

AC/27/06/2023/RS1



College of Arts,
Science &
Commerce (Autonomous)

RISE WITH EDUCATION

NAAC REACCREDITED - 'A' GRADE

SIES College of Arts, Science and Commerce

(Autonomous)

Affiliated to University of Mumbai

Syllabus under NEP effective from June 2023

Programme: B.Sc.

Subject: Biochemistry

Vocational Skill Enhancement Course (VSC)

Class: F.Y.B.Sc.

Semester : I and II

Choice Based Credit System (CBCS)

Content

1. Preamble	3
2. Overall Credit Structure for F.Y.BSc.....	4
3. Credit Structure of courses offered by Biochemistry Dept. (Semester I & II)	5
4. Syllabus for VSC- Basic tools & techniques in Biochemistry.....	6
5. References for VSC	7
6. Scheme of examination.....	7

Preamble

Biochemistry is a branch of biological science that delves into the chemical processes and information pathways governing the survival and propagation of life. It is an interdisciplinary science providing the learner an opportunity to elucidate molecular mechanisms and explore the intricate world of biomolecules and their applications. Under the aegis of New Education Policy-2020, the department offers a three-year BSc program and a four-year BSc Honours program with Biochemistry major or minor. At the first year level, along with core Biochemistry course, the department also offers Vocational skill enhancement course and Skill enhancement course. In this program, we will embark on a comprehensive journey from the structure and function of biomolecules to their interactions and implications in health and disease. Through lectures, laboratory sessions, and interactive discussions, the student will not only gain insights of the biochemical processes and pathways, but also develop skills for employability and an aptitude for research.

Objectives:

The goal of this interdisciplinary Biochemistry program is

1. Foundational knowledge: To build the foundation of Biochemistry and encourage the student to pursue Biochemistry at higher level.
2. Application of Biochemistry: To enable the student to recognize the application of biochemistry in areas of nutrition and food, pharmaceuticals, diagnostics, clinical research, bioinformatics, forensics, etc.
3. Laboratory skills: To develop essential laboratory skills for the experimental analysis of biochemical principles.

Program Outcome

At the end of the first year, the student should be able to:

- Comprehend the concepts in nutrition and importance of proper nutrition thus laying a foundation for the field of nutrition and dietetics
- Understand the physical and chemical properties of biomolecules
- Co-relate the structure of biomolecules with their properties and functions
- Explain the role of biomolecules in maintaining structural integrity as well as their role in cellular pathology
- Apply the experimental skills in studying biomolecules and cellular processes
- Recognize the application of biochemistry in diverse fields of food, nutrition, clinical research, drug discovery, diagnostics, forensics, genomics, proteomics and bioinformatics.
- Use basic computational skills in documentation and scientific data presentation.

Evaluation: Student's understanding of biochemistry will be evaluated through a combination of examinations, quizzes, laboratory reports, and class participation. These assessments are designed to gauge learner's comprehension of both theoretical concepts and practical applications.

Overall Credit Structure for F.Y. B.Sc.

Semester	Core I	Core II	OE	VSC, SEC (VSEC)	AEC, VEC, IKS	OJT, FP, CEP, CC	Credits/ semester	Degree/ cumulative credits
I	4C	4C	4C	VSC-2C SEC-2C	AEC-2C VEC-2C IKS-2C	Nil	22C	UG Certificate 44C
II	4C	4C	4C	VSC-2C SEC-2C	AEC-2C VEC-2C	CC-2C	22C	
Total Credits	8C	8C	8C	8C	10C	2C	44C	

OE: Open Elective/Generic open elective

VSC: Vocational Skill Course

SEC: Skill Enhancement Course

AEC: Ability Enhancement Course

VEC: Value Education Course

IKS: Indian Knowledge System

OJT: On-job training

FP: Field Project

CEP: Community engagement and service

CC: Co-curricular courses

**Credit Structure of courses offered by Biochemistry department for
F.Y. B.Sc. Biochemistry**

Name of Program: B.Sc. Biochemistry Biochemistry		Name of Department:				
Class	Semester	Course Code	Course Title	Credits	No. of lectures/ per week	Marks
FYBSc	I	SIUBCCC111	Foundations of Biochemistry	03	03	75
		SIUBCCCP111	Biochemistry Practical	01	02	25
		SIUBCVS111	Basic tools & techniques in Biochemistry	02 (01Th + 01P)	03 (01Th + 02P)	50
		SIUBCSE111	Good Laboratory Practices & Soft Skills	02 (01Th + 01P)	03 (01Th + 02P)	50
FYBSc	II	SIUBCCC121	Cell Biology	03	03	75
		SIUBCCCP121	Cell Biology Practical	01	02	25
		SIUBCVS121	Basic tools & techniques in Biochemistry	02 (01Th + 01P)	03 (01Th + 02P)	50
		SIUBCSE121	Good Laboratory Practices & Soft Skills	02 (01Th + 01P)	03 (01Th + 02P)	50

SI: SIES

U: Undergraduate

BC: Biochemistry

CC: Core Course

VS: Vocational Skill Course

SE: Skill Enhancement Course

Semester I and II
Syllabus- Vocational Skill Enhancement Course

Course Title: Basic tools & techniques in Biochemistry

Course code: SIUBCVS111 and SIUBCVS121

Credits: 02

Hours/week: 01L + 02 P

Course Outcome:

On completing the Course, the learner should be able to

1. *Understand the various units of concentration. Calculate and interconvert the units of concentration.*
2. *Skilfully carry out serial dilution of a sample.*
3. *Prepare buffers of particular pH and verify using pH paper and pH meter*
4. *Identify the components and understand the working of pH meter*
5. *Comprehend the principle and employ chromatography for separation of biomolecules*
6. *Understand the principle and working of a centrifuge. Apply the principle in separation by density gradient.*
7. *Understand the interaction of electromagnetic radiations with mater. Identify the components of a colorimeter.*
8. *Verify if a coloured solution obeys Beer Lambert law*
9. *Determine the concentration of analyte using Beer-Lambert law by calculation and graphically.*

Sr no	Title	Theory (T)/ Practical (P)
1.	Methods of expressing the concentration of a given solution (mole, molarity, normality, percent solution, ppm & ppb)	T
2.	Introduction to the concept of serial dilution.	T + P
3.	Preparation of buffers	P
4.	a. Preparation of a red cabbage/ turmeric pH indicator. b. Study the components of a pH meter. c. Determine the pH of a solution using a pH strip & a pH meter.	T + P
5.	Chromatographic separation of sugars present in fruit juice (ascending paper chromatography)	T + P
6.	a. Principle, components, and working of a centrifuge- Bench top and high-speed cold. b. Use of density gradient centrifugation.	T + P
7.	a. Introduction to basics of spectroscopy. b. Components of a colorimeter c. Verification of Beer-Lambert Law	T + P
8.	Extraction of pigments from flowers and determination of lambda max	P
9.	Phlebotomy (demonstration)	T + P

REFERENCES FOR VSC

1. Biochemical Methods Edition 3 by Sadasivam and Manickam.
2. An Introduction to Practical Biochemistry, 3rd edition- David T. Plummer
3. Microbiology, 5th edition- Michael Plczar Jr, E.C.S Chan, Noel Krieg.
4. Biophysical Techniques- Upadhyay, Upadhyay & Nath
5. Research Methodology- C.R Kothari
6. Butterfield Jeff Soft Skills for everyone.
7. Communication Skills for Engineers & Scientists- Sharma, Sangita and Binod Mishra.

Scheme of Examination:

Credits	Course Type	Distribution of Credits	Sem end	Internal	Practical	Total
2	VSC	without sem end exam	---	50	---	50

Details for Internal Assessment:

Weightage for Internal (marks)	Min. marks required for passing	Pattern of Evaluation
VSC : 50 marks (without sem end exam)	20	20 marks- class test (No retest) + 30 marks- Open to Department OR 50 marks from Practical- journal+ viva+ exam etc (continuous evaluation)

Options for internal evaluation: Quizzes, Presentations, Surveys, Internship, Tutorials, Role Play,