Code	Subject Title	Cr. Hrs	Semester
BOT-303	Microbial and Molecular Genetics	3	V
Year	Discipline		
3	Botany		

Syllabus Outline: Genetic Study of Prokaryotes and Eukaryotes.

Course Outline:

Recombination in Bacteria: Chromosome of Bacteria, Transformation, Transduction, Conjugation, Episomes and Plasmids.

Genetic Structure and Recombination in Viruses: Phage, Phenotype, Virulent, Phages, Temperate, Phages.

Transposable Genetic Elements: Transposable Elements in Bacteria, Transposable elements in Eukaryotes, Genetic and Evolutionary Significance of Transposable Elements.

Gene Mutation: Spontaneous and Induced Mutation the Molecular Basis of Mutation, Gene Suppression, Chemically Induced Mutations Practical Applications of Mutations.

Genetic Code: General Nature of Genetic Code, Biochemistry of Genetic Code, Confirmation of Genetic Code, Chain Termination Triplets.

Mechanism of Genetic Change – Recombination: General Homologous Recombination the Holiday Model, Enzymatic Mechanism of Recombination, Site Specific Recombination, Recombination and Chromosomal Rearrangements.

DNA Repair: Photoreactivation, Exscion Repair, Post-Replication Repair.

The Nature of the Gene: How Gene Works? Gene-Protein Relationship, Genetic Observations explained by Enzyme Structure, Genetic Fine Structure Complementation. **The Structure and Function of Eukaryotic Chromosomes:** One DNA molecule per chromosome the role of Histone Proteins in packaging of DNA Higher Order coiling Hetrochromatin and Euchromatin Chromosome Bands Sequence Organization Replication and Transcription of Chromatin.

Control of Gene Expression: Induction and Repression in Prokaryotes, Basic Control Circuits, Discovery of the *lac* Operon- Negative Control; Catabolite Repression of the *lac* Operon - Positive Control, The Phage: a Complex of Operons, Gene Regulation in Eukaryotes.

Module Aims: Course is designed to provide knowledge about Microbes their Evolution and Phylogenetic Relationship, Study of Heredity Material, Gene Analysis and their Product, Repair and Recombination.

Learning Strategies:

1. Lectures
2. Group Discussion
3. Laboratory work
4. Seminar/ Workshop

Learning Outcome: Students are expected to have knowledge about Structure and Function of Microbes; their Role in Genetic Diversity, Variation of Genes in Gene Pool and Awareness about Specificity and Complexity of genes.

Assessment Strategies:

1. Lecture Based Examination (Objective and Subjective)
2. Assignments
3. Class discussion
4. Quiz
5. Tests

Books Recommended:

1. **Strickberger, M.W. (2009).** *Genetics*, (5th Ed.) Macmillan Publishing N.Y.

2. **Goodenough, U. (2006).** *Genetics.* Saunders College Publishing, USA.

3. **Old, R.W. and Primrose, S.B. (2004).** *Principals of Gene Manipulation*, (3rd Ed.) University of California Press.

4. **Griffiths, A.J. F., Miller, J.H., Suzuki, D. T., Lewontin, R.C. and Gelbart, W. M., (2003).** *An introduction to Genetic Analysis.* W. H. Freeman and Company, New York.

5. **Lewin, L. (2000).** *Gene V.* John Wiley and Sons. New York.

6. **Brown, T.A. (1999).** *Genetics, A Molecular Approach*, Van Nostrand Reinhold Int.,

7. **Maloy, S.R., Cronan, Jr., J.E. and Freifelder, D. (1994).** *Microbial Genetics*, Jonest Bartelet Publisher, Boston, London.

8. **Smith-Keary, P.F. (1975).** *Genetic Structure and Function*, Macmillan Press, Ltd., London.