

**ST. XAVIER'S COLLEGE (AUTONOMOUS), AHMEDABAD-9
FACULTY OF SCIENCE**



DEPARTMENT OF BIOCHEMISTRY – BIOTECHNOLOGY

SEMESTER – IV SYLLABUS

OF

BSc BIOCHEMISTRY (HONOURS)

**BASED ON UNDERGRADUATE CURRICULUM FRAMEWORK
(NEP – 2020)**

(Effective from Academic Year 2023)

Programme Outcomes

- PO1. Create a strong knowledge domain/ expertise
- PO2. Develop critical thinking, Problem solving and research aptitude
- PO3. Skill development
- PO4. Encouraging social interaction, service learning and develop equity centred national development (Social Extension work)
- PO5. Self-directed and lifelong learning
- PO6. Developing employability and entrepreneurial skills
- PO7. Promoting Ecological sustainability development
- PO8. Nurturing creativity and humane values

Programme Specific Outcome for BSc Biotechnology

- PSO1. Comprehensive and Procedural Knowledge: Discuss and interpret the basic concepts of all subjects under the aegis of current multidisciplinary Biotechnology to translate and apply the same for professional, entrepreneurial and societal benefits.
- PSO2. Skill development: Learn wide – ranging technical skills inclusive of digital learning skills through laboratory sessions/ research projects and develop self-directed experiential learning with an objective to associate biotechnology with improving life, industrial applications and environment.
- PSO3. Critical thinking, Creativity and Problem Solving: Develop competence to solve problems in familiar and non – familiar context especially to alleviate stress in all life forms, develop an analytical mind to use information from various sources and create plans/models to come up with innovations in the field of Biotechnology.
- PSO4. Communication and Collaboration: Ability to communicate the understanding of the learning to others confidently and precisely, interact with diverse multicultural groups working in the subject area as well as collaborate to achieve goals that have a wider outreach.
- PSO5. Leadership, Lifelong learning and ethics: Extend the applicability of Biotechnology to service learning and nation development through awareness programmes/ action - oriented projects in health, nutrition, and environment; be accountable, responsible and conscientious in leading roles both in profession and personal space.

Curriculum Framework for Semester – IV BSc (Hon.) Biotechnology

Course	Title	Content	Hours/ week	Credit
DSC-1 (Theory)	BT – 4501 Microbiology	Unit 1: Basic structure of microbes Unit 2: Microbial growth and nutrition Unit 3: Microbial Control Unit 4: Basic concepts of Soil and Water Microbiology	4 hrs	4
DSC-2 (Theory)	BT – 4502 Recombinant DNA Technology	Unit 1: Basic concepts and Tools in Molecular Biology Unit 2: Cloning Vectors and Identification of Clones Unit 3: Studying gene location and structure Unit 4: Gene expression and regulation	4 hrs	4
DSC-1 (Lab)	BT – 4503 Experiments in Biotechnology - I	2 Credits: Lab based on Microbiology and rDNA Technology 2 Credits: SWAYAM course on ANY ONE <ul style="list-style-type: none"> • Experimental Biochemistry (8 – 12 weeks) • Data analysis for biologists (8 weeks) • Introductory Mathematical Methods in Biology (8 weeks) 	8 hrs	4 (2 + 2)
Minor – I	BC – 4103 (Nutrition – II)	Theory (2 Credits) U – 1: Nutritional importance of basic biomolecules U – 2: Nutritional assessment and importance of vitamins and minerals Lab (2 Credits): Practicals based on Nutritional assessments	6 hrs	4 (2 + 2)
SEC	BT – 4650 Critical Thinking in Biotechnology	U-1: Fundamentals of Critical Thinking U-2: Applying Critical Thinking	2 hrs	2
AEC	Ability Enhancement Courses	(To be chosen from a Basket of Courses)		2
VAC	Value Added Courses	(To be offered by the concerned subject Department)		2
Total Credits				22

BSC. (HONS.) BIOTECHNOLOGY SYLLABUS

SEMESTER – IV

Skill Enhancement Course – 1: Critical Thinking in Biotechnology

Course Title & Code	Credit Distribution of The Course			Eligibility Criteria	Prerequisite(s) of the Course (if any)
	Lecture	Tutorial	Practical / Practice		
BC – 4650: Critical Thinking in Biotechnology	2 (30 hr)	0	0	10 + 2 from a recognized board in any stream	Nil

I. Course Learning Objectives

Thus, the knowledge from this course can help in the following:

- Using information/s available, critical thinking will enable good decision making
- Improving problem solving skills
- Evaluating diverse sources of information for comprehensive understanding of complex issues and data
- Building self-empowerment and self confidence

II. Course Learning Outcomes

By the end of the paper, a student should be able to:

- CO 1: Understand the fundamental concepts and principles of critical thinking
- CO 2: Develop the ability to formulate, analyse and evaluate arguments effectively
- CO 3: Apply critical thinking skills to problem solving and real scenarios
- CO 4: Appreciate the importance of critical thinking in different contexts, including academic, professional, and personal

III. Course Content

Unit 1: Critical Thinking: The Fundamentals (1 Credit)

Definition and standards of critical thinking (clarity, accuracy, precision, relevance, depth, breadths); Benefits and barriers of critical thinking.

Identify the Problem, observation, hypothesis formation and Exploring Possible Strategies/ experiments; Analysis of data, graph and Inference

Synthesis and Explanation/ integrate; Reflecting on thinking practices

Unit 2: Applying Critical Thinking

(1 Credit)

Broadening the knowledge to applications: Case Studies/ movies/ analytical exercises/ open end questions/ collaborative learning/ reflective practice

Developing tools to improve Critical Thinking (writing, listening, Storytelling, explanations presentation and communication skills)

Leadership/ team work, organizational skills and management

IV. Recommended learning Resources

1. Madhuchanra Sen., An introduction to Critical Thinking, Pearson, 2022.
2. Marilyn Anderson., Critical Thinking, Academic Writing and Presentation Skills: Pearson, 2010

V. Pedagogy

1. Classroom engagement through lectures and PowerPoints
2. Lecture videos and online resources
3. Workbooks/Group activities/Assignments/Class Tests/Case studies

VI. Evaluation

The course paper is evaluated out of 50 marks, of which 50 percent weightage is of Internal Assessment and 50 percent weightage is of the End semester examination (External)

ASSESSMENT CRITERIA	INTERNAL EVALUATION	EXTERNAL EVALUATION
Continuous Internal Assessment (CIA) I and II	15	-
Assignment	05	-
Attendance	05	-
End Semester Exam	-	25
Total	25	25

*The assignment comprises activities designed by the faculty members concerned such as creating a working model based on the concepts learnt