



Hemchandracharya
North Gujarat University
PATAN – 384 265

Syllabus According To CBCS Semester pattern

B. Sc. (Biotechnology) Syllabus

(Semester I & II)

(With Effect From June 2011)

B. Sc. (Biotechnology)

(With effect from June 2011)

Semester I

Core Compulsory Course (CCC)

CBT 1-I Introduction to Biotechnology and Cell biology

Elective Course (EC) for Biotechnology

EBT 1 Biological evolution

EBT 1 Interdisciplinary relevance and Advancement of Biotechnology Semester II

Practical core course (PCC)

Semester II

Core Compulsory Course (CCC)

CBT 1-II Molecules of life

Elective Course (EC) for Biotechnology

EBT 1I Biodiversity

EBT 1I Biocomputing

Practical core course (PCC)

Course pattern Subject :Biotechnology

Semester I (First year B.Sc)

Semester	Paper	Instruction(hr per week)	Marks			Credits
			Internal	External	total	
Core Course compulsory(CCC)						
1	Core course CCC-I-1	4	30	70	100	4
	Core course 2 CCC-II-1	4	30	70	100	4
	Core course 3 CCC-III-1	4	30	70	100	4
Practical core course (PCC)						
	Practical core course (For biotechnology) PCC-I-1	4		50	50	2
	Practical core course2- PCC-II-1	4		50	50	2
	Practical core PCC-III-1	4		50	50	2
Foundation Course (FC)						
	Foundation (Compulsory) course (Generic) - English (L.L.) FCG-1	2	15	35	50	2
Elective Course (EC)						
	Elective (Generic) Course -I ECG-1	2		50	50	2
	Elective (Subject) Course -I ECS-1	2		50	50	2
		30	105	495	600	24

Semester 2
(First year B.Sc)

Semester	Paper	Instruction(hr per week)	Marks			Credits
			Internal	External	total	
Core Course compulsory(CCC)						
2	Core course CCC-II	4	30	70	100	4
	Core course 2 CCC-II-1I	4	30	70	100	4
	Core course 3 CCC-III-II	4	30	70	100	4
Practical core course (PCC)						
	Practical core course (For biotechnology) PCC-I-II	4		50	50	2
	Practical core course2- PCC-II-II	4		50	50	2
	Practical core PCC-III-II	4		50	50	2
Foundation Course (FC)						
	Foundation (Compulsory) course (Generic) - English (L.L.) FCG-1I	2	15	35	50	2
Elective Course (EC)						
	Elective (Generic) Course -I ECG-1I	2		50	50	2
	Elective (Subject) Course -I ECS-1I	2		50	50	2
		30	105	495	600	24

B.Sc Biotechnology

SEMESTER 1

SEMESTER 1

Core Course Compulsory (CCC I-I)

CBT I-I

Introduction to Biotechnology and Cell Biology

Unit 1

- 1.1. Introduction to Biotechnology
- 1.2. Domains of Biotechnology
- 1.3. Applications of Biotechnology.: Agriculture ,Pharmaceutical, Environment, Fermentation
- 1.4. State, national and international level commercial opportunities in Biotechnology sector.

Unit 2

- 2.1. Microscopy: Fundamental of microscope, light microscopy and specimen preparation Bright field microscopy, Dark field microscopy.
- 2.2. Morphology of Bacterial cell: Size, shape and arrangement of bacterial cells ,External structure: Flagella, Pili, Fimbriae, Prosthacate
- 2.3. Boundary layer: Capsule, cell wall , cell membrane
- 2.4. Dormant forms: Spores and cyst

Unit 3

- 3.1. General organization of eukaryotic cell External structures: Flagella, cilia The cell envelope: boundary layer: cell wall, cell membrane
- 3.2. Internal structures: Cytoplasm, cytoskeleton, nucleus and nucleolus
- 3.3. Endoplasmic Reticulum, Golgi apparatus, Mitochondria Lysosome, Micro bodies (Glyoxysome and Peroxisome) Chloroplast.
- 3.4. Chromosome: Size, shape, types and basic structure of chromosome, euchromatin and heterochromatin Giant Chromosome: Polytene chromosome and lamp brush chromosome

Unit 4

- 4.1. Cell cycle and overview of its regulation.
- 4.2. Mitosis and meiosis
- 4.3. Cell –Cell interaction
- 4.4. Endocytosis and exocytosis

Elective Course (EC)
EBT 1
Biological evolution

Unit 1

- 1.1. Theories of evolution: Charles Darwin, Lamark and Wallace
- 1.2. Chemical and biological evolution.,
- 1.3. Five kingdom classification system.
- 1.4. Understanding Species: Concept of Species and Speciation, Morphological and Biological explanation for species, Types of Speciation, Rates of Speciation

Unit 2

- 2.1. Isolation: Concept of Isolation, Mechanism of Isolation, Factor responsible for isolation, Types of Isolation.
- 2.2. Reproductive isolation, Types of Reproductive isolation, Role of Reproductive isolation in species formation.
- 2.3. Adaptation: Concept of Adaptation, Types of Adaptation
- 2.4. Adaptation and predators, adaptation and population.

Elective Course (EC)
EBT 1

Interdisciplinary relevance and Advancement of Biotechnology

Unit-1

- 1.1 What is interdisciplinary areas?
- 1.2 Biotechnology and relevance with Chemistry, Physics and Maths
- 1.3 Biotechnology and relevance with Agriculture,Medical,Pharmaceuticals
- 1.4 Advantage of Interdisciplinary subject

Unit-2

- 2.1. Advancement of Biotechnology in Crop Improvement for edible Vaccine and biopesticide.
- 2.2. Advancement of Biotechnology in Fermentation for organic acids
- 2.3. Advancement of Biotechnology in Health care for vacci
- 2.4. Advancement of Biotechnology in Sustainable development for Environment

Semester I

Practical Core course (PCCI-I)

1. Introduction to lab environment-Safety measures and introduction to lab equipments, glass wares and accessories ,Disposal of laboratory waste and cultures
2. Microscopy : Simple, compound and phase contrast; Basic components of microscope and their working principle
3. Staining techniques :Simple-Monochrome and Negative Differential- Grams and Special-Capsule, Spore, Cell wall.
4. Study of Bacterial Motility
5. Micrometry: Measurement of given biological sample
6. Use of Heamocytometer and determination of cell densities of Yeast cell
7. Preparation of permanent slides showing different stages of cell division – Meiosis and Mitosis

B.Sc Biotechnology

SEMESTER II

SRMESTER II

Core Compulsory course (CCC I-II)

CBT I-II Molecules of life

Unit 1

- 1.1. Overview of major elements involved in formation of biomolecules: C,N,P,S,O,H Water: chemical composition, role of hydrogen bonds, interactions with polar and non polar molecules, Water as reactivate, ionization of water, Solvent properties of water and importance
- 1.2. Buffers: Buffer systems and buffer system of blood, weak acid and weak base, dissociation constant of weak acid and base ,
- 1.3. pka values and their importance, pH and pH scale, acid dissociation constant pka and titration curve, Handerson-Hasselbalch equation
- 1.4. Structure of atoms and molecules and chemical bonds (covalent, ionic, Hydrogen, van der waal's, hydrophobic).

Unit 2

- 2.1. Carbohydrates Monosaccharides: Nomenclature and Classification, Hawarth and fischer projection.
- 2.2. Monosaccharide as reducing agent, stereoisomerism
- 2.3. Disaccharides formation and its biological importance.
- 2.4. Poly saccharide : types and biological importance

Unit 3

- 3.1. Amino acid: Classification and properties.
- 3.2. Proteins: Primary and secondary structure of proteins, tertiary and quaternary structure of proteins
- 3.3. Vitamins: water soluble and fat soluble vitamins and their biological significance.
- 3.4. Lipids: Classification, properties and biological importance.

Unit 4

- 4.1. Nucleotides: structure, chemical properties and functions,
- 4.2. Structure of DNA double helix
- 4.3. Alternative forms of DNA.
- 4.4. Types, structure and biological functions of RNA.

Elective Course (EC2)
EBT II
Biodiversity

Unit 1

- 1.1. Definition, Introduction
- 1.2. Types of biodiversity Genetic Diversity ,Species Diversity ,Ecological diversity and functional diversity
- 1.3. overview of microbial diversity
- 1.4. overview of plant diversity

Unit 2

- 2.1. Importance of biodiversity Applications of internet in society.
- 2.2. Biodiversity conservation
- 2.3. Loss of biodiversity.
- 2.4. Role of biotechnology in biodiversity conservation.

Elective Course (EC2)
EBT II
Biocomputing

Unit 1

- 1.1. Introduction to computer science.
- 1.2. History and generations of Computer.
- 1.3. Basics of Hardware components of computer.
- 1.4. Basics Software components of computer

Unit 2

- 2.1. Concepts of internet.
- 2.2. Applications of internet in society
- 2.3. Concept of HTML,HTTP,URL,Domain,Search engine
- 2.4. Computer and Internet in Biotechnology

Semester II

Practical Core Course(PCCI-II)

1. Preparation of standard solutions and buffer solutions
2. Preparation of buffer solutions
3. Operation of pH meter and measurement of pH
4. Qualitative tests for carbohydrates
5. Qualitative tests for Amino acids
6. Titration curve of amino acids and determination of pI, pK₁ and pK₂
7. Estimation of reducing sugar.
8. Estimation of non reducing sugar.