

FACULTY OF LIFE SCIENCES

Syllabus

For

Interdisciplinary Course in Molecular Biology & Biochemistry (PG)

Examinations: 2019–20



**Guru Nanak Dev University
Amritsar**

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Interdisciplinary Course in Molecular Biology & Biochemistry (PG)

Course No.MBL-094 Fundamentals of Biochemistry

Credits		
L	T	P
4	0	0

Time: 3 Hrs.

Max. Marks : 100

Mid Semester Marks : 20

End Semester Marks : 80

Mid Semester Examination: 20% weightage

End Semester Examination: 80% weightage

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section-A

Introduction: Biological fitness of organic compounds, dimensions and shape of biomolecules, supramolecular assemblies and cell organelles, Structure of atoms, molecules and chemical bonds. **Vitamins:** Definition, chemistry and functions of water and fat soluble vitamins.

Section-B

Biomolecules: Definition, importance, classification and functions of carbohydrates, proteins, lipids and nucleic acids.

Section-C

Metabolism: Introduction to metabolism; Types of metabolic pathways; Basic principles/mechanisms of metabolic regulation; Some activated carriers in metabolism; Principles of Bioenergetics; Metabolic pathways-glycolysis, citric acid cycle, gluconeogenesis, oxidation of fatty acid, urea cycle, degradation of purines and pyrimidines.

Section-D

Enzymology: Nomenclature, Classification and Characteristics of enzymes, Enzyme specificity, Cofactors, Co-enzyme and Prosthetic group. Basic concepts of enzyme kinetics: Michaelis-Menten equation; Types of enzyme inhibition; Significance of K_m and V_{max} ; Factors effecting enzyme activity.

Books Recommended:

1. Nelson DL and Cox MM. (2013) Lehninger Principles of Biochemistry, 6th Edition. Macmillan Worth Publishers, New Delhi.
2. Berg JM, Tymoczko, JL and Stryer L (2012) Biochemistry, 7th Edition, WH Freeman & Co., New York.
3. Murray RK, Bender DA, Botham KM, Kennelly PJ, Rodwell VW and Weil PA (2012) Harper's Biochemistry, 29th Edition, McGraw-Hill Medical Canada.
4. Voet D and Voet JG (2011). Biochemistry, 4th Edition. John Wiley & Sons. New York.

Interdisciplinary Course in Molecular Biology & Biochemistry (PG)

MBL-095 : MOLECULAR BIOLOGY AND GENETICS

Credits		
L	T	P
4	0	0

Time: 3 Hrs.

Max. Marks : 100

Mid Semester Marks : 20

End Semester Marks : 80

Mid Semester Examination: 20% weightage

End Semester Examination: 80% weightage

Instructions for the Paper Setters:

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

Section-A

Genetic Foundations: Basic principles of Heredity. Chromosomes and cellular reproduction. Sex linked and sexinfluenced inheritance, lethal alleles, cytoplasmic inheritance, multiple alleles, Epistasis, Transformation, Transduction and Conjugation. Recombination and omplementation. Mutational analysis, Genetic mapping and linkage analysis

Section-B

Chromatin and Chromosomes: Karyotypes, Translocations, inversions, deletions, and duplications, Aneuploidy and polyploidy.

Genome and Maintenance: Genome structure, repeated DNA, Gene identification, Transposable elements, DNA replication, DNA damage and repair

Section-C

Gene Expression: The genetic code, Transcription, Translation, Operon concept.

Gene Regulation in Prokaryotes: Positive and negative control of the operon, Promoter recognition by RNA polymerases.

Section-D

Gene Regulation in Eukaryotes: Cis-acting regulatory elements, Trans-acting regulatory factors, Gene rearrangements and amplifications.

Recombinant DNA Technology: Gene cloning: Vectors and tools, Protein expression in bacterial, Yeast and mammalian hosts. DNA sequencing and analysis.

Books Recommended:

1. Freifelder D (2008) Molecular Biology, 2nd edition. Narosa Publishing House, India.
2. Brown TA (2010) Gene Cloning and DNA Analysis, An Introduction. 4th Edition, Blackwell Scientific Publication, Oxford, UK.
3. Lewin B (2012) Genes XI, Oxford University Press, New York.
4. Charlotte A. Spencer, Michael A. Palladino, Michael R. Cummings, and William S. Klug(2015). Concepts of Genetics: Pearson New International Edition.