

Wollo University
College of Natural Science
School of Bioscience and Technology
Department of Biotechnology

Course Title: Molecular Biology
Course Code: Biot 2074
Credit Hours: 3 chrs (5 ECTS)
Instructor: Tadesse A. (MSc)
Email: tadeabate@gmail.com
Academic year: 2020
Year: II
Semester: II
Target groups: 2nd Year Biotechnology Students (Regular)

✎ **Course Description**

The course deals with molecular basis: constituents, structures & functions of DNAs, polymerization and base pairing; denaturation & renaturation of DNA, various forms of DNA, structure of RNA, DNA replication event and enzymes involved in DNA replication, replication of linear and circular DNA molecules, proofreading activity during DNA replication, structure of genes; transcription and translation process in prokaryotes and eukaryotes; regulation of gene expression in prokaryotes and eukaryotes; protein targeting, mutation and repair mechanism; introduction to DNA recombinant technology and immunoglobulin and advances in molecular biology.

✎ **Objectives**

At the end of this course, the student will be able to:

- ✓ Describe the structure of DNA
- ✓ Identify basic structure of the gene
- ✓ Explain base pairing rules in DNA and RNA

- ✓ Describe mechanism of DNA replication
- ✓ Differentiate the structure of DNA and RNA
- ✓ Describe mechanism of transcription and translation in prokaryotes and eukaryotes
- ✓ Recognize mechanism of gene regulation in prokaryotes and eukaryotes
- ✓ Define the recombinant DNA technology and be familiar with the advances of molecular biology.

Day	Contents	Reference(s)
1	Introduction Historical highlights Internal organizations of prokaryotic and eukaryotic cell The genetic material	Watson <i>et al.</i> , (2004) pp. Albert <i>et al.</i> , (1999) pp. Lodish <i>et al.</i> , (2004) pp.
2	Structure and function of nucleic acids Base, nucleic acids and nucleotides Polymerization and base pair Varies forms of DNA renaturation and denaturation of DNA Teriatiery structure of DNA	Watson <i>et al.</i> , (2004) pp. Albert <i>et al.</i> , (1999) pp. Lodish <i>et al.</i> , (2004) pp. Gardiner <i>et al.</i> , (1991)pp. Watson <i>et al.</i> , (2004)pp.
3	DNA replication Basic Molecular genetic process Enzyme and events evolved in DNA replication Process of DNA replication	Watson <i>et al.</i> , (2004) pp. Albert <i>et al.</i> , (1999) pp. Lodish <i>et al.</i> , (2004) pp. Gardiner <i>et al.</i> , (1991)pp. Watson <i>et al.</i> , (2004) pp.
4	Different modes of DNA replication Conservative Semi conservative Dispersive Fidelity of DNA replication	Watson <i>et al.</i> , (2004) pp. Albert <i>et al.</i> , (1999) pp. Lodish <i>et al.</i> , (2004) pp. Gardiner <i>et al.</i> , (1991)pp. Watson <i>et al.</i> , (2004)pp.
5	The Structure of a gene The regulatory system The promoter prokaryotic vs eukaryotic Other regulatory elements	Watson <i>et al.</i> , (2004) pp. Albert <i>et al.</i> , (1999) pp. Lodish <i>et al.</i> , (2004) pp. Gardiner <i>et al.</i> , (1991)pp. Watson <i>et al.</i> , (2004)pp.
6	Gene expression	Watson <i>et al.</i> , (2004) pp. Albert <i>et al.</i> , (1999) pp.

	Transcription Steps of transcription Prokaryotic vs eukaryotic Post-transcriptional modification	Lodish <i>et al.</i> , (2004) pp. Gardiner <i>et al.</i> , (1991)pp. Watson <i>et al.</i> , (2004)pp.
7	The Genetic code Translation Stages of translation Prokaryotic vs eukaryotic Post translational process of proteins	Watson <i>et al.</i> , (2004) pp. Albert <i>et al.</i> , (1999) pp. Lodish <i>et al.</i> , (2004) pp. Gardiner <i>et al.</i> , (1991)pp. Watson <i>et al.</i> , (2004)pp.
8	Regulation of gene expression Regulation of protein synthesis Principle of regulation of gene expression	Watson <i>et al.</i> , (2004) pp. Albert <i>et al.</i> , (1999) pp.
9	Regulation of gene expression... The <i>lac</i> The <i>Trp</i> operon Steroid hormones elements	Watson <i>et al.</i> , (2004) pp. Albert <i>et al.</i> , (1999) pp. Lodish <i>et al.</i> , (2004) pp
10	Mutation and repair Mutagens and mutagenesis Types of mutation Repair mechanism	Watson <i>et al.</i> , (2004) pp. Albert <i>et al.</i> , (1999) pp. Lodish <i>et al.</i> , (2004) pp. Gardiner <i>et al.</i> , (1991)pp. Watson <i>et al.</i> , (2004)pp.
11	Introduction to recombinant DNA technology Restriction enzymes: Mode of action Gene transfer Introduction to foreign DNA Amplification and detection of DNA PCR Benefits and risks of genetic engineering	Watson <i>et al.</i> , (2004) pp. Albert <i>et al.</i> , (1999) pp. Lodish <i>et al.</i> , (2004) pp. Gardiner <i>et al.</i> , (1991)pp. Watson <i>et al.</i> , (2004)pp.
12	Immunoglobulins	Watson <i>et al.</i> , (2004) pp.

Required Text Books and Materials

1. Albert *et al.*, (1994) molecular biology of the cell, Garland publishers, New York
2. Cooper GM, (1997) The Cell. A molecular approach. ASM press, Washington
3. Lewin B (2000) Genes VII, Oxford university press, New York
4. Lodish *et al.*, (2000) Molecular cell biology (4th Edition). W.H. Freeman & CO.
5. Gardiner *et al.*, (1991). Principle of genetics, John Wiley & Sons Pvt Ltd.
6. Purochit S (2005) Biotechnology fundamental and application 4th ed.
7. Watson *et al.*, (2004). Molecular biology of the gene (8th ed), The Benjamin Cummings publishing Co.

Assessment arrangements and Grading

Test 1 will be given, which weights out of 15%,

Test 2 will be given, which weights out of 15%





Assignment will be given, which weights out of 10%

Quizzes will be given, which weights out of 10%, and

The remaining 50 % will be for final exam.

Ground Rules

The course is delivered based on the rules and regulations of the university and the following rules must be kept for classroom purpose

-  100% attending is required
-  Punctuality in class and assignment is mandatory
-  Active participation is required at most
-  All students are kindly requested to switch off their cell phones