

**St. Xavier's College (Autonomous), Ahmedabad**  
**Syllabus of Semester – I of the following departments under Faculty of Science**  
**based on Under Graduate Curriculum Framework – 2023 (NEP)**  
**to be implemented from the Academic Year 2023-24.**

**FACULTY OF SCIENCE**

**DEPARTMENT OF BIOCHEMISTRY**

Course	Title	Content	Hours/Week	Credit
SEC	BC – 1650 Biophysical Techniques - I	U-1: Microscopy U-2: Centrifugation	4 hrs	2

**BSC. (HONS.) BIOCHEMISTRY SYLLABUS**

**SEMESTER - I**

**Skill Enhancement Course – 1: Biophysical Techniques - I**

Course Title & Code	Credit Distribution of The Course			Eligibility Criteria	Prerequisite(s) of the Course (if any)
	Lecture	Tutorial	Practical / Practice		
BC – 1650: Biophysical Techniques - I	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:

- The students could pursue a career in industries that specialize in Instrumentation specifically for Life Science Research and Analysis
- Avail jobs in Production, Quality Control and Rand D divisions of Pharmaceutical and Biotech companies.
- The students can carry out basic research in various areas of biology due to their understanding of the techniques
- Start up companies supplying basic instruments like colorimeters, pH meters, etc.

**II. Course Outcome**

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

CO 1: Correlate the concept of viscosity to various biological systems

CO 2: Correlate the use of centrifugation and microscopy to elucidate a fundamental or pathway or structure etc.

CO 3: Designing experiments using centrifugation and microscopy and analyze the data

obtained

CO 4: Correlate the instrumentation design with its applications

### **III. Course Content**

#### **Unit 1: Centrifugation and Viscosity**

Poiseuille's equation, unit of viscosity, relative viscosity and its determination, factors affecting viscosity, physiological importance

Principle of sedimentation, factors affecting sedimentation

Types of rotors used in centrifuges, separation methods in different rotors

Preparative centrifuges: Differential centrifugation, sub cellular fractionation, density gradient centrifugations; Applications, preparation of gradients, sample collection methods, zonal rotors

Analytical Centrifuges; Ultracentrifugation, working and applications

#### **Unit 2: Microscopy**

Parts of a compound microscope: condenser, objective, ocular lens systems; Basic principles of image formation; Relationship between magnification and numerical aperture; angular power and resolving power. Measurements and analysis through microscopy.

Principle, construction, working, limitations and applications of: dark-field microscopy, phase contrast microscopy, fluorescent microscopy, Inverted microscopy and Electron (TEM, SEM) microscopy.

Principle and applications of Confocal microscopy, AFM and Cryoelectric microscopy

### **IV. Recommended learning Resources**

1. Berg JM, and Tymoczko TJ, Stryer L,: Biochemistry (6<sup>th</sup> Ed)
2. Daniel, C Harris: Quantitative Chemical Analysis
3. David Freifelder: Physical biochemistry (2<sup>nd</sup> Ed) WH Freeman, USA)
4. Donald Voet and Voet J: Biochemistry (4<sup>th</sup> Ed) 2011
5. Ghatak KL: Techniques and methods in Biology. PHI learning Pvt Ltd. 2011
6. Nelson DL and Cox MM: Lehninger's Principles of Biochemistry (5<sup>th</sup> Ed) 2008
7. Oser: Hawks Physiological Chemistry (4<sup>th</sup> Ed) 1965.
8. Upadhyay and Nath: Biophysical chemistry: Principles and Techniques (3<sup>rd</sup> Ed)
9. Van Holde KE: Physical Biochemistry. Prentice Hall, NJ.
10. Vogel AI: A text book of quantitative inorganic analysis (3<sup>rd</sup> Ed), 1975.
11. West and Todd: Text book of biochemistry ((4<sup>th</sup> Ed) 1970
12. Wharton and McCarty: Experiments and methods in Biochemistry
13. Willard and Merrit: Instrumental methods of analysis (4<sup>th</sup> Ed) 1971.
14. Wilson K and Walker J: Principles and Techniques of Biochemistry and Molecular Biology (6<sup>th</sup> Ed) 2006. Cambridge University Press.

### **V. Pedagogy**

1. Classroom engagement through lectures and PowerPoints
2. Lecture videos and online resources
3. Workbooks/Group activities/Assignments/Class Tests
4. Using the basic instruments in the laboratory

## 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
<b>Continuous Internal Assessment (CIA) I and II</b>	<b>15</b>	-
<b>Assignment</b>	<b>05</b>	-
<b>Attendance</b>	<b>05</b>	-
<b>End Semester Exam</b>	-	<b>25</b>
<b>Total</b>	<b>25</b>	<b>25</b>

*\*The internal evaluation of CIA II and Assignment will be based on evaluative modules prepared by the concerned faculty members, which will be outlined during the course work.*