GUJARAT TECHNOLOGICAL UNIVERSITY
B. E. SEMESTER: V
BIO-TECHNOLOGY

Subject Name: **The Science of Life (Institute Elective - II)**
Subject Code: **150405**

Teaching Scheme				Evaluation Scheme		
Theory	**Tutorial**	**Practical**	**Total**	**University Exam (Theory) (E)**	**Mid Sem Exam (Theory) (M)**	**Internal Assessment (I)**
4	0	2	6	70	30	50

UNIT-I Evolution of Life

Sr. No.	Course content
1.	Introduction to akaryotic, Prokaryotic and eukaryotic cells, Structure of prokaryotic and eukaryotic cells, Origin and evolution of cell (from molecules to first cell, From prokaryotes to eukaryotes, From single cells to multicellular organisms), Comparison of prokaryotic and eukaryotic cells on structural, Functional and evolutionary basis.

UNIT- II Biomolecules and Metabolism

Sr. No.	Course content
1.	**Carbohydrate:** Structure: Monosaccharides – Classification, structure and properties, Disaccharies – Classification, structures and properties, Polysaccharides – Classification, structure and properties.
2.	**Amino Acid and Protein:** Amino acids: Structure, physical and chemical properties, classification, Proteins: Structure, Classification and forces involved in stability of proteins.
3.	**Lipids:** Biological significance, Structure and classification (simple, compound, derived and lipid associated compounds).
4.	**Nucleic Acid**: Basic components, Structure and types (DNA and RNA).
5.	**Metabolism:** Overview of metabolism, Cellular energy requirement for vital functions.

UNIT-III Central Dogma of Life

Sr. No.	Course content
1.	**DNA Replication:** Conservative, Semi-conservative and Dispersive model of DNA replication, Uni- and Bi-directional replication, Enzymology of prokaryotic and eukaryotic DNA replication.
2.	**Transcription:** Enzyme- RNA polymerase, Promoter, silencer and enhancer, Mechanism of Transcription in prokaryotes and eukaryotes, Monocistronic and Polycistronic mRNA, Post transcriptional modification of mRNA, tRNA and rRNA.
3.	**Genetic Code and Translation:** The discovery of genetic code, Concept of genetic code, Types and characteristics of genetic code, Overview of protein synthesis, Mechanism of translation in prokaryotes and eukaryotes, Post translational modification.

Unit – IV How Immune System Works?

Sr. No.	Course content
1.	**Introduction to Immune system:** History, Humaral and Cellular component of the immune system.
2.	**Types of Immunity:** Innate Immunity, Adaptive Immunity, Active and Passive Immunity.
3.	**Hematopoesis:** Hematopoesis regulation.
4.	**Cells of Immune System:** Lymphoid cells, T lymphocytes, B lymphocytes, Natural killer cells, Mononuclear Phagocytes, Granulolytic cells (Neutrophils, Eosinophils, Basophils, Mastcells), Dendritic cells.
5.	**Organ of The Immune System:** Primary organ- Thymus, Bone marrow, Lymphatic system, Secondary organ- Lymphnodes, Spleen, Mucosal-Associated lymphoid tissue.
6.	**Antigen:** Immunogenicity versus Antigenicity, Nature of Immunogen, Adjuvants, Epitopes, Haptens.
7.	**Antibody:** Basic structure of Antibody, Ab mediator effective function, Ab classes and Biological activities, Monoclonal Ab.
8.	**Immune Dysfunction and its Consequences:** Allergy and asthma, Autoimmune diseases, Graft rejection, Immunodeficiency

List of Practicals:

1. To study morphology of bacteria by monochrome staining
2. To perform gram staining.
3. To isolate bacteria using selective and differential media.
4. Qualitative analysis of different carbohydrates.
5. Qualitative analysis of different amino acids.
6. Estimation of starch content in different flours.
7. To determine the blood group of given sample by ABO and Rh system.
8. Total count of leucocytes.
9. Total count of erythrocytes.
10. Differential count of leucocytes.
11. To estimate hemoglobin content of given blood sample.
12. Diagnosis of AIDS by tri-dot method.

Reference Books:

1. Immunology by Richard A. Goldsby,Thomus J.Kindt, Barbara A. Osborne & Janis Kuby published by W.H. Freeman &company.
2. Text Book of Microbiology by Ananthnarayan & Paniker published by Universities Press Private Limited.
3. Immunology and Immunotechnology by Ashim K. Chakravarty Published by Oxford University Press.
4. Molecular biology of Cell: Alberts et al.
5. Cell Biology, Genetics… by P.S.Verma
6. Lehninger's Principles of Biochemistry by David L. Nelson and Michael M Cox,Macmillan Worth Publisher
7. Lubert Stryer, Biochemistry, 4th Edition, WH Freeman & Co., 2000.
8. Voet and Voet, Biochemistry, 2nd Edition, John Wiley & Sons Inc., 1995.