



Molecular Biology

Course Code	Course Num.	Course Name	Credit Hours	Lec.	Lab	Tut	Prerequisites
BIO	232	Molecular Biology	3	2	2	0	BIO231

Objectives:

By the end of the semester, the student should be able:

- To explain and give examples of how ionic, hydrophobic, and hydrogen bonding interactions determine the structure of nucleic acids and proteins and modulate the specificity of binding between them.
- To describe the molecular structure of genetic material and function.
- To distinguish between different molecular biology techniques that are used to isolate, separate, and probe for specific proteins, nucleic acids, and their interactions. Identify limitations of these techniques.
- To compare and contrast the mechanisms of bacterial and eukaryotic DNA replication, DNA repair, transcription, and translation.
- To explain how DNA topology and chromatin structure affects the processes of DNA replication, repair, and transcription.
- To give examples of DNA and histone modifications and predict how they will affect gene expression.
- To provide examples of how homologous recombination is used to ensure genome stability and promote genetic diversity.

Syllabus:

- How do nucleic acids and proteins interact in a genomic context
- The molecular structure of genetic material and function.
- Structure of chromosome and recombination, Nucleic acids and tools for analysis
- Genome sequencing and analysis, DNA topology and chromatin
- Proteins and tools for analysis, Interactions between nucleic acids and proteins
- Cell cycle and DNA replication, DNA damage and repair I, DNA damage and repair II – group work.
- Regulation of Gene expression in eukaryotic and prokaryotic, Mechanisms of transcription in bacteria, Chromatin and transcription in eukaryotes, RNA splicing and processing, The genetic code and translation initiation
- Mechanisms and regulation of translation, Regulation of gene expression I.
- Regulation of gene expression II, Regulation of gene expression by small RNAs
- Tools for genome editing, Work of the map the genome and its applications

References:

- Harvey Lodish et al. .Molecular Cell Biology (Lodish, Molecular Cell Biology) 7th (2012). ISBN-13: 978-1429234139.
- Bruce Alberts , Alexander Johnson et al. Molecular Biology of the Cell, 6th Ed.(2014) , ISBN-13: 978-0815344322.

