hill Science, 2007

Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking
10.00	20.00	25.00	25.00	10.00	10.00

Instructional Method:

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, etc.

Instructional Method:

- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the class-room in the form of attendance, assignments, verbal interactions etc.
- 3 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.

Supplementary Resources:

- 1 https://books.google.co.in/books/about/Lewin_s_Genes_XI.html?id=yXFfPkLq4yEC&redir_esc=y
- 2 <https://www.youtube.com/shorts/Ndl89DpDa08>
- 3 https://www.youtube.com/watch?v=g_FQdmP5d5Q&pp=ygUabW9sZWN1bGFyIGJpb2xvZ3kgZ3JhcGhpY3M%3D