AMITY UNIVERSITY
UTTAR PRADESH

Annexure **'CD-01'**

Course Title: Molecular Biology
Course Code: GCMB213
Credit Units: 4
Level: UG

L	T	P/ S	FW/S W	TOTAL CREDIT UNITS
3	0	2	0	4

Course Objectives:
Molecular biology deals with nucleic acids and proteins and how these molecules interact within the cell to promote proper growth, division, and development. This course will emphasize the molecular mechanisms of DNA replication, repair, transcription, protein synthesis, and gene regulation in both prokaryotes and eukaryotes.The student will gain hands-on experience of the basic techniques involved in Molecular Biology.

Pre-requisites: Prerequisite courses are Biochemistry and Genetics

Student Learning Outcomes:

- Understand the basic molecular events that occur in a cell.
- Associate the complexity of various processes and their regulation with the increasing complexity from prokaryotes to eukaryotes.
- Critically analyze primary literature in the field
- Design simple experiments including controls and critically evaluate the resulting data

Course Contents / Syllabus:	**Weightage**
Module I Central dogma	**15%**
• Central dogma of Molecular Biology • DNA as genetic material • Structure of DNA and RNA	
Module II DNA replication and Repair	**20%**
• Mechanisms of prokaryotic and eukaryotic DNA replication, • Enzymes and accessory proteins involved in DNA replication, • Molecular basis of mutations,	

DNA repair mechanisms ; • mismatch, • direct • base-excision • nucleotide excision • SOS repair	
Module III Transcription	**15%**
• Prokaryotic transcription • Eukaryotic transcription, • RNA polymerases, • General and specific transcription factors. • Regulatory elements: Promoters and Enhancers	
Module IV Processing of RNA	**15%**
• 5'-cap formation, • transcription termination, • 3 '-end cleavage and polyadenylation, • Splicing of nuclear mRNA and Group II introns, • Ribozymes (group I introns), • RNA editing, • Nuclear export of mRNA	
Module V Translation	**15%**
• Genetic code and its properties, • Prokaryotic and eukaryotic translation, • Mechanisms of initiation, elongation and termination.	
Module VI Regulation of gene expression in prokaryotic and eukaryotic systems	**20%**
• Gene regulation in prokaryotes: *lac* operon, *trp* operon, • Gene regulation in eukaryotes at transcriptional level and translational level, • Chromatin structure and organization. • RNA interference mediated gene silencing	
List of Experiments: • Isolation of genomic DNA	

- Isolation of plasmid DNA
- Agarose gel electrophoresis
- Restriction Digestion and Ligation of DNA
- RFLP analysis

Pedagogy for Course Delivery:

Lectures: 43
Tutorial: 0
Presentation/ Seminar: 0
Class Test: 02
Total: 45

Lab/ Practical details, if applicable:

Practical: 13
Tutorial: 0
Class Test: 01
Viva: 1
Total: 15

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	Total
75	25	100

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment						
Components (Drop down)	Mid-Term Exam	Project	Viva	Attendance	End Term Examination	**Total**

Weightage (%)	10	10	5	5	70	100

Lab/ Practical/ Studio Assessment:

	Continuous Assessment/Internal Assessment				**End Term Examination**			
Components (Drop down)	**Class test**	**Lab record**	**Viva**	**Attendance**	**Performance**	**Lab Record**	**Viva**	Total
Weightage (%)	15	5	5	5	40	10	20	100

Text:

- Genes IX. Lewin,, Benjamin Lewin 2008, Oxford University Press
- Molecular Biology of the Gene ,7th Edition. James D. Watson**,** Tania A. Baker,Stephen P. Bell and Alexander Gann 2013; Pearson Education.
- Molecular Cell Biology 7th Edition. Harvey Lodish, Arnold Berk, Chris A. Kaiser and Monty Krieger**,** 2012**;** W.H. Freeman and Company