JAMSHEDPUR WOMENS COLLEGE, JAMSHEDPUR

**DEPARTMENT OF BIOTECHNOLOGY**

COURSE CURRICULUM FOR BACELOR OF SCIENCE COURSE UNDER CHOICE BASED CREDIT SYSTEM

**B.Sc. BIOTECHNOLOGY (HONS.)** WITH EFFECT FROM 2020



# Dr. Bidyut Bandyopadhyay Mrs. Anita Shukla

(Professor , Dept. of Biotechnology, (Coordinator), Dept. of Biotechnology,J.W.C) OIST, Vidyasagar University



# Dr. Vishwa Raj Lal

**Dr. N.Venkat Appa Rao (**Assistant Professor, Dept of Biotechnology Associate Professor, St. Xavier J.W.C)

College, Ranchi)

# Dr. Dinesh Prasad Mr. Kunal Vora, Director

(Assistant Professor, BIT, Mesra) ( SHRM Biotechnologies Pvt Ltd., Kolkata)



 **Miss Minni Mishra (**Student Alumuni , J.W.C**)**

MEMBERS OF BOARD OF STUDIES

DEPARTMENT OF BIOTECHNOLOGY

JAMSHEDPUR WOMENS COLLEGE, JAMSHEDPUR

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| 5. | **Dr. Dinesh Prasad**(Assistant Professor, BIT, Mesra, Ranchi) |  |
| 6. | **Mr. Kunal Vora**(Director, SHRM Biotechnologies Pvt.Ltd., Kolkata) |  |
|  | **Ms. Minni Mishra**(Student Alumni, JWC) |  |

**Table 1: Scheme for CBCS in B.Sc. Honours Biotechnology**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sl.No.** | **Name of the Courses** | **Total No. of Papers** | **Credits in** **Theory + Practicals** | **Total Credits** |
| **1.**  | **Core Courses** | **14** | **06** | **84** |
| **2.** | **DSEC**(Discipline Specific Elective) | **04** | **06** | **24** |
| **3.** | **GE** (Generic Elective) | **04** | **06** | **24** |
| **4.** | **AECC** (Ability Enhancement Compulsory Course) | **02** | **04** | **08** |
| **5.** | **SEC** (Skill Enhancement Courses) | **02** | **04** | **08** |
|  **Total Credits** | **148** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  Semester | Core Course (14 Papers) | Ability Enhancement Compulsory Course (AECC) (2 Papers) | SkillEnhancement Course (SEC)(2 Papers) | Discipline SpecificElective (DSE) (4 Papers) | GenericElective (GE) (4 Papers) |
| I | C 1 | AECC 1English/ MILCommunication |  |  | GE 1 |
| C 2 |
| II | C 3 | AECC 2Environmental Science |  |  | GE 2 |
| C 4 |
| III | C 5 |  | SEC 1 |  | GE 3 |
| C 6 |
| C 7 |
| IV | C 8 |  | SEC 2 |  | GE 4 |
| C 9 |
| C 10 |
| V | C 11 |  |  | DSE 1 |  |
| C 12 | DSE 2 |
| VI | C 13 |  |  | DSE 3 |  |
| C 14 | DSE 4 |

 **Table 2: Semester wise distribution of B.Sc Honours Biotechnology**

 **FIRST SEMESTER**

|  |  |
| --- | --- |
| **COURSE CODE** | **TITLE COURSE** |
| C-1T | BIOCHEMISTERY AND METABOLISM |
| C-1 P | PRACTICAL |
| C-2T | CELL BIOLOGY |
| C-2 P | PRACTICAL |
| AECCI | ENGLISH |
| GE-1 T | BOTANY/ZOOLOGY |
| GE-1 P | BOTANY/ZOOLOGY |

# SEMESTER I

#  UGCCVBT101 (BIOCHEMISTRY AND METABOLISM)

**UNIT I: Introduction to Biochemistry (10 Periods**

Amino acids & Proteins**:** Structure & Function. Structure and properties of Amino acids, Types of proteins and their classification, Forces stabilizing protein structure and shape. Different Level of structural organization of proteins, Protein Purification. Denaturation and renaturation of proteins. Fibrous and globular proteins.

Carbohydrates: Structure, Function and properties of Monosaccharides, Disaccharides and Polysaccharides. Homo & Hetero Polysaccharides, Mucopolysaccharides, Glycoprotein’s and their biological functions.

**UNIT II (10 Periods)**

Lipids: Structure and functions –Classification, nomenclature and properties of fatty acids, essential fatty acids. Phospholipids, sphingolipids, glycolipids, cerebrosides, gangliosides, Prostaglandins, Cholesterol.

Nucleic acids: Structure and functions: Physical & chemical properties of Nucleic acids, Nucleosides & Nucleotides, purines & pyrimidines,. Biologically important nucleotides, Double helical model of DNA structure and forces responsible for A, B & Z – DNA, denaturation and renaturation of DNA

**UNIT III (20 Periods)**

Enzymes: Nomenclature and classification of Enzymes, Holoenzyme, apoenzyme, Cofactors, coenzyme, prosthetic groups, metalloenzymes, monomeric & oligomeric enzymes, activation energy and transition state, enzyme activity, specific activity, common features of active sites, enzyme specificity: types & theories, Biocatalysts from extreme thermophilic and hyperthermophilic archaea and bacteria.

**UNIT IV (20 Periods)**

Carbohydrates Metabolism: Glycolysis, Pentose phosphate pathway and its significance, Gluconeogenesis, Glycogenolysis and glycogen synthesis. TCA cycle, Electron Transport Chain, Oxidative phosphorylation. ß-oxidation of fatty acids.

# PRACTICALS

1. To study activity of any enzyme under optimum conditions.
2. To study the effect of pH, temperature on the activity of salivary amylase enzyme.
3. Estimation of blood glucose by glucose oxidase method.
4. Principles of Colorimetry**: (i)** Verification of Beer's law, estimation of protein. (**ii)** To study relation between absorbance and % transmission.
5. Preparation of buffers.
6. Separation of Amino acids by paper chromatography.
7. Qualitative tests for Carbohydrates, lipids and proteins

# SUGGESTED READING

1. Berg, J. M., Tymoczko, J. L. and Stryer, L. (2006). Biochemistry. VI Edition. W.H Freeman and Co.
2. Buchanan, B., Gruissem, W. and Jones, R. (2000) Biochemistry and Molecular Biology of Plants.American Society of Plant Biologists.
3. Nelson, D.L., Cox, M.M. (2004) Lehninger Principles of Biochemistry, 4th Edition, WH Freeman and Company, New York, USA.
4. Hopkins, W.G. and Huner, P.A. (2008) Introduction to Plant Physiology. John Wiley and Sons.
5. Salisbury, F.B. and Ross, C.W. (1991) Plant Physiology, Wadsworth Publishing Co. Ltd.

# UGCCVBT102 (CELL BIOLOGY)

**UNIT I (10 Periods)**

Cell: **I**ntroduction and classification of organisms by cell structure, cytosol, compartmentalization of eukaryotic cells, cell fractionation.

Cell Membrane and Permeability: Chemical components of biological membranes, organization and Fluid Mosaic Model, membrane as a dynamic entity, cell recognition and membrane transport.

Cell cycle: mitosis and meiosis.

**UNIT II (15 Periods)**

Membrane Vacuolar system, cytoskeleton and cell motility: Structure and function of microtubules, Microfilaments, Intermediate filaments.

Endoplasmic reticulum: Structure, function including role in protein segregation. Golgi complex: Structure, biogenesis and functions including role in protein secretion.

**UNIT III (20 Periods)**

Lysosomes: Vacuoles and micro bodies: Structure and functions Ribosomes: Structures and function including role in protein synthesis. Mitochondria: Structure and function, Genomes, biogenesis.

Chloroplasts: Structure and function, genomes, biogenesis Nucleus: Structure and function, chromosomes and their structure.

**UNIT IV (15 Periods)**

Extracellular Matrix: Composition, molecules that mediate cell adhesion, membrane receptors for extra cellular matrix, macromolecules, regulation of receptor expression and function. Signal transduction.

#  PRACTICALS

* 1. Study the effect of temperature and organic solvents on semi permeable membrane.
	2. Demonstration of dialysis.
	3. Study of plasmolysis and de-plasmolysis.
	4. Study of structure of any Prokaryotic and Eukaryotic cell.
	5. Microtomy: Fixation, block making, section cutting, double staining of animal tissues like liver, stomach, pancreas, intestine, kidney.
	6. Cell division in onion root tip.

# SUGGESTED READING

1. Karp, G. 2010. Cell and Molecular Biology: Concepts and Experiments. 6th Edition. John Wiley & Sons. Inc.
2. De Robertis, E.D.P. and De Robertis, E.M.F. 2006. Cell and Molecular Biology. 8th edition.Lippincott Williams and Wilkins, Philadelphia.
3. Cooper, G.M. and Hausman, R.E. 2009. The Cell: A Molecular Approach. 5th edition. ASMPress & Sunderland, Washington, D.C.; Sinauer Associates, MA.
4. Becker, W.M., Kleinsmith, L.J., Hardin. J. and Bertoni, G. P. 2009. The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, San Francisco.