

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



DEPARTMENT OF BIOCHEMISTRY – BIOTECHNOLOGY

SEMESTER – II 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 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 – II BSc (Hon.) Biochemistry and BSc Biochemistry with Vocational Biotechnology

Course	Title	Content	Hours/ week	Credit
DSC-1 (Theory)	BC – 2501 Concepts in Cell Biology	Unit 1: Membrane Structure and Cytoskeleton Unit 2: Cell organelles Unit 3: Cell – cell Interaction and Communication Unit 4: Cell cycle and Cell Death	4 hrs	4
DSC-1 (Lab)	BC – 2502L Basic Techniques in Cell Biology	Practical based as per Theory syllabus.	8 hrs	4
Minor-1 (Theory + Lab) <i>Offered to students of other Major Discipline (Chemistry)</i>	BC – 2101 Theory: Ultrastructure of Cell	Unit 1: Membrane Structure and Cytoskeleton Unit 2: Cell Organelles	2 hrs	2
	Lab: Basic Cell Biology Lab	Practical based as per Theory syllabus.	4 hrs	2
Minor-1 (Theory + Lab) <i>Offered to students with Voc Biotech</i>	BT – 2101 Theory: Environmental Biotechnology	Unit 1: Renewable energy and Biofuels Unit 2: Bioremediation and Biofertilizers	2 hrs	2
	Lab: Basic Techniques in Environmental Biotechnology	Labs based on environmental biotechnology	4 hrs	2
SEC	BC – 2650 Biophysical Techniques - II	U-1: Spectroscopy U-2: Chromatography	2 hrs	2
MDC <i>Offered to students of other Major Discipline</i>	MDC – 201_1C (Sem 2) Nutrition and Health	U-1: Food groups and diet U-2: Nutrients in food U-3: Food adulteration and Food safety standards U-4: Activity Modules	4 hrs	4
AEC	English	(To be offered by the concerned subject Department)		2
VAC	Value Courses Added	(To be offered by the concerned subject Department)		2
Total Credits				22

BSC. (HONS.) BIOCHEMISTRY OFFERED MULTIDISCIPLINARY COURSE SYLLABUS

SEMESTER - III

MultiDisciplinary Course – 1: Nutrition and Health

Course Title & Code	Credit Distribution of The Course			Eligibility Criteria	Prerequisite(s) of the Course (if any)
	Lecture	Tutorial	Practical/ Practice		
MDC 201_1C: Nutrition and Health	3 (45 hr)	1 (15 hr)	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:

- The students could plan a balance diet according to the age group
- The students can carry out basic experiments for identifying food adulteration.
- 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 food standards and food quality and know how to detect adulteration

III. Course Content

Unit 1: Food Groups and Diet

Definition: Nutrition and health, Classification of food groups, Energy value of the food, RDA, adequate energy intake, tolerable and upper limit of intake. Factors affecting RDA, Concept of balance diet based upon food pyramid, portion size and my plate concept. Food exchange list. Planning of balance diet.

Unit II: Nutrients in Food

Classification of Nutrients based upon their chemical characteristics.

A. Carbohydrates: Sources of carbohydrates (Digestive and non-digestive), energy derived from it and functions. Glycaemic index and glycaemic load, its importance, Importance of over and under nutrition of it.

B. Non Digestive Carbohydrates (Dietary Fibres): Its classification, physiological and metabolic importance, RDA and diseases which can be prevented from it.

C. Proteins: Classification based upon its nutritive value, Complete, incomplete and complementary proteins, N balance, Protein quality indexes

D. Fats and Lipids: MUFA, PUFA, EFAs, Role of fat in the diet, its benefits and disadvantages and lipid profile.

E. Minerals and Vitamins: Their importance, functions and deficiency disorders (Night blindness, Anaemia, Osteoporosis)

Unit III: Food Adulteration and Food Safety Standards:

Types, reasons and impact of adulteration with example of milk. Methods to detect milk adulterant. Food safety and standard act, Voluntary standards and certification system, Food standardization and regulation agencies in India.

Unit IV: Tutorials/ activity based learning:

1. Activity: Plan a diet for the diabetics and or for the weight loss in a healthy individual.
2. Activity: Visit the following website: <https://www.ketoforindia.com/indian-keto-diet-plan/>
3. Evaluate the diet plan described in terms of Kcal of the food, and availability of the nutrients from the five food groups.
4. Activity: Collect the wrapper of the five different brands of biscuits. Make the table describing the total carbohydrate, How much of it is sugars and dietary fibre content.
5. Activity: Japan has the lowest coronary heart disease mortality rate in the world. Explore their dietary habits and explain the reason.
6. Watch the video <https://www.youtube.com/watch?v=AKR1g4aHNb4>
Answer the following questions:
 - a) How carotene is converted into Vitamin A?
 - b) Which enzymes are involved in conversion of carotene to Vitamin A?
 - c) How does cis retinol undergo modifications?
7. Awareness, scrutiny and analyses of food labels of variety of ready-made packaged food and their analyses with regard to energy values, calorie and nutrient content in terms of RDA values.
8. Analyses of food packets for their fat content and evaluation of the food quality based on percentages of fat.
9. Recognizing and identifying different aromatic and coloured constituents of food (wet and dry) and their justification for inclusion in the preparation of flavoured and coloured food articles.

IV. Reference Books:

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

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 100 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	40	-
Assignment (Research element)*	05	-
Attendance	05	-
End Semester Exam	-	50
Total	50	50

**The assignment comprises case studies/activities/Assignments designed by the faculty*