

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



DEPARTMENT OF BIOCHEMISTRY – BIOTECHNOLOGY

SEMESTER – I SYLLABUS

OF

BSc BIOTECHNOLOGY (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 Biochemistry

- PSO1. Comprehensive and Procedural Knowledge: Discuss and interpret the basic concepts of all subjects under the aegis of current multidisciplinary Biochemistry 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 biochemistry 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 Biochemistry.
- 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 Biochemistry 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	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

Minor Course – 1: Nutrition - II

Course Title & Code	Credit Distribution of The Course			Eligibility Criteria	Prerequisite(s) of the Course (if any)
	Lecture	Tutorial	Practical / Practice		
BC – 4103 Nutrition - II	2 (30 hr)	0	2 (60 hrs)	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:

- The students could plan a balance diet according to the age group
- The students can carry out basic experiments for isolation and estimation of specific nutrients.
- Students can also go in for a career in nutrition counsellor and diet planner.

II. Course Learning Outcomes

The main objective of the course will be to build the basic foundation for studying Nutrition and Health

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

- CO 1: Understand the importance of various food groups, recommended intake of each and energy derived from it.
- CO 2: Categorize various micro and macro nutrients and disease that occur due to malnourishment and overuse
- CO 3: Apply the concept of anthropometric assessment, BMI, Lipid profile etc, analyze different data and interpret the data to understand the clinical significance
- CO 4: Design surveys to assess nutritional status in different populations/age groups etc
- CO 5: Perform experiments assessing levels of nutrients/analytes in food samples, serum samples etc.

III. Course Content

Part A: Theory (2 Credits)

Unit 1: Nutritional Importance of various Biomolecules (1 Credit)

Carbohydrates: Nutritionally important carbohydrates, Carbohydrate loading, Glycaemia index, Prebiotics and Probiotics, Dietary fibres types and its beneficiary effects, Diabetes.

Lipids: Essential fatty acids and functions, transport, mobilization and storage of fat, Ketosis, Obesity

Proteins: Types of dietary protein on the basis of quality, Nitrogen balance, Metabolism and

Protein Indices: Digestibility Coefficient, Biological value, Net Protein Utilization and Protein Energy ratio.

Unit 2: Nutritional assessment and Importance of Vitamins and minerals (1 Credit)

RDA definition and its significance, Determination of energy value of foods through direct and indirect methods (Physiological and Gross calorific value), BMR and its significance. Anthropometric assessment.

Biochemical functions, sources and deficiency of some significant vitamins and minerals (Calcium, Phosphorous, Iron and Iodine).

Part B: Laboratory Sessions (2 Credits)

1. Determination of Vitamin C using 2,6 – Dichlorophenol Indophenol
2. Estimation of Iron using Potassium thiocyanate (KSCN)
3. Estimation of Magnesium
4. Assessment of sugar in food sources
5. Assessment of protein in food sources
6. Determination of Obesity by various indices
7. Interpretation of Lipid Profile Indices

IV. Recommended learning Resources

1. B. Srilakshmi : Dietetics: 6th Edition
2. B. Srilakshmi : Nutrition Science, 7th edition
3. Sunetra Reddy: Food Science and Nutrition
4. Edward Arnold: Food Science Nutrition and Health, 6th Edition

V. Pedagogy

A. For Theory

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

B. For Lab Sessions

1. Explanation of each laboratory experiment emphasising on the use of different reagents and instruments
2. Problem solving, group activities and presentations. There are defined activities for every laboratory experiment in the journal, which encourages self-learning, peer learning, team work, developing presentation skills and reading from science articles and research papers.

VI. Evaluation

The theory part of 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 and CIA II comprises modules and activities designed by the concerned faculty.*

The laboratory part of 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
Internal Practical Examination*	20	-
Attendance	05	-
End Semester Practical Exam	-	25
Total	25	25

The internal practical exam will entail the students to answer a question paper based on the experiments in their journal, and to perform one experiment. The journal duly completed and signed will also carry weightage in the end semester evaluation.