



**Swami Shraddhanand College
(University of Delhi)**

Alipur, Delhi- 1100036

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Lesson Plan

Name of Teacher	Prof. Bhoopander Giri (1 class/week) Dr. Bhawna Saxena (1 class/week)	Department	Botany
Course	B.Sc. (ALS)	Semester	III
Paper	Genetic and Molecular Biology	Academic Year	2023-2024

Learning Objectives

Learning Objectives:

The Learning Objectives of this course are as follows:

- To understand the basic concept of Mendelian genetics and comprehensive study of Mendelian extensions.
- To provide adequate knowledge about Linkage, Crossing over and Mutations.
- To provide brief knowledge of population and evolutionary genetics.
- To impart detailed understanding about nucleic acids structure and types, Nucleosome; and key events of molecular biology comprising of mechanism of DNA Replication, Transcription and Translation in Prokaryotes and Eukaryotes
- To give comprehensive explanation of Transcriptional Regulation with examples of lac operon and tryptophan operon in prokaryotic as well as eukaryotic organisms along with key concept of Gene Silencing to the course learners.

Learning Outcomes

By the end of the course, the students will be able to:

- understand the basic concepts of Mendelian genetics and its extension, Linkage and Crossing over, Mutations and population genetics.
- Formulate the mechanism of replication, transcription, translation in prokaryotes and eukaryotes.
- Comprehend the mechanism of gene regulation and gene silencing.

Lesson Plan

Week No.	Theme/ Curriculum
1. Week 1 (16 st -20 th Aug 23)	Orientation
2. Week 2 (21 st -27 th Aug 23)	Unit 1: Mendelian Genetics and Extensions Mendel's work on transmission of traits, Co-dominance (Prof. Bhoopander Giri) Unit 2: Extra-chromosomal Inheritance Cytoplasmic inheritance: Chloroplast variegation in Four 'O clock plant, (Dr. Bhawna Saxena)
3. Week 3 (28 th -3 rd Sept 23)	Unit 1: Mendelian Genetics and Extensions Incomplete dominance, Multiple alleles (Prof. Bhoopander Giri) Unit 2: Extra-chromosomal Inheritance Cytoplasmic inheritance: Kappa particles in Paramecium, Maternal effect-shell coiling pattern in snail. (Dr. Bhawna Saxena)
4. Week 4 (4 th -10 th Sept 23)	Unit 1: Mendelian Genetics and Extensions Lethal Genes, Epistasis, Pleiotropy, polygenic inheritance, Pedigree analysis. (Prof. Bhoopander Giri) Unit 3: Linkage, Crossing over and Chromosomal Mapping Linkage and crossing over (Dr. Bhawna Saxena)
5. Week 5	Unit 4: Mutations Chromosomal mutations, Deletion (Prof. Bhoopander Giri)

(11 th -17 th Sept 23)	Unit 3: Linkage, Crossing over and Chromosomal Mapping Recombination mapping two point (Dr. Bhawna Saxena)
6. Week 6 (18 th -24 th Sept 23)	Unit 4: Mutations Duplication, Inversion, Translocation (Prof. Bhoopander Giri) Unit 3: Linkage, Crossing over and Chromosomal Mapping Recombination mapping three points. (Dr. Bhawna Saxena)
7. Week 7 (25 th -1 th Oct 23)	Unit 4: Mutations Aneuploidy and Polyploidy (Prof. Bhoopander Giri) Unit 5: Population and Evolutionary Genetics Allelic frequencies, Genotypic frequencies (Dr. Bhawna Saxena)
8. Week 8 (2 nd -8 th oct 23)	Unit 4: Mutations Gene mutations. (Prof. Bhoopander Giri) Unit 5: Population and Evolutionary Genetics Gene pool, Hardy-Weinberg Law. (Dr. Bhawna Saxena)
9. Week 9 (9 th -15 th oct 23)	Unit 6: The Structures of Genetic Material: DNA and RNA DNA structure: Salient features of double helix, Types of DNA (Prof. Bhoopander Giri) Unit 8: Transcription and Processing of RNA Mechanism of transcription in prokaryotes (Dr. Bhawna Saxena)
10. Week 10 (16 th -22 th Oct 23)	Unit 6: The Structures of Genetic Material: DNA and RNA DNA denaturation and renaturation, Nucleosome, Chromatin structure- Euchromatin (Prof. Bhoopander Giri) Unit 8: Transcription and Processing of RNA Mechanism of transcription in eukaryotes (Dr. Bhawna Saxena)
11. Week 11 (23 th -29 th Oct 23)	Unit 6: The Structures of Genetic Material: DNA and RNA Heterochromatin-Constitutive and Facultative heterochromatin, RNA structure and its types. (Prof. Bhoopander Giri) Unit 8: Transcription and Processing of RNA Split genes-concept of introns and exons (Dr. Bhawna Saxena)
12. Week 12 (30 th -5 th Nov 23)	Unit 7: Replication of DNA Mechanism of prokaryotic DNA replication (Prof. Bhoopander Giri) Unit 8: Transcription and Processing of RNA (04 Hours) Removal of introns, Spliceosome machinery. (Dr. Bhawna Saxena)
13. Week 13 (6 th -12 th Nov 23)	Unit 7: Replication of DNA (03 Hours) Chemistry of DNA synthesis, Enzymes and proteins involved in DNA replication. (Prof. Bhoopander Giri) Unit 9 Translation

	Mechanism of translation in prokaryotes initiation, elongation and termination of polypeptides (Dr. Bhawna Saxena)
14. Week 14 (13 th -19 th Nov 23)	Unit 7: Replication of DNA Comparison of replication in prokaryotes and eukaryotes. (Prof. Bhoopander Giri) Unit 9 Translation Mechanism of translation in eukaryotes: initiation, elongation and termination of polypeptides (Dr. Bhawna Saxena)
15. Week 15 (20 th -26 th Nov 23)	Unit 7: Replication of DNA Comparison of replication in prokaryotes and eukaryotes. (Prof. Bhoopander Giri) Unit 10: Regulation of transcription in prokaryotes and eukaryotes Prokaryotes: Regulation of lactose metabolism and tryptophan synthesis in E.coli (Dr. Bhawna Saxena)
16. Week 16 (27 th -3 rd Dec 23)	Revision- (Prof. Bhoopander Giri) Unit 9 Translation proteins and enzymes involved in translation. (Dr. Bhawna Saxena)
17. Week 17 (4 th -6 th Dec 23)	Unit 10: Regulation of transcription in prokaryotes and eukaryotes Eukaryotes:Transcription factors, Heat shock proteins (Dr. Bhawna Saxena) Unit 10: Regulation of transcription in prokaryotes and eukaryotes Heat shock proteins, Gene silencing. (Dr. Bhawna Saxena)
Suggested Readings	
Books	Essential/recommended readings 1. D.P. Snustad, and M.J. Simmon, Genetics, 6 th Ed., John Wiley & Sons. (Singapore) 2012 2. B.A Pierce, Genetics - A Conceptual Approach, . 4 th Ed., W.H. Freeman & Co. (New York) 2012 3. A.J.F Griffiths, S. R Wessler, S. B Carroll & J. Doebley, An Introduction to Genetic Analysis,. 10 th Ed., W.H. Freeman & Company (New York) 2010. 4. Watson J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M., Losick, R. (2007). Molecular Biology of the Gene, Pearson Benjamin Cummings, CSHL Press, New York, U.S.A. 6th edition.

Suggestive readings

1. Klug, W.S., Cummings, M.R., Spencer, C.A. (2009). Concepts of Genetics. Benjamin Cummings.U.S.A. 9th edition.

2. Russell, P. J. (2010). Genetics- A Molecular Approach. Benjamin Cummings, U.S.A. 3rd edition.

Assignment and Class Test Schedule for Semester

Assignments: Submission by 30th October 2023

Class Test: As per the College mid-semester exam schedule