

B. Sc., BIOCHEMISTRY

SYLLABUS

Programme Code: 3USBIC

2026-2029



**SENGAMALA THAYAR EDUCATIONAL TRUST
WOMEN'S COLLEGE (AUTONOMOUS)**

(Affiliated to Bharathidasan University, Tiruchirappalli)
(Accredited by NAAC)

**Sundarakkottai, Mannargudi – 614 016, Thiruvarur (Dt.),
Tamil Nadu, India.**



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

(Affiliated to Bharathidasan University, Tiruchirappalli)

(Accredited by NAAC & An ISO 9001:2015 Certified Institution)

SUNDARAKKOTTAI, MANNARGUDI-614016.

TAMILNADU, INDIA.

**B.Sc., BIOCHEMISTRY
CHOICE BASED CREDIT SYSTEM–
LEARNING OUTCOMES BASED CURRICULUM FRAME WORK (CBCS–LOCF)
*(For the candidates admitted in the academic year 2026–2027)***

CHOICE BASED CREDIT SYSTEM

The credit based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching. The choice based credit system provides a 'cafeteria' type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning. Our College has moved to CBCS and implemented the grading system.

**OUTCOME-BASED EDUCATION (OBE)
LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)**

The fundamental premise underlying the learning outcomes-based approach to curriculum planning and development is that higher education qualifications are awarded on the basis of demonstrated achievement of outcomes (expressed in terms of knowledge, understanding, skills, attitudes and values) and academic standards expected of graduates of a programme of study. Learning outcomes specify what graduates completing a particular programme of study are expected to know, understand and be able to do at the end of their programme of study. The expected learning outcomes are used as reference points that would help to formulate graduate attributes, qualification descriptors, programme learning outcomes and course learning outcomes which in turn will help in curriculum planning and development, and in the design, delivery and review of academic programmes. They provide general guidance for articulating the essential learnings associated with programmes of study and courses within a programme, maintain national standards and international comparability of learning outcomes and academic standards to ensure global competitiveness, and to facilitate student/graduate mobility and provide higher education institutions an important point of reference for designing teaching-learning strategies, assessing student learning levels, and periodic review of programmes and academic standards.

Some important aspects of the Outcome Based Education Course: is defined as a theory, practical or theory cum practical subject studied in a semester.

Course Outcomes (COs): are statements that describe significant and essential learning that learners have achieved, and can reliably demonstrate at the end of a course. Generally, three or more course outcomes may be specified for each course based on its weightage.

Programme: is defined as the specialization or discipline of a Degree.

Programme Outcomes (POs): Programme outcomes are narrower statements that describe what students are expected to be able to do by the time of graduation. POs are expected to be aligned closely with Graduate Attributes.

Programme Specific Outcomes (PSOs): PSOs are what the students should be able to do at the time of graduation with reference to a specific discipline.

Some important terminologies repeatedly used in LOCF.

Ability Enhancement Courses (AEC): Ability Enhancement Courses are designed to improve students' language proficiency, communication skills, analytical abilities, environmental awareness, and understanding of contemporary issues. These courses aim to enhance the overall academic and professional capabilities of students and facilitate their effective participation in higher education and employment.

Core Courses (CC): A course that is compulsorily studied by a student as a fundamental requirement of the programme is termed a Core Course (CC). These courses provide the basic knowledge and conceptual understanding of the major discipline. Core Courses constitute the foundation of the programme and ensure that all students acquire the essential competencies and academic standards prescribed for the degree. Successful completion of Core Courses is mandatory for the award of the degree.

Core Practical Courses (CP): Core Practical Courses are laboratory-based courses associated with the Core Theory Courses. These courses provide hands-on training, experimental skills, analytical techniques, and practical exposure necessary for understanding the concepts of the discipline. Students are required to successfully complete all prescribed practical courses as part of the programme requirements.

Allied Courses (AC): Allied Courses are courses offered from disciplines other than the major discipline. These courses provide students with opportunities to gain additional knowledge and skills in allied or complementary areas of study. Allied Courses promote multidisciplinary learning and broaden the academic perspective of students. The selection and completion of Allied Courses shall be governed by the regulations of the institution and the curriculum framework.

Allied Practical (AP): Allied Practical are practical components associated with the chosen Minor discipline. These courses provide laboratory or field-based exposure to the concepts learned in the Allied Courses and help students develop practical skills relevant to the selected area of study.

Interdisciplinary Courses (IDC): Interdisciplinary Courses are designed to provide knowledge and skills that integrate concepts from multiple disciplines. These courses encourage students to explore the interrelationship between different fields of study and develop a broader understanding of contemporary issues and applications. Students may choose Interdisciplinary Courses as prescribed in the curriculum and subject to eligibility requirements.

Discipline Specific Elective Courses (DSE): Discipline Specific Elective Courses are elective courses offered by the major discipline. These courses provide students with opportunities to acquire advanced knowledge and specialization in selected areas of the discipline. Students may choose courses from the prescribed list of electives based on their interests, aptitude, and career aspirations. These courses are generally application-oriented and provide in-depth exposure to specific domains of study.

Skill Enhancement Courses (SECs): These courses focus on developing skills or proficiencies of the student, and aim at providing hands-on training. Skill enhancement courses can be opted by the students of any other discipline, but are highly suitable for students pursuing their academic programme. These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge.

Value Added Courses (VAC): Value Added Courses are intended to provide additional knowledge, skills, attitudes, and competencies that complement the regular curriculum. These courses focus on holistic development, professional ethics, environmental awareness, personality development, life skills, and emerging areas of knowledge. Successful completion of the prescribed Value Added Courses may be mandatory or optional as specified in the curriculum.

Field Study/Industrial Visit/Case Study: It has to be completed during the fifth semester of the degree programme. Credit for this course will be entered in the fifth semester's marks statement.

Internship: Students must complete internship training during summer holidays after the fourth semester. They have to submit a report of internship training with the necessary documents and have to appear for a viva-voce examination during fifth semester. Credit for internship will be entered in the fifth semester's mark statement.

Extra Credit Courses: In order to facilitate the students, gaining knowledge/skills by attending online courses MOOC, credits are awarded as extra credits, the extra credit are at three semesters after verifying the course completion certificates. According to the

guidelines of UGC, the students are encouraged to avail this option of enriching their knowledge by enrolling themselves in the Massive Open Online Courses (MOOC) provided by various portals such as SWAYAM, NPTEL etc.

Project Work: Project Work provides students with an opportunity to apply the knowledge and skills acquired during the programme to investigate a specific problem or research topic. Students shall undertake the project under the guidance of a faculty member and submit a dissertation/report followed by evaluation and viva-voce examination.

Extension Activities: Students are encouraged to participate in extension and outreach activities such as National Service Scheme (NSS), National Cadet Corps (NCC), Youth Red Cross (YRC), Red Ribbon Club (RRC), Sports, Fine Arts, Students Exnora, Rotaract, community engagement programmes, environmental awareness campaigns and other socially relevant activities. Such participation may be recognized through credits, certificates or awards as prescribed by the institution.

Undergraduate Programme:

Programme Pattern: The Under Graduate degree programme consists of **FIVE** vital components. They are as follows:

Part -I: Ability Enhancement Course (Tamil / Hindi / French / Sanskrit)

Part-II: Ability Enhancement Course (English)

Part-III: Core Course (Theory, Practicals, Allied courses, Allied Practicals and Group Project)

Part-IV: Skill Enhancement Courses, Discipline Specific Elective Courses, Interdisciplinary Courses, Value Education, Health & Wellness, Introduction to Disaster Management, Summer Internship, Value Added Course, Environmental studies, Gender studies and Extension activity.

EXAMINATION

Continuous Internal Assessment (CIA):

UG - Distribution of CIA Marks

Passing Minimum: 40 %

Assisgnment-3	=	30%
Test-2	=	50%
Seminar	=	10%
Attendance	=	10%

Question Paper Pattern

Section A1 (10x1=10 marks)

One word question/ Fill in/ True or False/ Multiple Choice Questions

Two Questions from Each unit

Section A 2 (5x2=10 marks)

Short Answers / Match the following

One question from Each unit

Total Marks – 20

Section B: (5x4=20 marks)

Paragraph Answers

Either/ or type, One Question from each unit

Section C: (10x3=30)

Essay Type Answers

Answer 3 out of 5 Questions

One Question from each unit

Section A1 & A2: K1 Level

Section B: K2, K3 and K4 Level

Section C: K5 and K6 Level

Knowledge levels for assessment of Outcomes based on Blooms Taxonomy

S.No	Level	Parameter	Description
1	K1	Knowledge/Remembering	It is the ability to remember the previously learned
2	K2	Comprehension/ Understanding	The learner explains ideas or concepts
3	K3	Application/Applying	The learner uses information in a new way
4	K4	Analysis/Analyzing	The learner distinguishes among different parts
5	K5	Evaluation/Evaluating	The learner justifies a stand or decision
6	K6	Synthesis /Creating	The learner creates a new product or point of view

WEIGHTAGE of K – LEVELS IN QUESTION PAPER

(Cognitive Level) K- LEVELS	Lower Order Thinking			Higher Order Thinking			Total
	K1	K2	K3	K4	K5	K6	
END SEMESTER EXAMINATIONS (ESE)	20	20			30		70
Continuous Internal Assessment (CIA)	20	20			30		70
QUESTION PATTERN FOR END SEMESTER EXAMINATION/ Continuous Internal Assessment							
SECTION							MARKS
SECTION – A1 (No choice ,One Mark) TWO questions from each unit (10x1 =10)							20
SECTION –A2 (No choice ,Two Mark) ONE question from each unit (5x2 =10)							20
SECTION - B (Either/ or type, 4-Marks) ONE questions from each unit (5x4 =20)							30
SECTION - C (3 out of 5) (10 Marks) ONE question from each unit (3x10 =30)							30
Total							70

BLUE PRINT OF QUESTION PAPER FOR END SEMESTER EXAMINATION							
DURATION: 3. 00 Hours.				Max Mark : 70			
K- LEVELS	K1	K2	K3	K4	K5	K6	Total Marks
SECTION							
SECTION –A1 (1 Mark, No choice) (10x1 =10)	10						10
SECTION –A2 (2-Marks, No choice) (5x2=10)	10						10
SECTION –B (4-Marks) (Either/or type) (5x4=20)		4	8	8			20
SECTION -C (10 Marks) (3 out of 5) (3x10=30) Courses having only K5, K6 levels, K5 level- 3 Questions, K6 level- 2 Questions (One K6 level question is compulsory)					20	10	30
Total	20	04	08	08	20	10	70

EVALUATION

GRADING SYSTEM

Once the marks of the CIA and the end-semester examination for each of the courses are available, they will be added and converted as final mark. The marks thus obtained will then be graded as per the scheme provided in Table-1.

Grade Point Average (GPA) will be calculated from the first semester onwards for all semester. From the second semester onwards, the total performance within a semester and the continuous performance starting from the first semester are indicated by semester Grade Point Average (GPA) and Cumulative Grade Point Average (CGPA), respectively. These two are calculated by the following formulae:

$$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$$

Where,

C_i is the Credit earned for the Course i

G_i is the Grade Point obtained by the student for the Course i

M_i is the marks obtained for the course i and

n is the number of Courses **Passed** in that semester.

$$\text{WAM (Weighted Average Marks)} = \frac{\sum_{i=1}^n C_i M_i}{\sum_{i=1}^n C_i}$$

CGPA: Average GPA of all the Courses starting from the first semester to the current semester.

CLASSIFICATION OF FINAL RESULTS:

- For each of the first three parts, there shall be separate classification on the basis of CGPA, as indicated in Table-2.
- For the purpose of declaring a candidate to have qualified for the Degree of Bachelor of Arts/ Science/ Commerce/ Management as Outstanding/ Excellent/ Very Good/ Good/ Above Average/ Average, the marks and the corresponding CGPA earned by the candidate in Part-III alone will be the criterion, provided the candidate has secured the prescribed passing minimum in the all the Five parts of the Programme.
- Grade in Part –IV and Part-V shall be shown separately and it shall not be taken into account for classification.
- A Pass in PART- V will be mandatory although the marks will not count for the calculation of the CGPA.
- Absence from an examination shall not be taken an attempt.

Table-1: Grading of the Courses – UG

Marks Range	Grade Point	Corresponding Grade
90 and above	10	O
80 and above and below 90	9	A+
70 and above and below 80	8	A
60 and above and below 70	7	B+
50 and above and below 60	6	B
40 and above and below 50	5	C
Below 40	NA	RA

The candidate's performance in every current semester is indicated by **Semester Grade Point Average (SGPA)** and from the second semester onwards, the continuous performance including previous semester /s is indicated by **Cumulative Grade Point Average (CGPA)**.

Table-2: Final Result

CGPA	Corresponding Grade	Classification of Final Result
9.00 and above	O	Outstanding
8.00 to 8.99	A+	Excellent
7.00 to 7.99	A	Very Good
6.00 to 6.99	B+	Good
5.00 to 5.99	B	Above Average
4.00 to 4.99	C	Average
Below 4.00	RA	Re-appearance

The candidates who have passed in the first appearance and within the prescribed duration of the UG programme are eligible. If the candidate's Grade is O/A+ with more than one attempt, the performance is fixed as "Very Good".

VISION

- Imparting quality education in Biochemistry to make the students to document the biological resources with scientific validation so as to enhance the quality of life.

MISSION

- To provide a learning environment to the students to understand, analyze and augment the basic analytical skills in Biochemistry.
- To expose the students and make them well versed in the various biochemical processes and update their knowledge and skills in advanced biochemical techniques.

PROGRAMME OUTCOMES FOR B.Sc., DEGREE PROGRAMMES

PO No.	Programme Outcomes (Upon completion of the B.Sc., Degree Programme, the Under graduate will be able to)
PO-1	Disciplinary knowledge: Demonstrate comprehensive knowledge and understanding of one or more disciplines that form a part of an under graduate Program of study in Bachelor of Science.
PO-2	Critical thinking, Problem Solving and Reflective thinking: Think critically about the issues and identify, critically analyze and solve problems from the disciplines of concern using appropriate tools and techniques and the knowledge, skills and attitudes acquired and extrapolate the same to real life situations; show critical sensibility to life experiences, with self-awareness and reflexivity of both self and society.
PO-3	Analytical & Scientific Reasoning: Evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesized from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints; critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.
PO-4	Research-related Skills: Develop a sense of capability for relevant/ appropriate inquiry and asking questions, synthesize, articulate and report results and to recognize and predict cause and effect relationships, define problems, formulate and establish hypothesis, analyze and interpret and draw conclusions from data, execute and report the results of an experiment or investigation.
PO-5	Digital literacy and Effective Communication: Use ICT in a variety of learning situations and speak, read, write and listen clearly in person and through electronic media in English and in one or more Indian languages, and make meaning of the world by connecting people, ideas, books, media and technology; Efficiently communicate thoughts and ideas in a clear and concise manner.
PO-6	Individual and Team Work: Effectively accomplish tasks individually as well as work effectively and respectfully as member or leader with diverse teams, facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interest so for a common cause and work efficiently as a member of a team.

PO-7	Multicultural Competence and Social Interaction: Understand the values and beliefs of multiple cultures, global perspectives, engage and interact respectfully with diverse groups and elicit views of others, mediate disagreements and help reach conclusions in group settings.
PO-8	Awareness of Ethical issues, Human values and Gender Issues: Embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work and understand the value of relationship between self and the community and aware of the various issues concerning women and society.
PO-9	Awareness of Environment and Sustainability: Understand the impacts of technology and business practices in societal and environmental contexts, and Sustainable development.
PO-10	Self-directed and Lifelong learning: Acquire knowledge and skills, including learning "how to learn", that are necessary for participating in learning activities throughout life and to engage in independent and life-long learning in the Broadest context of socio-technological changes.

PROGRAM SPECIFIC OUTCOMES (PSO)

PSO No.	Program Specific Outcomes (B.Sc., Biochemistry)
PSO1	Comprehend the knowledge in the biochemical, analytical, bio statistical and Computational areas
PSO2	Ability to understand the technical aspects of existing technologies that help in Addressing the biological and medical challenges faced by human kind
PSO3	Acquiring analytical and hands on skills to perform research in multidisciplinary environments
PSO4	Use library search tools and online databases and sources to locate and retrieve scientific information about a topic and techniques related to biochemistry



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

(Affiliated to Bharathidasan University, Tiruchirappalli)

(Accredited by NAAC)

**SUNDARAKKOTTAI, MANNARGUDI-614016.
TAMILNADU, INDIA.**

B.Sc., BIOCHEMISTRY

**CHOICE BASED CREDIT SYSTEM-LEARNING OUTCOMES BASED
CURRICULUM FRAMEWORK (CBCS – LOCF)**

(For the candidates admitted in the academic year 2026–2027)

ELIGIBILITY: A Pass in 10+2 with Chemistry as one of the core subjects

Sem	Part	Course	Course Code	Title of the Course	Ins. Hrs.	Credits	Exam. Hours	Maximum Marks		
								Int.	Ext .	Total
I	I	Ability Enhancement Course -I (AEC - I)	U26TAEC11	(Tamil\$ / Other Languages+, #)	6	3	3	30	70	100
	II	Ability Enhancement Course -II (AEC - II)	U26EAEC11	English Course – I	6	3	3	30	70	100
	III	Core Course -I (CC - I)	U26BC101	Biomolecules	4	4	3	30	70	100
		Core Practical - 1 (CP - I)	U26BC102P	Biomolecules Practical	4	4	3	40	60	100
		Allied Course -1 (AC - I)	U26ACH101	Chemistry-I	3	3	3	30	70	100
		Allied Practical - I (AP-I)	U26ACH102P	Chemistry-I Practical	3	3	3	40	60	100
	IV	Value Education	26UGVED	Value Education	2	2	3	30	70	100
		Interdisciplinary Course -I (IDC - 1) #			2	2	3	30	70	100
	Total				30	24	--	--	--	800
II	I	Ability Enhancement Course - III (AEC - III)	U26TAEC22	(Tamil\$ / Other Languages+, #)	6	3	3	30	70	100
	II	Ability Enhancement Course - IV (AEC - IV)	U26EAEC22	English Course – II	6	3	3	30	70	100
	III	Core Course - II (CC - II)	U26BC203	Biochemical Techniques	4	4	3	30	70	100
		Core Practical - II (CP - II)	U26BC204P	Biochemical Techniques Practical	4	4	3	40	60	100
		Allied Course - II (AC - II)	U26ACH203	Chemistry-II	3	3	3	30	70	100
		Allied Practical - II (AP-II)	U26ACH204P	Chemistry- II Practical	3	3	3	40	60	100
	IV	Skill Enhancement Course -I (SEC - I) ##	U26SEBC21	Biomedical Instrumentation	2	2	3	30	70	100
		Interdisciplinary Course- II (IDC - II) #			2	2	3	30	70	100
	Total				30	24	--	--	--	800

III	I	Ability Enhancement Course - V(AEC - V)		(Tamil\$ / Other Languages+, #)	6	3	3	30	70	100
	II	Ability Enhancement Course - VI (AEC - VI)		English Course – III	6	3	3	30	70	100
	III	Core Course- III (CC - III)		Cell Biology	4	4	3	30	70	100
		Core Practical - III (CP - III)		Cell Biology Practical	4	4	3	40	60	100
		Allied Course - III (AC - III)		Basic Microbiology	3	3	3	30	70	100
		Allied Practical – III (AP-III)		Basic Microbiology Practical	3	3	3	40	60	100
	IV	Skill Enhancement Course - II (SEC - II) ##		Artificial Intelligence in Biochemistry	2	2	3	30	70	100
		Interdisciplinary Course - III (IDC - III) \$\$			2	2	3	30	70	100
		Health & Wellness @			--	1	--	20	80	100
Total				30	25	--	--	--	900	
IV	I	Ability Enhancement Course - VII (AEC - VII)		(Tamil\$ / Other Languages+, #)	6	3	3	30	70	100
	II	Ability Enhancement Course - VIII (AEC - VIII)		English Course - IV	6	3	3	30	70	100
	III	Core Course- IV (CC - IV)		Enzymology	4	4	3	30	70	100
		Core Practical – IV (CP - IV)		Enzymology Practical	4	4	3	40	60	100
		Allied Course – IV (AC - IV)		Medical Microbiology	3	3	3	30	70	100
		Allied Practical – IV (AP-IV)		Medical Microbiology Practical	3	3	3	40	60	100
	IV	Skill Enhancement Course - III (SEC - III) ##		Forensic Science for Biochemist	2	2	3	30	70	100
		Interdisciplinary Course - IV (IDC - IV) \$\$			2	2	3	30	70	100
	Total				30	24	--	--	--	800
	Summer Internship / Industrial Activity during the Summer Vacation after II Year									

V	III	Core Course - V (CC - V)		Human Physiology	4	4	3	30	70	100
		Core Course - VI (CC - VI)		Molecular Biology	5	4	3	30	70	100
		Core Course – VII (CC - VII)		Immunology	5	4	3	30	70	100
		Core Course - VIII (CC - VIII)		Endocrinology	5	4	3	30	70	100
		Core Practical – V (CP - V)		Molecular Biology and Immunology Practical	5	4	3	40	60	100
	IV	Skill Enhancement Course - IV (SEC - IV)		Basics of Bioinformatics	2	2	3	30	70	100
		Discipline Specific Elective Course -I (DSEC-I)		Research Methodology / Biochemical Pharmacology/ Genetics	2	2	3	30	70	100
		Introduction to Disaster Management			2	2	3	30	70	100
		Summer Internship / Industrial Activity @@		Summer Internship with Viva-Voce	--	2	--	20	80	100
	Total				30	28	--	--	--	900
VI	III	Core Course -IX (CC - IX)		Intermediary Metabolism	4	4	3	30	70	100
		Core Course - X (CC - X)		Clinical Biochemistry	5	4	3	30	70	100
		Core Practical - VI (CP - VI)		Clinical Biochemistry Practical	5	4	3	40	60	100
		Core Project Work(CPW) @@		Project Work with Viva - Voce	6	4	3	20	80	100
	IV	Skill Enhancement Course - V (SEC - V)		Pharmacovigilance	2	2	3	30	70	100
		Discipline Specific Elective Course -II (DSEC-II)		Biotechnology and Plant Biochemistry/ Herbs and Phytotherapeutics/ Environmental Biochemistry	2	2	3	30	70	100
		Environmental Studies			2	2	3	30	70	100
		Gender Studies			2	1	3	30	70	100
		Value Added Course		General Studies for Competitive Examinations	2	2	-	30	70	100
		Extension Activities *			--	1	--	--	--	--
		Total				30	26	--	--	--
Grand Total				180	151	--	--	--	5100	

ALLIED COURSE (AC)		
S. No	Semester	Course Name
1	I	Chemistry-I
2	I	Chemistry -I Practical
3	II	Chemistry-II
4	II	Chemistry- II Practical
5	III	Basic Microbiology
6	III	Basic Microbiology Practical
7	IV	Medical Microbiology
8	IV	Medical Microbiology Practical

SKILL ENHANCEMENT COURSE (SEC)		
S. No	Semester	Title of the Course
1	II	SEC-I Biomedical Instrumentation
2	III	SEC-II Artificial Intelligence in Biochemistry
3	IV	SEC-III Forensic Science for Biochemist
4	V	SEC-IV Basics of Bioinformatics
5	VI	SEC-V Pharmacovigilance

DISCIPLINE SPECIFIC ELECTIVE COURSE (DSEC)		
S. No	Semester	Title of the Course
1	V	DSEC-I Research Methodology/ Biochemical Pharmacology/ Genetics
2	VI	DSEC-II Biotechnology and Plant Biochemistry/ Herbs and Phytotherapeutics/ Environmental Biochemistry

INTERDISCIPLINARY COURSE (IDC)		
Semester	Couse Code	Title of the Course
I	U26IDBC11	Basic Biochemistry
II	U26IDBC22	Biochemistry of Lifestyle Diseases and Treatments
III		Nutritional Biochemistry
IV		First Aid Management

VALUE ADDED COURSE ** (VAC)		
Semester	Course	Title of the Course
II	VAC - I	Indian Knowledge System in Biochemistry and Health Sciences
IV	VAC - II	Data Science Using Python and R Programming

INTERDISCIPLINARY COURSE (IDC) # FOR WHO HAVE NOT OPT TAMIL AS PART - I		
Those who have studied Tamil upto 10 th +2 but opt for other languages in degree	I Semester	Special Tamil - I
	II Semester	Special Tamil - II
Those who have not studied Tamil in school level	I Semester	Basic Tamil - I
	II Semester	Basic Tamil – II
INTERDISCIPLINARY COURSE (IDC) \$\$ FOR NCC CADETS ONLY		
NCC Course is a Compulsory Course for the NCC Cadets in the III Semester	NCC Course is a Compulsory Course for the NCC Cadets in the IV Semester	
Introduction to NCC	1. Special Subject Army (or) 2. Special Subject Navy (or) 3. Special Subject Air force	

SUMMARY OF CURRICULUM STRUCTURE OF UG PROGRAMMES – SCIENCE

S. No.	Part	Types of the Courses	No. of Courses	Credits for each Course	Total Credits	Marks
1.	I	Ability Enhancement Course (AEC) (Tamil)	4	3	12	400
2.	II	Ability Enhancement Course (AEC) (English)	4	3	12	400
3.	III	Core Course (CC)	10	4	40	1000
4.		Core Practical (CP)	6	4	24	600
5.		Allied Course (AC)	4	3	12	400
6.		Allied Practical (AP)	4	3	12	400
7.		Core Project Work (CPW)	1	4	4	100
8.	IV	Skill Enhancement Course (SEC)	5	2	10	500
9.		Discipline Specific Elective Course (DSEC)	2	2	4	200
10.		Interdisciplinary Course (IDC)	4	2	8	400
11.		Value Education	1	2	2	100
12.		Health and Wellness	1	1	1	100
13.		Introduction to Disaster Management	1	2	2	100
14.		Summer Internship / Industrial Activity	1	2	2	100
15.		Value Added Course	1	2	2	100
16.		Environmental Studies	1	2	2	100
17.		Gender Studies	1	1	1	100
18.		EXTENSION ACTIVITIES (NCC / NSS / SPORTS / ANTI DRUG CELL / YRC & Any Other Activities)	--	1	1	--
Total			51	-	151	5100
Additional Value Added Course in semester II and IV**			2**	2	4**	200
MOOC-SWAYAM/NPTEL Courses			-	2	2	-

\$	For those who have studied Tamil upto10 th +2 (Regular Stream)															
+	Syllabus for other Languages should be on par with Tamil at degree level															
#	Those who have studied Tamil up to10 th +2 but opt for other languages in degree level under Part-I should study special Tamil and those who have not studied Tamil in the school level should study Basic Tamil in Part–IV under the Interdisciplinary Course.															
\$\$	NCC Course is one of the Choices in the Interdisciplinary Course. Only the NCC Cadets are eligible to choose this course. However, NCC Course is a Compulsory Course for the NCC Cadets.															
@	Health and Wellness: Assessments: • Use self-reflective worksheets to assess their understanding • submit the worksheets to internal audit / external audit • Every student’s activity report should be documented and the same have to be assessed by the Physical Director with Mentor. The evaluation should be for 100 marks. No examination is required. Scheme of Evaluation: <table><tr><th>Part</th><th>Description</th><th>Marks</th></tr><tr><td>A</td><td>Report</td><td>40</td></tr><tr><td>B</td><td>Attendance</td><td>20</td></tr><tr><td>C</td><td>Activities (Observation During Practice)</td><td>40</td></tr><tr><td colspan="2">Total</td><td>100</td></tr></table>	Part	Description	Marks	A	Report	40	B	Attendance	20	C	Activities (Observation During Practice)	40	Total		100
Part	Description	Marks														
A	Report	40														
B	Attendance	20														
C	Activities (Observation During Practice)	40														
Total		100														
@ @	Summer Internship / Industrial Activity Internship will be carried our during the summer vacation after the second year. Viva-Voce will be conducted by the college and Marks shall be send to the University and the same will be included in the V semester Mark Statement. Summer Internship / Industrial Activity & Project Work Scheme of Evaluation: <table><tr><th>Description</th><th>Marks</th></tr><tr><td>Report</td><td>80</td></tr><tr><td>Viva-Voce</td><td>20</td></tr><tr><td>Total</td><td>100</td></tr></table>	Description	Marks	Report	80	Viva-Voce	20	Total	100							
Description	Marks															
Report	80															
Viva-Voce	20															
Total	100															
*	Extension Activities shall be outside instruction hours.															
**	Additional value added courses credit will not be included in the total CGPA. These courses are extra-credit courses. Instruction hours for these courses is 30 hours															

SEMESTER - I



SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)
SUNDARAKKOTTAI, MANNARGUDI- 614016
(For the Candidates admitted in the academic year 2026 – 2027)
DEPARTMENT OF BIOCHEMISTRY
B.Sc., BIOCHEMISTRY

Semester: I-CC-I: Biomolecules

Ins. Hrs./Week: 5

Course Credit: 5

Course Code: U26BC101

COURSE OBJECTIVES

- To understand the classification, structure, properties and biological significance of carbohydrates.
- To acquire knowledge on the chemistry, classification, properties and functions of amino acids.
- To explain the structural organization, properties and biological roles of proteins.
- To understand the classification, characterization and physiological importance of lipids.
- To gain insight into the structure, properties and biological functions of nucleic acids and recent advances in biomolecular research.

UNIT-I: Carbohydrates (15 Hours)

Definition, classification – monosaccharide, oligosaccharides and polysaccharides; occurrence, structure and functions of monosaccharide (glucose and fructose). General properties with reference to glucose, anomer, epimer, enantiomer and mutarotation. Structure, occurrence, properties and biological importance of disaccharides (sucrose, lactose, maltose) and Polysaccharides Storage polysaccharides (starch, glycogen), Structural polysaccharides (cellulose, chitin), Heteropolysaccharides (hyaluronic acid, heparin).

UNIT –II: Amino acids (15 Hours)

Amino acids -Classification based on composition of side chain and nutritional significance. General structure of amino acids. 3 - and 1- letter abbreviations. Modified amino acids in protein non - protein amino acids. Physical properties of amino acids, isoelectric point, titration curve (alanine, lysine, glutamic acid), optical activity. Chemical reactions due to carboxyl group, amino group and side chains. Colour reactions of amino acids.

UNIT- III: Proteins (15 Hours)

Proteins-Classification based on shape, composition, solubility and functions. Properties of proteins - Ampholytes, isoelectric point, salting in and salting out, denaturation and renaturation, UV absorption. Levels of Organization of protein structure- Primary structure, Formation and characteristics of peptide bond, phi and psi angle, Secondary structure- α helix (egg albumin), β - pleated sheath (keratin), triple helix (collagen). Tertiary structure with reference to myoglobin. Quaternary structure with reference to haemoglobin.

UNIT-IV: Lipids**(15 Hours)**

Lipids: Bloor's classification, chemical nature and biological functions. Fatty acids: classification, nomenclature, structure and properties of fatty acids. Simple and mixed triglycerides: structure and general properties, Characterization of fats- iodine value, saponification value, acid number, acetyl number, polensky number, Reichert –Meissl number along with their significance. Compound lipids - Structure and functions of phospholipids and glycolipids. Derived lipids - Structure and functions of cholesterol, bile acids and bile salts.

UNIT-V: Nucleic acids**(15 Hours)**

Nucleic acids-Structure of purine and pyrimidine bases, nucleosides and nucleotides and their biological importance. Types of DNA: A, B, C, Z DNA, structure and biological significance, superhelicity. Types of RNA: mRNA, tRNA, rRNA, hnRNA, snRNA, Secondary and tertiary structure of tRNA. Properties of DNA-Hypochromic and hyperchromic effect, melting temperature, viscosity. Denaturation and annealing.

UNIT – VI: Current Contours (For Continuous Internal Assessment only – Self Study)

Recent advances in biomolecules, nutritional biochemistry. Role of probiotics, prebiotics, bioinformatics and nanobiotechnology in health and medicine. AI, omics technologies, biomarkers, antioxidants and current trends in metabolic disease research.

Total Lecture Hours-75**COURSE OUTCOMES**

The students are able to,

1. Classify carbohydrates and explain their structure, properties and biological functions.
2. Describe the classification, chemical properties and metabolic significance of amino acids.
3. Analyze the structural hierarchy of proteins and correlate structure with function.
4. Explain the classification, characterization and biological importance of lipids.
5. Illustrate the structure and functions of nucleic acids and evaluate recent developments in biomolecular applications and biotechnology.
6. Apply knowledge of recent advances in biomolecules, nutraceuticals, probiotics, bioinformatics, nanobiotechnology, AI and omics technologies in modern biomedical research.

TEXT BOOK(S)

1. Bhutani, S. P. (2022). Chemistry of biomolecules (2nd ed.). CRC Press.
2. Sathyanarayana, U., & Chakrapani, U. (2013). Biochemistry (5th ed.). Elsevier India Pvt. Ltd. / Books & Allied Pvt. Ltd.
3. Jain, J. L., Jain, S., & Jain, N. (2021). Fundamentals of biochemistry (7th ed.). S. Chand & Company Ltd.
4. Chatterjea, M. N., & Shinde, R. (2002). Textbook of medical biochemistry (8th ed.). Jaypee Brothers.
5. Murray, R. K., Granner, D. K., Mayes, P. A., & Rodwell, V. W. (2023). Harper's illustrated biochemistry (26th ed.). McGraw-Hill Medical Publishers.
6. Vasudevan, D. M. (2018). Biochemistry (9th ed.). Aypee Brothers Medical Publishers.

REFERENCE BOOK(S)

1. Nelson, D. L., & Cox, M. M. (2017). Principles of biochemistry (7th ed.). W.H. Freeman and Company.
2. Voet, D., Voet, J. G., & Pratt, C. W. (2004). Principles of biochemistry (4th ed.). John Wiley & Sons, Inc.
3. Zubay, G. L., Parson, W. W., Vance, D. E., & Thomas, D. J. (1995). Principles of biochemistry (1st ed.). Wm. C. Brown Publishers.
4. Ambika Shanmugam. (2016). Fundamentals of biochemistry (8th ed.). Wolters Kluwer India Pvt. Ltd.
5. Nelson, D. L., & Cox, M. M. (2008). Lehninger principles of biochemistry (5th ed.). W.H. Freeman and Company.

E-RESOURCES

1. <https://onlinecourses.harvard.edu/biomolecules>.
2. <https://www.khanacademy.org/science/biology/macromolecules>
<https://www.nih.gov/biomolecules>
4. <https://nptel.ac.in/content/storage2/courses/104103071/pdf/mod10.pdf>
5. <https://nptel.ac.in/content/storage2/courses/104103071/pdf/mod11.pdf>
6. <https://nptel.ac.in/content/storage2/courses/104103071/pdf/mod12.pdf>
7. <https://www.nih.gov/biomolecules-functions>
8. www.ncbi.nlm.nih.gov
9. www.biochemistry.org
10. www.who.int
11. www.sciencedirect.com

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3		2		2		2	3	3	3	3
CO2	3	3	3	3		2		2		2	3	3	3	3
CO3	3	3	3	3		2		2		2	3	3	3	3
CO4	3	3	3	3		2		2		2	3	3	3	3
CO5	3	3	3	3		2		2		2	3	3	3	3
CO6	3	3	3			2		2			3	3		3

S-Strong (3)

M-Medium (2)

L-Low (1)



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2026 – 2027)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: I-CP-I: Biomolecules Practical

Ins. Hrs./Week: 4

Course Credit: 4

Course Code: U26BC102P

COURSE OBJECTIVES

- To provide practical knowledge on qualitative and quantitative analysis of biomolecules such as carbohydrates, amino acids and lipids.
- To develop laboratory skills for identification and characterization of biochemical compounds using standard biochemical tests.
- To train students in quantitative estimation techniques used in biochemical and clinical laboratories.
- To understand the principles, procedures and applications of titrimetric and analytical methods in biochemistry.
- To enhance analytical, observational and interpretation skills required for biochemical experimentation and research.

Qualitative analysis

1. Qualitative analysis of carbohydrates (glucose, fructose, galactose, maltose, sucrose, lactose), Identification of both monosaccharides and disaccharides in mixtures.
2. Qualitative analysis of amino acids (Tryptophan, Tyrosine, Arginine, Proline, Phenylalanine and Histidine).
3. Qualitative analysis of Lipids-Solubility, Emulsification test, Saponification test, Acrolein test for Unsaturation, Test for Cholesterol-Salkowski test and Lieberman-Burchard test.

Quantitative analysis

1. Estimation of reducing sugar by Benedict's quantitative method.
2. Estimation of amino acid by formal titration
3. Estimation of ascorbic acid by titrimetric method using 2,6-dichlorophenol indophenol dye.
4. Estimation of acid number of edible oil.
5. Determination of saponification number of edible oil.
6. Estimation of iodine value of edible oil.

Total Hours - 60

COURSE OUTCOMES

The students are able to,

1. Perform qualitative analysis and identify carbohydrates, amino acids and lipids using standard biochemical tests.
2. Differentiate monosaccharides, disaccharides and amino acids based on their characteristic reactions.
3. Apply quantitative analytical methods for estimation of reducing sugars, amino acids and ascorbic acid.
4. Determine physicochemical properties of edible oils such as acid number, saponification number and iodine value.
5. Interpret experimental observations and biochemical test results with accuracy and scientific reasoning.
6. Demonstrate competency in laboratory techniques, safety practices and biochemical data analysis for research and clinical applications.

TEXT BOOK(S)

1. Plummer, D. T. (1987). An introduction to practical biochemistry (3rd ed.). Tata McGraw-Hill.
2. Jayaraman, J. (1996). Laboratory manual in biochemistry. New Age International.
3. Sadasivam, S., & Manickam, A. (2008). Biochemical methods (3rd ed.). New Age International.
4. Nelson, D. L., & Cox, M. M. (2021). Lehninger principles of biochemistry (8th ed.). W.H. Freeman.
5. Wilson, K., & Walker, J. (2018). Principles and techniques of biochemistry and molecular biology (8th ed.). Cambridge University Press.

REFERENCE BOOK(S)

1. Rao, B. S. N., & Rama Rao, A. V. S. S. (2005). A textbook of biochemistry (4th ed.). UBS Publishers.
2. Voet, D., & Voet, J. G. (2021). Biochemistry (5th ed.). Wiley.
3. Berg, J. M., Tymoczko, J. L., & Stryer, L. (2019). Biochemistry (9th ed.). W.H. Freeman.
4. Satyanarayana, U., & Chakrapani, U. (2017). Biochemistry (5th ed.). Elsevier.
5. Ninfa, A. J., & Ballou, D. P. (2010). Fundamental laboratory approaches for biochemistry and biotechnology (2nd ed.). Wiley.

E-RESOURCES

1. <https://www.pdfdrive.com/instant-notes-analytical-chemistry-e912659.html> 14
2. <https://www.pdfdrive.com/analytical-biochemistry-e46164604.html>
3. <https://www.pdfdrive.com/biochemistry-books.html>
4. <https://www.protocol-online.org/>
5. <https://www.biologyonline.com/>
6. www.ncbi.nlm.nih.gov
7. www.biochemj.org
8. www.sciencedirect.com
9. www.elsevier.com

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	2		2		2		2	3	3	3	3
CO2	3	3	3	2		2		2		2	3	3	3	3
CO3	3	3	3	3		2		2		2	3	3	3	3
CO4	3	3	3	3		2		2		2	3	3	3	3
CO5	3	3	3	3		2		2		2	3	3	3	3
CO6	2	3	3	1	2			1		2	3		3	

S-Strong (3)

M-Medium (2)

L-Low (1)



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2026 – 2027)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: I-Value Education

Ins. Hrs./Week: 2

Course Credit: 2

Course Code: 26UGVED

COURSE OBJECTIVES

- To understand the philosophy of life and values through Thirukural
- To analyse the components of values education to attain the sense of citizenship
- To understand different types of values towards National Integration and international understanding
- To learn yoga as value education to promote mental and emotional health
- To understand human rights, women rights and other rights to promote peace and harmony

UNIT I: Philosophy of Life and Social Values

(6 Hours)

Human Life on Earth (Kural 629), Purpose of Life (Kural 46), Meaning and Philosophy of Life (Kural 131, 226), Family (Kural 45), Peace in Family (Kural 1025), Society (Kural 446), The Law of Life (Kural 952), Brotherhood (Kural 807), Five responsibilities/duties of Man.

UNIT II: Human Values and Citizenship

(6 Hours)

Aim of education and value education, Evolution of value oriented education, Concept of Human values, Types of Values, Character Formation, Components of Value Education, A.P.J. Kalam's ten points for enlightened citizenship, Role of media in value building.

UNIT III: Value Education towards National and Global Development

(6 Hours)

Constitutional or national values, Social values, Professional values, Religious values, Aesthetic values, National Integration and International Understanding.

UNIT IV: Yoga and Health

(6 Hours)

Definition, Meaning, Scope of Yoga, Aims and objectives of Yoga, Yoga Education with modern context, Different traditions and schools of Yoga, Yoga practices: Asanas, Pranayama and Meditation.

UNIT V: Human Rights

(6 Hours)

Concept of Human Rights, Indian and international perspectives, Evolution of Human Rights, Constitutional Provisions, Rights of Women and Children, Peace and harmony.

Total Lecture Hours-30

COURSE OUTCOMES

The students are able to,

1. Apply values in Thirukkural in family and society.
2. Develop character formation and citizenship.
3. Be secular, sincere, respectful and moral.
4. Practice yoga and meditation for mental health.
5. Follow constitutional rights.

TEXT BOOK(S)

1. Grose, D. N. (2005). *A textbook of value education*. New Delhi, India: Dominant Publishers.
2. Gawande, E. N. (2002). *Value oriented education: Vision for better living*. New Delhi, India: Sarup & Sons.
3. Levin, L. (1998). *Human rights: Questions and answers* (3rd ed.). New Delhi, India: National Book Trust.
4. Chandrasekaran, K. (1999). *Sound health through yoga*. Sedapatti, India: Prem Kalyan Publications.
5. Kuvalayananda, S., & Vinekar, S. L. (1963). *Yogic therapy: Its basic principles and methods*. New Delhi, India: Government of India, Ministry of Health.

REFERENCE BOOK(S)

1. Pope, G. U. (Trans.). (2006). *The Tirukkural of Tiruvalluvar* (Reprint ed.). New Delhi, India: Asian Educational Services.
2. Levin, L. (1998). *Human rights: Questions and answers* (3rd ed.). New Delhi, India: National Book Trust.
3. Krishna Iyer, V. R. (1994). *Dialectics and dynamics of human rights in India*. New Delhi, India: Eastern Law House.
4. Kuvalayananda, S., & Vinekar, S. L. (1963). *Yogic therapy: Its basic principles and methods*. New Delhi, India: Ministry of Health, Government of India.
5. Chandrasekaran, K. (1999). *Sound health through yoga*. Sedapatti, India: Prem Kalyan Publications.
6. Grose, D. N. (2005). *A textbook of value education*. New Delhi, India: Dominant Publishers.
7. Gawande, E. N. (2002). *Value oriented education: Vision for better living*. New Delhi, India: Sarup & Sons.
8. Brain Trust Aliyar. (2004). *Value education for health, happiness and harmony*. Erode, India: Vethathiri Publications.

E-RESOURCES

1. <https://www.gutenberg.org>
2. <https://www.ohchr.org>
3. <https://www.nhrc.nic.in>
4. <https://www.theyogainstitute.org>
5. <https://www.svyasa.edu.in>
6. www.nhrc.nic.in
7. www.ohchr.org
8. www.svyasa.edu.in

SEMESTER - II



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2026 – 2027)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: II- CC II: Biochemical Techniques

Ins. Hrs./Week: 5

Course Credit: 5

Course Code: U26BC203

COURSE OBJECTIVES

- To provide fundamental knowledge on the principles, instrumentation and applications of major biochemical analytical techniques.
- To develop understanding of chromatographic, electrophoretic, centrifugation and spectroscopic methods used in biochemical analysis.
- To train students in the separation, identification and characterization of biomolecules using modern analytical tools.
- To familiarize students with radioisotopic techniques and their applications in biological and biomedical research.
- To create awareness about recent advances and emerging trends in bioanalytical and clinical biotechnology techniques.

UNIT-I: Chromatography

(15 Hours)

Principles, Instrumentation and Applications - Paper, Thin Layer Chromatography, Column Chromatography, Ion exchange Chromatography, Molecular sieve Chromatography, Affinity Chromatography, High Performance Liquid Chromatography, Gas Liquid Chromatography.

UNIT-II: Electrophoresis

(15 Hours)

Principle, Instrumentation and Applications-Factors affecting electrophoretic mobility- Paper Electrophoresis, Agarose Gel Electrophoresis, PAGE, SDS PAGE, Iso electric focusing.

UNIT-III: Centrifugation

(15 Hours)

Principle, Instrumentation and Applications- RCF, Svedberg unit, Types of centrifuge and Rotors - Preparative, differential, density gradient, differential, Analytical ultracentrifugation – instrumentation and applications - Determination of molecular weight.

UNIT-IV: Spectroscopy

(15 Hours)

Principle, Instrumentation and Applications -Colorimeter, UV spectrophotometer, Flame Photometer, Atomic Absorption Spectrophotometer, Fluor meter.

UNIT-V: Radioactivity

(15 Hours)

Radioactive decay, Units of radioactivity, types of radiation, measurement of radioactivity - GM counter, Scintillation counter, Autoradiography, Applications of radioisotopes in biology.

UNIT – VI: Current Contours (For Continuous Internal Assessment only – Self Study)

Recent advances in analytical and separation techniques in biochemistry. Applications of chromatography and electrophoresis in biomedical research.

Emerging trends in spectroscopic and radioisotopic techniques.
Current developments in bioanalytical methods and clinical biotechnology.

Total Lecture Hours-75

COURSE OUTCOMES

The students are able to,

1. Explain the principles, instrumentation and applications of chromatography, electrophoresis, centrifugation, spectroscopy and radioisotopic techniques.
2. Differentiate various chromatographic and electrophoretic methods used for separation and analysis of biomolecules.
3. Apply centrifugation and spectroscopic techniques for biochemical investigations and molecular analysis.
4. Interpret analytical data obtained from modern bioanalytical instruments and laboratory techniques.
5. Describe the applications of radioisotopes and radiation detection methods in biology and biomedical research.
6. Evaluate recent developments and emerging technologies in analytical biochemistry and clinical biotechnology.

TEXT BOOK(S)

1. Jayaraman, J. (2011). *Laboratory manual in biochemistry* (2nd ed.). New Age International Publishers.
2. Plummer, D. T. (2017). *An introduction to practical biochemistry* (6th ed.). McGraw-Hill Education.
3. Sharma, B. K. (2014). *Instrumental methods of chemical analysis* (24th ed.). Goel Publishing House.
4. Wilson, K., & Walker, J. (2018). *Principles and techniques of biochemistry and molecular biology* (8th ed.). Cambridge University Press.
5. Upadhyay, A., Upadhyay, K., & Nath, N. (2019). *Biophysical chemistry: Principles and techniques* (5th ed.). Himalaya Publishing House.

REFERENCE BOOK(S)

1. Freifelder, D. (2016). *Physical biochemistry: Applications to biochemistry and molecular biology* (3rd ed.). W. H. Freeman.
2. Holme, D. J., & Peck, H. (2017). *Analytical biochemistry* (4th ed.). Pearson Education.
3. Keith, W. (2018). *Biochemistry and molecular biology techniques*. Oxford University Press.
4. Skoog, D. A., Holler, F. J., & Crouch, S. R. (2018). *Principles of instrumental analysis* (7th ed.). Cengage Learning.
5. Voet, D., Voet, J. G., & Pratt, C. W. (2019). *Fundamentals of biochemistry: Life at the molecular level* (6th ed.). Wiley.

E- RESOURCES

1. <https://www.britannica.com/science/chromatography>
2. <https://www.youtube.com/watch?v=xgxFBQZYXIE>
3. <https://www.youtube.com/watch?v=7onjVBsQwQ8>
4. <https://www.khanacademy.org/science/physics>
5. <https://www.coursera.org/courses?query=chromatography>
6. www.ncbi.nlm.nih.gov
7. www.biochemistry.org

8. www.sciencedirect.com

9. www.nature.com

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3			3		2		2		3	3	3	3	3
CO2	3			3		2		2		3	3	3	3	3
CO3	3			3		2		2		3	3	3	3	3
CO4	3	2	2	3		2		2	2	3	3	3	3	3
CO5	3			3		2		2		3	3	3	3	3
CO6	3		2			2	2		2		3		3	

S-Strong (3)

M-Medium (2)

L-Low (1)



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2026 – 2027)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: IV-CP- IV: Biochemical Techniques Practical

Ins. Hrs. /Week: 4

Course Credit: 4

Course Code: U26BC204P

COURSE OBJECTIVES

- To provide practical training in chromatographic, electrophoretic, spectrophotometric and centrifugation techniques used in biochemistry.
- To develop skills for separation, identification and estimation of biomolecules such as sugars, amino acids, lipids, proteins and nucleic acids.
- To familiarize students with laboratory instrumentation and analytical procedures used in biochemical research and diagnostics.
- To enhance understanding of qualitative and quantitative biochemical analysis through experimental techniques.
- To train students in interpretation of experimental data, laboratory safety and scientific reporting.

Biochemical Separation Techniques

1. Separation of sugars and amino acids by paper chromatography
2. Separation of amino acids and lipids by TLC
3. Separation of leaf pigments by column chromatography
4. Separation of serum protein by paper electrophoresis
5. Separation of nucleic acid by agarose gel electrophoresis
6. Estimation of carbohydrate by an throne method
7. Estimation of ascorbic acid by colorimetric method
8. Demonstration of Flame Photometer
9. Demonstration of Sub cellular organelle separation by differential centrifugation

Total Hours-60

COURSE OUTCOMES

The students are able to,

1. Perform separation of biomolecules using paper chromatography, TLC, column chromatography and electrophoresis techniques.
2. Analyze proteins, nucleic acids, amino acids and pigments using suitable biochemical methods.
3. Apply colorimetric and spectrophotometric methods for estimation of carbohydrates and ascorbic acid.
4. Demonstrate knowledge of laboratory instruments such as flame photometer and centrifuge used in biochemical analysis.
5. Interpret experimental observations and analytical results with scientific accuracy.

6. Develop practical competency in biochemical laboratory techniques relevant to research, clinical and industrial applications.

TEXT BOOK(S)

1. Wilson, K., & Walker, A. (2018). Practical biochemistry: Principles and techniques (7th ed.). Cambridge University Press.
2. Dixon, M., & Webb, W. C. (2019). Enzymes: A practical introduction to structure, mechanism, and data analysis (3rd ed.). Wiley-Blackwell.
3. Guthrie, R. H., Jr., & Pelley, W. W. (2022). Biochemistry and molecular biology of plants (2nd ed.). Wiley-Blackwell.
4. Stryer, L. (2015). Biochemistry (8th ed.). W.H. Freeman and Company.
5. Hames, B. D., & Hooper, D. H. (2007). Protein purification: Principles and practice (3rd ed.). Springer. Springer, 2007.

REFERENCE BOOK(S)

1. Glick, B. R., & Pasternak, J. J. (2010). Molecular biotechnology: Principles and applications of recombinant DNA (4th ed.). ASM Press.
2. Berg, J. M., Tymoczko, J. L., & Stryer, L. (2012). Biochemistry (7th ed.). W.H. Freeman and Company.
3. Zubay, G. L. (1995). Biochemistry (4th ed.). McGraw-Hill.
4. Freeman, S. (2013). Biological science (6th ed.). Pearson.
5. Benson, H. J. (2024). Microbiological applications: Laboratory manual in general microbiology (13th ed.). McGraw-Hill Education.

E-RESOURCES

1. <https://www.pdfdrive.com/biochemistry-books.html>
2. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7023142/>.
3. <https://onlinelibrary.wiley.com/doi/abs/10.1002/bit.20663>.
4. <https://www.ncbi.nlm.nih.gov/books/NBK21340/>.
5. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3418254/>.
6. www.ncbi.nlm.nih.gov
7. www.biochemj.org
8. www.sciencedirect.com
9. www.thermofisher.com

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3		2		2		2	3	3	3	3
CO2	3	3	3	3		2		2		2	3	3	3	3
CO3	3	3	3	3		2		2		2	3	3	3	3
CO4	3	3	3	3		2		2		2	3	3	3	3
CO5	3	3	3	3		2		2		2	3	3	3	3
CO6		3		3	2	2		2			3		3	

S-Strong (3)

M-Medium (2)

L-Low (1)



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2026 – 2027)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: II-SEC-I: Biomedical Instrumentation

Ins. Hrs./Week: 2

Course Credit: 2

Course Code: U26SEBC21

COURSE OBJECTIVES

- To provide fundamental knowledge of human anatomy, physiology and bioelectric phenomena related to biomedical sciences.
- To familiarize students with the principles, operation and applications of basic biomedical laboratory instruments and electrodes.
- To develop understanding of diagnostic and monitoring instruments used in cardiovascular, respiratory and nervous system analysis.
- To impart knowledge on patient care equipment, medical imaging techniques and electrical safety in biomedical practice.
- To train students in handling biomedical instruments and performing physiological measurements in laboratory settings.

UNIT – I: Introduction to Physiology and Anatomy

(6 Hours)

Physiological system of the body, Cell and its functions – Anatomy and physiology of respiratory system-Cardio vascular system-Endocrine system-Central nervous system. Bio-Electric phenomenon: Basic Bio potentials-Bio electricity – Resting and action potentials-Sodium pump generation- Characteristics of electric signals from heart, brain and muscle.

UNIT – II: Basic Instruments and Electrodes

(6 Hours)

Principles and applications of Autoclave – Hot air oven – Incubator, Laminar air flow chamber / Biosafety cabinets, BOD Incubator, Lyophilizer. Electrodes- Types: Surface electrodes and Needle electrodes - Made of Ag/AgCl (Silver/Silver Chloride).

UNIT – III: Diagnosing Instruments

(6 Hours)

Cardiovascular System and Measurements: ECG, blood pressure and its measurement, respiration and pulse rate, characteristics and measurement of blood flow meter, cardiac output, plethysmography, pacemaker, defibrillators, heart sounds and its measurement, test and instrument for the mechanics of breathing, the somatic nervous system, EEG, EMG and GSR. Measurement and Recording of Non-invasive Diagnostic Instrumentation.

UNIT – IV: Patient Care and Electrical Safety

(6 Hours)

Principle of ultrasonic measurement, ultrasonic, thermography, elements of intensive care monitoring, X-ray, CT – Scan and MRI, tonometer, dialysis, diathermy, Shock hazards from electrical equipment.

UNIT – V: Laboratory Work

(6 Hours)

Study the variance in pulse rate of subject in a batch, use Spirometer on the subject, auditory system check-up using Audiometer, Measurement of Heart Rate using Stethoscope, Blood pressure using Sphygmomanometer, Pulse Rate and SpO₂ using Pulse Oximeter, Skin Conductance and Skin Potential using Galvanic Skin Response Module, Pulse Rate using Polyrite machine. Respiration Rate using Polyrite. Electromyogram test using EMG biofeedback Trainer.

UNIT – VI: Current Contours (For Continuous Internal Assessment only – Self Study)

Biomedical instrumentation; applications of nanotechnology in medical devices; recent innovations in biomedical engineering; and notable Nobel Prize contributions relevant to biomedical sciences and engineering.

Total Lecture Hours-30

COURSE OUTCOMES

The students are able to,

1. Explain the anatomy and physiology of major human body systems and their bioelectrical activities.
2. Describe the principles, components and applications of biomedical laboratory instruments and electrodes.
3. Operate and interpret diagnostic instruments such as ECG, EEG, EMG, spirometer and pulse oximeter.
4. Apply knowledge of patient monitoring systems, medical imaging techniques and therapeutic equipment in healthcare applications.
5. Demonstrate practical skills in measuring physiological parameters including pulse rate, blood pressure, respiration and muscle activity.
6. Evaluate recent advances in biomedical instrumentation, nanotechnology and innovations in biomedical engineering.

TEXT BOOK(S)

1. Sachan, V., Malik, S., Gautam, R., & Kumar, P. (2023). *Advances in AI for biomedical instrumentation*. CRC Press.
2. Arumugam, M. (2021). *Bio-medical instrumentation*. Anuradha Agencies.
3. Geddes, L. A., & Baker, L. E. (2016). *Principles of applied bio-medical instrumentation*. John Wiley & Sons.
4. Webster, J. G. (2003). *Medical instrumentation*. John Wiley & Sons.
5. Rajarao, C., & Guha, S. K. (1996). *Principles of medical electronics and bio-medical instrumentation*. Orient Longman.

REFERENCE BOOK(S)

1. Khandpur, R. S. (2023). *Compendium of biomedical instrumentation*. John Wiley & Sons.
2. Weibell, F. J., Pfeiffer, E. A., & Cromwell, L. (2022). *Bio-medical instrumentation and measurements* (2nd ed.). Pearson Education.
3. Khandpur, R. S. (2014). *Handbook of biomedical instrumentation* (3rd ed.). McGraw-Hill Education.
4. Webster, J. G., & Eren, H. (2018). *Medical instrumentation: Application and design* (5th ed.). Wiley.
5. Carr, J. J., & Brown, J. M. (2015). *Introduction to biomedical equipment technology* (4th ed.). Pearson.

E-RESOURCES

1. <https://youtu.be/GkUCmb0cKwo?list=PLCZ9KmODEcu138IIVeHClJ4nskArYr1Dg>
2. <https://www.khanacademy.org/science/ap-biology/heredity/meiosis-and-geneticdiversity/a/phases-of-meiosis>
3. <https://www.microscopemaster.com/organelles.html>
4. <https://www.pdfdrive.com/biochemistry-books.html>
5. <https://www.ncbi.nlm.nih.gov/books/NBK21340/>.
6. www.ncbi.nlm.nih.gov
7. www.who.int
8. www.ieee.org
9. www.nibib.nih.gov

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3		3	2	3	3	3	3	3	3	3
CO2	3	3	3	3		3	2	3	3	3	3	3	3	3
CO3	3	3	3	3		3	2	3	3	3	3	3	3	3
CO4	3	3	3	3		3	2	3	3	3	3	3	3	3
CO5	3	3	3	3		3	2	3	3	3	3	3	3	3
CO6		2		2			2		3		3	3		3

S-Strong (3)

M-Medium (2)

L-Low (1)

**INTERDISCIPLINARY COURSE (IDC)
OFFERED BY THE DEPARTMENT**



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2026 – 2027)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: I- IDC - I: Basic Biochemistry

Ins. Hrs. /Week: 2

Credit: 2

Course Code: U26IDBC11

COURSE OBJECTIVES

- To provide fundamental knowledge on the chemical basis of life and the role of biomolecules in living systems.
- To explain the structure, properties and biological significance of carbohydrates, proteins, lipids and nucleic acids.
- To develop understanding of amino acids, enzymes, coenzymes, vitamins and metal ion containing biomolecules in metabolism.
- To familiarize students with the physicochemical properties and functional importance of major biomolecules in health and disease.
- To create awareness about recent advances in molecular biology, genome editing, proteomics, metabolomics and biomedical applications of nanotechnology and AI.

UNIT – I: Foundations of Life

(6 Hours)

Elements found in living organisms. Biological significance of water, weak interactions in aqueous systems, ionization of water, pH, pKa. Henderson–Hassel Balch equation, biological buffer systems: body fluids and their principal buffers.

UNIT – II: Carbohydrates

(6 Hours)

Carbohydrate – Definition, Classification, biological significance, structure of glucose, digestion and absorption of carbohydrates. Monosaccharide: stereoisomers, enantiomers, epimers, mutarotation. Sugar derivatives: amino sugars, sugar alcohol, sugar acids, deoxy sugar and glycosides. Disaccharides: sucrose, lactose and maltose. Polysaccharides: homo and hetero polysaccharides, mucopolysaccharides and glycoproteins.

UNIT – III: Proteins and Amino acids

(6 Hours)

Classification, chemical and physical properties of amino acids. Peptide bond: planarity and dihedral angles, Ramachandran plot. Structural hierarchy of proteins: primary, secondary, super secondary, tertiary and quaternary structures. Classification of proteins, properties: isoelectric point, zwitterions, and precipitation reactions. Globular and fibrous proteins: structure and functions of haemoglobin, collagen, elastin, and keratin. Coenzymes and their role in metabolism, metal ion containing biomolecules, heme, porphyrins and cyanocobalamin – their biological significance

UNIT – IV: Lipids**(6 Hours)**

Classification, chemical and physical properties. Fatty acids: saturated, unsaturated and essential fatty acids; rancidity, saponification number, iodine number, acid number and Reichert–Meissel number. Structure and biological functions of triacylglycerol, phospholipids, cholesterol and plant sterols.

UNIT – V: Nucleic acids**(6 Hours)**

Chemistry of purine and pyrimidine, nucleosides and nucleotides. Types of DNA: structure and properties of A-, B- and Z-DNA. Denaturation, renaturation, T_m and hyperchromicity. Effect of acid and alkali on DNA and RNA. Types and functions of RNA: rRNA, mRNA, tRNA. Vitamins, coenzymes and metal ions.

UNIT – VI: Current Contours (For Continuous Internal Assessment only – Self Study)

Discussion on recent advancements such as: CRISPR-Cas9 and genome editing techniques, Proteomics and metabolomics approaches, Role of artificial intelligence in biochemistry and drug discovery, Recent Nobel Prize-winning discoveries in biochemistry and molecular biology, Nanotechnology in biomedical applications.

COURSE OUTCOMES

The students will be able to

1. Explain the biochemical composition of living organisms and the significance of water, pH and buffer systems in biological processes.
2. Describe the structure, classification, properties and functions of carbohydrates, proteins, lipids and nucleic acids.
3. Differentiate various biomolecules based on their chemical nature, structural organization and biological roles.
4. Interpret the structural and functional relationship of proteins, nucleic acids, vitamins and coenzymes in metabolism.
5. Apply biochemical concepts to understand physiological and molecular mechanisms in living systems.
6. Evaluate recent developments in biochemistry including CRISPR technology, proteomics, metabolomics, artificial intelligence and nanobiotechnology.

TEXT BOOK(S)

1. Vasudevan, D. M., Sreekumari, S., & Vaidyanathan, K. (2023). Textbook of biochemistry for medical students (10th ed.).
2. Voet, D., Voet, J. G., & Pratt, C. W. (2024). Fundamentals of biochemistry: Life at the molecular level (6th ed.).
3. Jain, J. L., Jain, S., & Jain, N. (2016). Fundamentals of biochemistry (8th ed.).
4. De, A. K. (2018). Biochemistry (8th ed.). New Central Book Agency
5. Satyanarayana, U., & Chakrapani, U. (2021). Biochemistry (6th ed.).

REFERENCE BOOK(S)

1. Nelson, D. L., & Cox, M. M. (2017). Lehninger principles of biochemistry (7th ed.). W.H. Freeman and Company

2. Voet, D., Voet, J. G., & Pratt, C. W. (2012). Principles of biochemistry (4th ed.). John Wiley & Sons
3. Murray, R. K., Bender, D. A., Botham, K. M., Kennelly, P. J., Rodwell, V. W., & Weil, P. A. (2000). Harper's illustrated biochemistry (25th ed.). McGraw-Hill Education
4. Berg, J. M., Tymoczko, J. L., Gatto, G. J., & Stryer, L. (2019). Biochemistry (9th ed.). W.H. Freeman and Company
5. Devlin, T. M. (2010). Textbook of biochemistry with clinical correlations (7th ed.). Wiley-Liss

E-RESOURCES

1. <https://archive.org/details/lehninger-principles-of-biochemistry-7th-edition>
2. <https://openstax.org/details/books/biochemistry>
3. <https://archive.org/details/molecular-biology-of-the-cell>
4. <https://biochemistryfreeandeasy.com>
5. <https://archive.org/details/principles-of-biochemistry>
6. www.ncbi.nlm.nih.gov
7. www.biochemistry.org
8. www.nature.com
9. www.sciencedirect.com

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3		3	2	3	3	3	3	3	3	3
CO2	3		3	3		3	2	3	3	3	3	3	3	3
CO3	3	3	3	3		3	2	3	3	3		3	3	3
CO4	3	3		3		3	2	3		3	3	3	3	3
CO5	3	3	3	3		3	2	3	3	3	3	3	3	3
CO6		2		2			2		3		3	3		3

S-Strong (3)

M-Medium (2)

L-Low (1)



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2026 – 2027)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: I- IDC - II: Biochemistry of Lifestyle Diseases and Treatments

Ins. Hrs. /Week: 2

Credit: 2

Course Code: U26IDBC22

COURSE OBJECTIVES

- To provide fundamental knowledge about lifestyle diseases, their causes, risk factors and preventive measures.
- To develop understanding of cardiovascular, metabolic, respiratory and nutritional disorders associated with unhealthy lifestyles.
- To explain the causes, diagnosis, complications and management of diabetes mellitus and other chronic diseases.
- To familiarize students with stress management techniques, therapeutic approaches and rehabilitation methods in healthcare.
- To create awareness about recent advances in disease diagnosis, personalized medicine, telemedicine and artificial intelligence in healthcare.

UNIT – I: Introduction to Lifestyle Diseases (6 Hours)

Concept and causes of lifestyle diseases. Risk factors including obesity, smoking, alcohol, stress, and physical inactivity. Prevention and control through healthy lifestyle practices.

UNIT – II: Cardiovascular and Metabolic Disorders (6 Hours)

Hypertension, atherosclerosis, obesity, and metabolic syndrome. Causes, symptoms, diagnosis, and management of cardiovascular diseases. Role of diet, exercise, and medications in treatment.

UNIT – III: Diabetes Mellitus and Nutritional Disorders (6 Hours)

Types, causes, complications, and diagnosis of diabetes mellitus. Nutritional imbalance disorders and their management. Diet therapy and lifestyle modification in diabetes care.

UNIT – IV: Cancer and Respiratory Disorders (6 Hours)

Lifestyle-related cancers and respiratory diseases. Effects of smoking, pollution, and occupational hazards. Prevention, diagnosis, and modern therapeutic approaches.

UNIT – V: Stress Management and Therapeutic Approaches (6 Hours)

Stress, anxiety, and psychosomatic disorders. Yoga, meditation, exercise, and behavioral therapy in disease management. Recent advances in treatment and rehabilitation methods.

UNIT – VI: Current Contours (For Continuous Internal Assessment only – Self Study)

Recent advances in lifestyle disease diagnosis and treatment. Role of wearable devices, telemedicine, and artificial intelligence in healthcare. Emerging trends in personalized medicine and preventive healthcare.

COURSE OUTCOMES

The students are able to,

1. Explain the concept, causes and risk factors associated with lifestyle diseases.
2. Describe the pathophysiology, diagnosis and management of cardiovascular, metabolic and respiratory disorders.
3. Interpret the role of nutrition, exercise and lifestyle modification in prevention and treatment of chronic diseases.
4. Analyze the impact of stress, anxiety and psychosomatic factors on human health and disease management.
5. Apply knowledge of therapeutic approaches such as yoga, meditation and behavioral therapy for improving health outcomes.
6. Evaluate recent developments in healthcare technologies including wearable devices, telemedicine, artificial intelligence and personalized medicine.

TEXT BOOK(S)

1. Walker, B. R., Colledge, N. R., Ralston, S. H., & Penman, I. D. (2022). *Davidson's principles and practice of medicine* (24th ed.). Elsevier.
2. Jameson, J. L., Fauci, A. S., Kasper, D. L., Hauser, S. L., Longo, D. L., & Loscalzo, J. (2022). *Harrison's principles of internal medicine* (21st ed.). McGraw-Hill.
3. Hall, J. E. (2021). *Guyton and Hall textbook of medical physiology* (14th ed.). Elsevier.
4. Sembulingam, K., & Sembulingam, P. (2022). *Essentials of medical physiology* (8th ed.). Jaypee Brothers Medical Publishers.
5. Kumar, P., & Clark, M. (2020). *Kumar and Clark's clinical medicine* (10th ed.). Elsevier.

REFERENCE BOOK(S)

1. Sharma, T. K. (2020). *Lifestyle diseases*. CBS Publishers & Distributors.
2. Sahu, K. K. (2021). *Textbook of community medicine and public health*. Jaypee Brothers Medical Publishers.
3. Park, K. (2023). *Park's textbook of preventive and social medicine* (27th ed.). Banarsidas Bhanot.
4. Watson, R. R., & Killgore, W. D. S. (Eds.). (2017). *Nutrition and lifestyle in neurological autoimmune diseases*. Academic Press.
5. Rippe, J. M. (2019). *Lifestyle medicine* (3rd ed.). CRC Press.

E-RESOURCES

1. <https://www.mcgill.ca/biochemistry/about-us/information/biochemistry#:~:text=Biochemistry%20is%20both%20life%20science,for%20understanding%20all%20biological%20processes.>
2. <https://isc.strath.ac.uk/blog/why-study-biochemistry>
3. <https://study.com/academy/lesson/energy-yielding-nutrients-carbohydratesfat-protein.html>
4. <https://ncert.nic.in/textbook/pdf/kehe103.pdf>
5. https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SBC1101.pdf
6. www.who.int
7. www.cdc.gov
8. www.ncbi.nlm.nih.gov
9. www.diabetes.org

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3		3	2	3	3	3	3	3	3	3
CO2	3	3	3	3		3	2	3	3	3	3	3	3	3
CO3	3	3		3		3	2	3	3	3	3		3	3
CO4	3	3	3	3		3	2		3	3	3	3		3
CO5	3	3	3	3		3	2	3	3	3	3	3	3	3
CO6		2		2			2		3		3	3		3

S-Strong (3)

M-Medium (2)

L-Low (1)

**ALLIED COURSE
OFFERED BY THE DEPARTMENT**



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2026 – 2027)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., MICROBIOLOGY

Semester: I- AC- I: Biochemistry I

Ins. Hrs. /Week: 3

Course Credit: 3

Course Code: U26ABC101

COURSE OBJECTIVES

- To provide fundamental knowledge on the structure, classification and functions of major biomolecules present in living systems.
- To explain the chemical properties and biological significance of carbohydrates, proteins, lipids, nucleic acids and vitamins.
- To develop understanding of the relationship between biomolecular structure and biological function.
- To familiarize students with nutritional importance, metabolism and physiological role of biomolecules in health and disease.
- To create awareness about recent advances in biomolecules, nutraceuticals, bioinformatics and nanobiotechnology in healthcare applications.

UNIT-I: Carbohydrates

(8 Hours)

Definition, sources, classification, structure and Functions of Carbohydrate: Monosaccharides, Disaccharides and Polysaccharides. General properties with reference to glucose, anomer, epimer, enantiomer and mutarotation. Biological importance of carbohydrate.

UNIT- II: Amino acids and Proteins

(10 Hours)

Definition, Structure and properties of amino acids, classification based on structure and chemical nature. Essential and non-essential amino acids. Proteins- Definition, classification based on shape, solubility, chemical composition. Structure: Primary, Secondary, tertiary and quaternary. Properties and functions.

UNIT-III: Lipids

(9 Hours)

Definition, sources, structure, properties, classification (simple lipids, compound lipids – glycolipids, phospholipids, sphingolipids and derived lipids - steroids) and functions of lipids. Fatty acids- Definition, structure, classification– saturated fatty acids, unsaturated fatty acids. Essential and non-essential fatty acids.

UNIT-IV: Nucleic acids

(9 Hours)

Definition, bases, nucleotides and nucleosides, phosphodiester linkage. Structure of nucleosides, nucleotides. DNA double helical structure. A, B and Z forms of DNA and its functions. Types, structure and functions of RNA (mRNA, tRNA, rRNA). Difference between DNA and RNA.

UNIT-V: Vitamins**(9 Hours)**

Definition, source, classification, structure, daily requirement, deficiency manifestation and biological significances of fat soluble vitamins - A, D, E, K and water soluble vitamins- ascorbic acid, thiamine, riboflavin, pantothenic acid, niacin, pyridoxine, biotin, folic acid and cyanocobalamin.

UNIT – VI: Current Contours (For Continuous Internal Assessment only – Self Study)

Recent advances in biomolecules, nutritional biochemistry, functional foods and nutraceuticals. Role of probiotics, prebiotics, bioinformatics and nanobiotechnology in health and medicine.

Total Lecture Hours - 45**COURSE OUTCOMES**

The students are able to,

1. Explain the structure, classification, properties and biological functions of carbohydrates, proteins, lipids, nucleic acids and vitamins.
2. Differentiate various biomolecules based on their chemical nature, structural organization and physiological roles.
3. Describe the importance of essential amino acids, fatty acids and vitamins in maintaining normal body functions.
4. Interpret the structural features and functional significance of DNA, RNA and proteins in biological systems.
5. Apply biochemical concepts to understand nutritional and metabolic processes related to human health.
6. Evaluate recent developments in biomolecular research, functional foods, probiotics, bioinformatics and nanobiotechnology.

TEXT BOOK(S)

1. Jain JL, Sunjay Jain and Nitin Jain. 2018. Fundamentals of Biochemistry. Updated edition. 2020. S.Chand Publishers, New Delhi.
2. RituSinghandRajeev Goyal. 2020.Illustrated Reviews Biochemistry (SAE). Wolterskluwer Publisher, Netherland.
3. PoonamAgarwal.2020. Reviewof Biochemistry. 5thEdition.CBSPublishers,NewDelhi.
4. DebAC.2016.FundamentalsofBiochemistry.7thedition,NCBAPublishers,New Delhi.
5. Vasudevan DM. 2018. Biochemistry. 9th edition. Aypee Brothers Medical Publishers, New Delhi.

REFERENCE BOOK(S)

1. David L. Nelson and Michael M.Cox. 2017. Lehninger Principles of Biochemistry. 7th edition. WH Freeman Publishers, New York.
2. Berg ,J M. TymoczkoJ L and. Stryer, 2019. Biochemistry. 9th edition.WH.Freeman Publishers, US.
3. Anders Liljas. (2019). Textbook of Structural Biology. 2nd edition. World Scientific Publishers, Singapore.
4. Satyanarayana U and.Chakrapani. U, 2020.Biochemistry. 5th Updated Edition. Elsevier Publishers, Netherland.

5. Lehninger A L, Nelson D L and Cox M M, 2020. Principles of Biochemistry. 8th Edition. WH Freeman Publishers, New York.
6. David L. Nelson, 2023. Lehninger Principles of Biochemistry, 8th Edition, Macmillan Publisher, New York.

E-RESOURCES

1. onlinecourses.swayam2.ac.in/cec20_bt12
2. onlinecourses.swayam2.ac.in/cec20_bt19
3. <https://www.macmillanlearning.com/college/us/product/Biochemistry/p/1319114679>
4. <https://www.macmillanlearning.com/college/us/product/Lehninger-Principles-of-Biochemistry/p/1319381498>
5. <https://www.cengage.com/c/biochemistry-7e-garrett/>
6. <https://www.cengage.com/c/advanced-nutrition-and-human-metabolism-8e-gropper/>
7. <https://www.cengage.com/c/biochemistry-9e-campbell/>
8. www.ncbi.nlm.nih.gov
9. www.biochemistry.org
10. www.sciencedirect.com
11. www.nature.com

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3		1	3		1		2	2	3	3	3	3	3
CO2	3		1	3		1		2	2	3	3	3	3	3
CO3	3		1	3		1		2	2		3	3		3
CO4	3		1	3		1		2	2	3	3	3	3	3
CO5	3		1	3		1		2	2	3	3	3	3	3
CO6	2			3		1		3	2		2		3	3

S-Strong (3)

M-Medium (2)

L-Low (1)



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2026 – 2027)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., MICROBIOLOGY

Semester: I- AP- I: Biochemistry I Practical

Ins. Hrs. /Week: 3

Course Credit: 3

Course Code: U26ABC102P

COURSE OBJECTIVES

- Identify and distinguish carbohydrates such as glucose, fructose, galactose, maltose, and lactose using appropriate qualitative biochemical tests.
- Analyze the characteristic reactions of amino acids including tyrosine, tryptophan, histidine, arginine, and proline through specific qualitative tests.
- Detect and characterize biomolecules such as lipids (gingelly oil and coconut oil) and nucleic acids (DNA and RNA) using standard qualitative analytical techniques.
- Estimate the concentration of glucose in a sample using Benedict's quantitative method and interpret the experimental results accurately.
- Determine the ascorbic acid content in biological samples using the 2,6-Dichlorophenol Indophenol (DCPIP) dye method.

PRACTICALS

1. Qualitative analysis of Carbohydrates –Glucose, Fructose, Galactose, Maltose and Lactose.
2. Qualitative analysis of Amino acids-Tyrosine, Tryptophan, Histidine, Arginine and Proline.
3. Qualitative analysis of Lipids- Gingelly oil and Coconut oil.
4. Qualitative analysis of Nucleic acids- DNA and RNA.
5. Quantitative estimation of glucose by Benedict's method.
6. Quantitative estimation of Ascorbic acid-2,6-Dichlorophenol Indophenol dye method (from biological sample).

Total Hours-60

COURSE OUTCOMES

The students are able to,

1. Perform qualitative tests to identify and differentiate carbohydrates such as glucose, fructose, galactose, maltose, and lactose.
2. Analyze and distinguish amino acids including tyrosine, tryptophan, histidine, arginine, and proline based on their characteristic biochemical reactions.
3. Identify lipids (gingelly oil and coconut oil) and nucleic acids (DNA and RNA) using standard qualitative biochemical techniques.
4. Quantitatively estimate glucose concentration using Benedict's method and interpret the results accurately.
5. Determine the ascorbic acid content of biological samples using the 2,6-Dichlorophenol Indophenol (DCPIP) dye method.

TEXT BOOK(S)

1. Plummer, D. T. (2017). An introduction to practical biochemistry (6th ed.). McGraw-Hill Education.
2. Jayaraman, J. (2018). Laboratory manual in biochemistry. New Age International Publishers.
3. Wilson, K., & Walker, J. (2018). Principles and techniques of biochemistry and molecular biology (8th ed.). Cambridge University Press.
4. Sadasivam, S., & Manickam, A. (2020). Biochemical methods (4th ed.). New Age International Publishers.
5. Sawhney, S. K., & Singh, R. (2019). Introductory practical biochemistry. Narosa Publishing House.

REFERENCE BOOK(S)

1. Nelson, D. L., & Cox, M. M. (2021). Lehninger principles of biochemistry (8th ed.). W. H. Freeman.
2. Berg, J. M., Tymoczko, J. L., Gatto, G. J., & Stryer, L. (2019). Biochemistry (9th ed.). W. H. Freeman.
3. Voet, D., Voet, J. G., & Pratt, C. W. (2019). Fundamentals of biochemistry: Life at the molecular level (6th ed.). Wiley.
4. Rodwell, V. W., Bender, D. A., Botham, K. M., Kennelly, P. J., & Weil, P. A. (2021). Harper's illustrated biochemistry (32nd ed.). McGraw-Hill Education.
5. Boyer, R. F. (2019). Modern experimental biochemistry (3rd ed.). Pearson Education.

E-RESOURCES

1. <https://www.elsevier.com/journals/clinical-biochemistry/0009-9120/guide-for-authors>
2. <http://rajswasthya.nic.in/RHSDP%20Training%20Modules/Lab.%20Tech/Biochemistry/Dr.%20Jagarti%20Jha/Techniques%20In%20Biochemistry%20Lab.pdf>
3. https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistry-pdf.pdf?sequence=1&isAllowed=y
4. https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistry-pdf.pdf?sequence=1&isAllowed=y
5. <https://www.e-booksdirectory.com>
6. www.ncbi.nlm.nih.gov
7. www.biochemj.org
8. www.sciencedirect.com
9. www.elsevier.com

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3		2		2		2	3	3	3	3
CO2	3	3		3		2		2		2	3	3	3	3
CO3	3	3	3	3		2		2		2	3	3		3
CO4	3	3	3	3		2		2		2	3	3	3	3
CO5	3	3	3	3		2		2		2	3	3	3	3
CO6		3		3		3		2		2		3	3	3

S-Strong (3)

M-Medium (2)

L-Low (1)



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2026 – 2027)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., MICROBIOLOGY

Semester: I- AC- II: Biochemistry II

Ins. Hrs. /Week: 3

Course Credit: 3

Course Code: U26ABC203

COURSE OBJECTIVES

- Understand the structure and functions of biological membranes and the mechanisms involved in membrane transport.
- Explain the classification, properties, kinetics and applications of enzymes in biological systems.
- Describe the classification, mechanism of action and physiological functions of major hormones.
- Interpret the principles of bioenergetics, biological oxidation and cellular energy production.
- Discuss the role of water, minerals and acid-base balance in maintaining normal physiological functions.

UNIT-I: Biological Membranes and Transport

(9 Hours)

Cell membrane – Structure and functions. Fluid mosaic model. Membrane lipids, proteins and carbohydrates. Membrane transport mechanisms – simple diffusion, facilitated diffusion, osmosis and active transport. Transport of ions and nutrients across biological membranes. Biological significance of membrane transport.

UNIT-II: Enzymes

(9 Hours)

Definition, nomenclature and classification of enzymes. Characteristics of enzymes, active site, specificity, cofactors, coenzymes and prosthetic groups. Factors affecting enzyme activity – substrate concentration, enzyme concentration, pH and temperature. Isoenzymes and their significance. Applications of enzymes in medicine and industry.

UNIT-III: Hormones

(9 Hours)

Definition, classification and general characteristics of hormones. Mechanism of hormone action. Biological functions of insulin, glucagon, thyroid hormones, parathyroid hormone, adrenal hormones and reproductive hormones. Hormonal regulation of metabolism and growth.

UNIT-IV: Bioenergetics and Biological Oxidation

(9 Hours)

Concept of energy in biological systems. ATP as an energy currency. High-energy compounds. Biological oxidation, electron transport chain and oxidative phosphorylation. Inhibitors of electron transport chain. Free radicals and antioxidants.

UNIT-V: Water, Minerals and Acid-Base Balance**(9 Hours)**

Water – properties, distribution and functions. Macro and trace minerals: calcium, phosphorus, sodium, potassium, iron, iodine and zinc – sources, functions and deficiency manifestations. Acid-base balance, buffers, physiological importance of pH and maintenance of acid-base homeostasis.

UNIT-VI: Current Contours (For Continuous Internal Assessment only – Self Study)

Applications of biochemistry in healthcare, agriculture, food industry and environmental management. Basics of genomics, proteomics and personalized medicine. Recent advances and career opportunities in biochemistry.

Total Lecture Hours - 45**COURSE OUTCOMES**

The students are able to,

1. Explain the structure, composition and functions of biological membranes and membrane transport processes.
2. Classify enzymes and describe their properties, factors affecting enzyme activity and applications.
3. Illustrate the mechanism of action and physiological roles of major hormones in metabolism and growth.
4. Describe the principles of bioenergetics, electron transport chain and oxidative phosphorylation.
5. Explain the importance of water, minerals, buffers and acid-base balance in human health.
6. Relate biochemical principles to current applications in healthcare, agriculture, food technology and emerging areas such as genomics and personalized medicine.

TEXT BOOK(S)

1. Satyanarayana, U., & Chakrapani, U. (2022). *Biochemistry* (7th ed.). Elsevier.
2. Naik, P. (2023). *Textbook of biochemistry* (5th ed.). Jaypee Brothers Medical Publishers.
3. Das, D. (2023). *Biochemistry* (14th ed.). Academic Publishers.
4. Jain, J. L., Jain, S., & Jain, N. (2022). *Fundamentals of biochemistry* (9th ed.). S. Chand Publishing.
5. Vasudevan, D. M., Sreekumari, S., & Vaidyanathan, K. (2023). *Textbook of biochemistry for medical students* (10th ed.). Jaypee Brothers Medical Publishers.

REFERENCE BOOK(S)

1. Nelson, D. L., & Cox, M. M. (2025). *Lehninger principles of biochemistry* (9th ed.). W. H. Freeman and Company.
2. Berg, J. M., Gatto, G. J., Jr., Stryer, L., & Tymoczko, J. L. (2023). *Biochemistry* (10th ed.). W. H. Freeman and Company.
3. Voet, D., Voet, J. G., & Pratt, C. W. (2024). *Fundamentals of biochemistry: Life at the molecular level* (7th ed.). John Wiley & Sons.

4. Rodwell, V. W., Bender, D. A., Botham, K. M., Kennelly, P. J., & Weil, P. A. (2022). *Harper's illustrated biochemistry* (33rd ed.). McGraw-Hill Education.
5. Devlin, T. M. (2024). *Textbook of biochemistry with clinical correlations* (9th ed.). Wiley-Blackwell.
6. Ferrier, D. R. (2022). *Lippincott illustrated reviews: Biochemistry* (8th ed.). Wolters Kluwer.
7. Koolman, J., & Röhme, K. H. (2023). *Color atlas of biochemistry* (4th ed.). Thieme Medical Publishers.

E-RESOURCES

1. <https://nptel.ac.in>
2. <https://ndl.iitkgp.ac.in>
3. <https://pubmed.ncbi.nlm.nih.gov>
4. <https://swayam.gov.in>
5. <https://biochemistryfreandeasy.com>
6. <https://www.rcsb.org>
7. <https://www.khanacademy.org>
8. www.ncbi.nlm.nih.gov/books
9. www.expasy.org
10. www.ncbi.nlm.nih.gov

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3		2		2		2	3	3	3	3
CO2	3	3	3	3		2		2		2	3	3	3	3
CO3	3	3	3	3				2		2	3	3	3	3
CO4	3	3	3			2		2		2	3	3	3	3
CO5	3	3	3	3		2		2		2	3	3	3	3
CO6		3		3		3		2		2		3	3	3

S-Strong (3)

M-Medium (2)

L-Low (1)



**SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE
(AUTONOMOUS)**

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2026 – 2027)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., MICROBIOLOGY

Semester: I- AP- II: Biochemistry II Practical

Ins. Hrs. /Week: 3

Course Credit: 3

Course Code: U26ABC204P

COURSE OBJECTIVES

- To develop skills in the preparation of standard laboratory solutions and buffers used in biochemical analysis.
- To perform qualitative analysis of water samples and identify common inorganic constituents.
- To detect and identify biologically important minerals using standard qualitative tests.
- To investigate the effects of pH and temperature on enzyme activity.
- To perform simple clinical biochemical tests for the detection of glucose and ketone bodies in urine.

PRACTICALS

1. Preparation of percentage, molar and normal solutions.
2. Preparation of standard buffer solutions.
3. Determination of pH using pH paper and pH meter.
4. Qualitative Water Analysis: Physical examination, test for Chloride, Sulphate, Phosphate, Iron, Calcium, Nitrate, carbonates and bicarbonates
5. Qualitative analysis of Minerals: Calcium, Phosphate, Iron, Chloride, Sulphate
6. Effect of pH on any one enzyme activity.
7. Effect of temperature on any one enzyme activity.
8. Qualitative detection of glucose in urine (related to insulin function).
9. Qualitative detection of ketone bodies in urine.

COURSE OUTCOMES

The students are able to,

1. Prepare percentage, molar and normal solutions and standard buffer solutions accurately.
2. Analyze water samples qualitatively and identify the presence of chloride, sulphate, phosphate, iron, calcium, nitrate, carbonates and bicarbonates.
3. Perform qualitative tests for important minerals and interpret the observed results.
4. Evaluate the influence of pH and temperature on enzyme activity through laboratory experiments.
5. Detect glucose and ketone bodies in urine samples and relate the findings to metabolic disorders.

TEXT BOOK(S)

1. Plummer, D. T. (2018). *An introduction to practical biochemistry* (6th ed.). McGraw-Hill Education.

- Jayaraman, J. (2017). *Laboratory manual in biochemistry* (2nd ed.). New Age International Publishers.
- Sawhney, S. K., & Singh, R. (2020). *Introductory practical biochemistry* (3rd ed.). Narosa Publishing House.
- Pattabiraman, T. N., & Sadasivam, S. (2021). *Practical biochemistry* (2nd ed.). Scion Publishing.
- Wilson, K., & Walker, J. (2023). *Principles and techniques of biochemistry and molecular biology* (9th ed.). Cambridge University Press.

REFERENCE BOOK(S)

- Nelson, D. L., & Cox, M. M. (2025). *Lehninger principles of biochemistry* (9th ed.). W. H. Freeman and Company.
- Berg, J. M., Gatto, G. J., Jr., Tymoczko, J. L., & Stryer, L. (2023). *Biochemistry* (10th ed.). W. H. Freeman and Company.
- Voet, D., Voet, J. G., & Pratt, C. W. (2024). *Fundamentals of biochemistry: Life at the molecular level* (7th ed.). John Wiley & Sons.
- Rodwell, V. W., Bender, D. A., Botham, K. M., Kennelly, P. J., & Weil, P. A. (2022). *Harper's illustrated biochemistry* (33rd ed.). McGraw-Hill Education.
- Ferrier, D. R. (2022). *Lippincott illustrated reviews: Biochemistry* (8th ed.). Wolters Kluwer.

E-RESOURCES

- <https://nptel.ac.in>
- <https://swayam.gov.in>
- <https://ndl.iitkgp.ac.in>
- <https://pubmed.ncbi.nlm.nih.gov>
- <https://www.ncbi.nlm.nih.gov/books>
- <https://www.rcsb.org>
- <https://ocw.mit.edu>
- www.expasy.org
- www.khanacademy.org/science/biology
- www.openstax.org

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3	3	3	3		2		2		2	3	3	3	3
CO2	3		3	3		2		2		2	3	3	3	3
CO3	3	3		3		2				2	3		3	3
CO4	3	3	3					2		2	3	3		3
CO5	3	3	3	3		2		2		2	3	3		3
CO6		3		3		3		2		2		3	3	3

S-Strong (3)

M-Medium (2)

L-Low (1)