

B. Sc. Biotechnology Course
Veer Narmad South Gujarat University, Surat

Semester	Semester-II (24 Credits)						Total Credits
	Theory			Laboratory Work			
	Course	Credit	hours	Course	Credit	Hours	
Foundation Compulsory	1	2	2	-	-	-	2
Generic Elective	1	2	2	-	-	-	2
Core 1	2	4	4	1	2	4	6
Core 2	2	4	4	1	2	4	6
Core 3	2	4	4	1	2	4	6
Foundation Elective	1	2	2	-	-	-	2
Total	9	18	18	3	6	12	24

Semester-II

[Academic Year of Implementation: 2018-2019]

Core 1: Biotechnology

Course 1: BT-03: Basic Biochemistry

Course 2: BT-04: Fundamentals of Genetics

Practical Core 1: BTP-02: Biotechnology Practical

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B. Sc. Biotechnology Semester-II

BT-03: Basic Biochemistry

UNIT-1: EVOLUTIONARY FOUNDATIONS:

- 1.1 Changes in the hereditary instructions
- 1.2 Appearance of bio-molecules
- 1.3 A possible “RNA world” scenario
- 1.4 Biological evolution
- 1.5 Synthetic cells
- 1.6 Evolution of eukaryotic cells
- 1.7 Functional genomics and its importance in human biology & medicine

UNIT-2: PHYSICAL FOUNDATIONS:

- 2.1 Dynamic steady state of living organisms
- 2.2 Energy transformation in living organisms
- 2.3 Flow of electrons as source of energy
- 2.4 Requirement of work and energy for creation and maintenance
- 2.5 Energy coupling links reactions in biology
- 2.6 Enzymes promote sequences of chemical reactions
- 2.7 Regulation to achieve balance and economy

UNIT-3: WATER:

- 3.1 Non-covalent interactions among bio-molecules in aqueous solvent
 - 3.1.1 Hydrogen bonds
 - 3.1.2 Ionic interactions
 - 3.1.3 Hydrophobic interactions
 - 3.1.4 Van der Waals interactions
- 3.2 Water as a reactant
- 3.3 Fitness of the aqueous environment for living organisms

UNIT-4: BUFFERS & pH:

- 4.1 Ionization of water, weak acids and weak bases
- 4.2 pH scale
- 4.3 Types of buffers

REFERENCES:

1. Cox, M. M., & Nelson, D. L., (2017). *Lehninger: Principles of Biochemistry*, 7th Edition, W. H. Freeman, New York.
2. Powar, C. B., & Chatwal, G. R., (2011). *Biochemistry*, Himalaya Publishing House, India.

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B. Sc. Biotechnology Semester-II

BT-04: Fundamentals of Genetics

UNIT-1: CONCEPT OF GENOME AND ITS ORGANIZATION:

- 1.1 Mendel's discoveries
- 1.2 History of genetics
- 1.3 DNA as genetic material
 - 1.3.1 Griffith's Transformation Experiment
 - 1.3.2 Avery's experiment
 - 1.3.3 Hershey-Chase Experiment

UNIT-2: CHROMOSOMES & NUCLEOSOMES:

- 2.1 Euchromatin and Heterochromatin
- 2.2 Nucleosome-subunit of all chromatin
- 2.3 Banding Patterns in chromosomes
- 2.4 Lampbrush & Polytene chromosomes

UNIT-3: LARGE-SCALE CHROMOSOMAL CHANGES:

- 3.1 Euploids & Aneuploids
- 3.2 The concept of gene balance
- 3.3 Deletions & Duplications
- 3.4 Reciprocal & Robertsonian translocations

UNIT-4: PATTERNS OF INHERITANCE IN HUMANS:

- 4.1 Pedigree analysis of autosomal recessive disorders
- 4.2 Pedigree analysis of autosomal dominant disorders
- 4.3 Pedigree analysis of X-linked dominant and recessive disorders
- 4.4 Y-linked inheritance
- 4.5 The Hardy-Weinberg Law

REFERENCES:

1. Griffiths, A. F., Wessler, S. R., Lewontin, R. C. and Carroll, S. B. (2008) *Introduction to Genetic Analysis*, 9th Edition, W. H. Freeman and Company, New York.
2. Klug, W. S. and Cummings, M. R. (2007) *Concepts of Genetics*, 7th Edition, Pearson Education.

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B. Sc. Biotechnology Semester-II

Practical Core 1: BTP-02: Biotechnology

1. Preparation of normal, molar and molal solutions
2. Preparation of stock and working solutions
3. Preparation of buffer (Phosphate, Glycine-NaOH, Glycine-HCl)
4. Determination of acid value of fats and oils by titration with KOH
5. Calibration of pH meter
6. Identification of eye colour in Drosophila
7. Contribution of scientists in the field of genetics
8. Study of permanent slides/photographs of banding techniques
9. Problems related to Mendelian genetics
10. Pedigree analysis of human genetic disorders

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