- Electronic Devices and Circuit Theory-R.L. Boylestad and L.Nashelsky, Pearson Education, 2009.

GENERIC ELECTIVES (GE-III.4.3.): Flow of information in Living Systems

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course	Department offering the course
		Lecture	Tutorial	Practical/ Practice			
GE 3.3.; Flow of Information in Living Systems	4	2	0	2	Class XII pass	NIL	Chemistry / Biology Faculty of CIC

Learning Objectives

This module is designed to:

- Introduce students to nuclear events such as replication, transcription, translation, condensation, repair and recombination etc.
- Introduce gene regulation in prokaryotes and eukaryotes
- Introduce various biophysical and biochemical techniques related to these nuclear events

Learning Outcomes

Upon completion of the course the students will be able to:

- Understand the structure and function of DNA and RNA
- Build concepts about the processes of the Central Dogma of the living systems (replication, transcription, translation, recombination etc.)
- Develop an understanding of prokaryotic and eukaryotic gene regulation

SYLLABUS

Unit I: Structure and properties of the nucleic acids

Structure and biophysical properties of the DNA and RNA, forms of DNA and RNA, DNA binding domains [8 hours]

Unit II: Replication, Transcription and Translation

DNA replication models, Enzymes of DNA replication, DNA replication in prokaryotes and eukaryotes, regulation of DNA replication; [8 hours]

RNA polymerases, Transcription in prokaryotes and eukaryotes, Regulation of transcription in Prokaryotes and Eukaryotes, Eukaryotic chromatin; Ribosomes; translation in prokaryotes and eukaryotes

Unit III: DNA repair and recombination

DNA damage and repair, Molecular recombination [8 hours]

Unit IV: DNA packaging and chromatin structure, regulation of gene expression in eukaryotes [6 hours]

Practical Component [60 hours]

- Agarose gel electrophoresis of DNA/ Proteins
- SDS-PAGE Electrophoresis
- Polymerase Chain Reaction (PCR)
- Primer design
- Spectrometry (Experiments based on DNA/ protein interactions with ligands)
- Modelling of DNA and RNA forms and motifs through computational tools
- Innovation Projects

Essential/recommended readings

- Nucleic acids in Chemistry and Biology; G. Michael Blackburn, Martin Egli, Michael J. Gait; RSC Publisher, 2022
- Molecular Biology of the Cell; Bruce Alberts, Rebecca Heald, Alexander Johnson, David Morgan, Martin Raff, Keith Robert, Peter Walter 2022
- Biology, Raven et al. Tata Mc Graw –Hill, 2016
- Biology: Global Approach. Reece et al., Pearson Educations, Global edition, 2020
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GENERIC ELECTIVES (GE-3.4.): The Living world: Systems Approach

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course	Department offering the course
		Lecture	Tutorial	Practical/ Practice			
***GE 3.4.; The Living world: Systems Approach**	**4**	**2**	**0**	**2**	**Class XII pass**	**NIL**	**Chemistry / Biology Faculty of CIC**

***This paper can be opted by students in either 3rd or 4th semester.**

Learning Objectives

This module is designed to: