B. Sc., BIOCHEMISTRY

SYLLABUS

Programme Code : 3USBIC

2024-2027

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE (AUTONOMOUS)

(Affiliated to Bharathidasan University, Tiruchirappalli)

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

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

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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 2024–2025)

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 with in 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.

Core Courses (CC) A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course. These are the courses which provide basic understanding of their main discipline. In order to maintain a requisite standard certain core courses must be included in an academic program. This helps in providing a universal recognition to the said academic program.

Discipline Specific Elective Courses (DSE) Elective course may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective (DSE). These courses offer the flexibility of selection of options from a pool of courses. These are considered specialized or advanced to that particular programme and provide extensive exposure in the area chosen; these are also more applied in nature.

Generic Elective Courses An elective course chosen generally from an **unrelated discipline/subject,** with an intention to seek exposure is called a Generic Elective. Generic Elective courses are designed for the students of **other disciplines**. Thus, as per the CBCS policy, the students pursuing particular disciplines would have to opt Generic Elective courses offered by other disciplines, as per the basket of courses offered by the college. The scope of the Generic Elective (GE) Courses is positively related to the diversity of disciplines in which programmes are being offered by the college.

Non Major Elective (NME). A student shall choose at least two Non – major Elective Courses (NME) from outside his /her department. Non –Major Elective I – Those who choose Tamil in Part I can choose a non –major elective course offered by other departments. Those who do not choose Tamil in Part I must choose either a) Basic Tamil if Tamil language was not studies in school level or b) Special Tamil if Tamil language was studies upto 10^{th} & 12^{th} std.

Skill Enhancement Courses (SECs) These courses focus on developing skills or proficiencies in 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**.**

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 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.

Undergraduate Programme:

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

Part -I : Languages (Tamil / Hindi / French / Sanskrit)

Part-II : General English

Part-III: Core Course (Theory, Practicals, Generic Elective courses , Discipline Specific Elective courses , Compulsory and Optional Allied courses, Project)

Part-IV: Non Major Elective, Foundation Course, Value Education, Environmental studies, Skill Enhancement Courses/ Soft Skills, Internship / field visit / industrial visit/ Case Study), Professional Competency Course

Part –V

Extension activity, Gender studies

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

Part A:

Part A 1 (10X1=10 marks)

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

Two Questions from Each unit

Part A 2 (5X2=10 marks)

Short Answers / Match the following

One question from Each unit

Total Marks – 20

Part B: (5X5=25 marks)

Paragraph Answers

Either/ or type, One Question from each unit

Part C: (10X3=30)

Essay Type Answers

Answer 3 out of 5 Questions

One Question from each unit

Part A: K1 Level

Part B: K2, K3 and K4 Level

Part 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	25			30		**75**
Continuous Internal Assessment (CIA)	20	25			30		**75**

QUESTION PATTERN FOR END SEMESTER EXAMINATION/ Continuous Internal Assessment	
PART	**MARKS**
PART –A I. (No choice ,One Mark) **TWO** questions from each unit (10x1 =10) **II.** (No choice ,Two Mark) **ONE** question from each unit (5x2 =10)	20
PART -B (Either/ or type ,5-Marks) **ONE** questions from each unit (5x5 =25)	25
PART -C (3 out of 5) (10 Marks) **ONE** question from each unit (3x10 =30)	30
Total	**75**

BLUE PRINT OF QUESTION PAPER FOR END SEMESTER EXAMINATION							
DURATION: 3. 00 Hours. **Max Mark : 75**							
K- LEVELS / **PART**	**K1**	**K2**	**K3**	**K4**	**K5**	**K6**	**Total Marks**
PART –A (One Mark, No choice) (10x1 =10)	10						10
(2-Marks, No choice) (10x2=20)	10						10
PART–B (5-Marks) (Either/or type) (5x5=25)		5	10	10			25
PART -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**	**05**	**10**	**10**	**20**	**10**	**75**

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:

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

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

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.

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

CLASSIFICATION OF FINAL RESULTS:

1. For each of the first three parts, there shall be separate classification on the basis of CGPA, as indicated in Table-2.
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.
3. Grade in Part –IV and Part-V shall be shown separately and it shall not be taken into account for classification.
4. A Pass in PART- V will be mandatory although the marks will not count for the calculation of the CGPA.
5. 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 pervious 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 **s**peak, 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 wellas 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, biostatistical 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

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SUNDARAKKOTTAI, MANNARGUDI–614 016.
TAMIL NADU, INDIA.

B.Sc., BIOCHEMISTRY COURSE STRUCTURE UNDER CHOICE BASED CREDIT SYSTEM– LEARNING OUTCOMES BASED CURRICULUM FRAMEWORK (CBCS-LOCF)

(For the candidates admitted from the academic year 2024-2025)

ELIGIBILITY: A Pass in 10+2 with Chemistry

Semester	Part	Course	Course Code	Title of the Course	Ins. Hours/ Week	Ins. Hours/ Week				Credit	Exam Hours	Marks		Total
						L	T	P	S			CIA	ESE	
I	I	Language Course-I	U24LC101	Pothu Tamil–I: Tamil Elakkiya Varalaru-1	6	5	1	0	0	3	3	25	75	100
	II	English Language Course-I	U24ELC101	General English -I	6	5	1	0	0	3	3	25	75	100
	III	Core Course-I	U24BC101	Nutritional Biochemistry	5	4	1	0	0	5	3	25	75	100
		Core Practical-I	U24BC102P	Nutritional Biochemistry Practical	4	0	0	4	0	4	3	25	75	100
		Allied Course-I	U24ACH101	Allied Chemistry-I	3	2	1	0	0	2	3	25	75	100
		Allied Practical-I	U24ACH102P	Allied Chemistry Practical	2	0	0	2	0	--	--	---	--	--
	IV	Non Major Elective-I		-	2	1	1	0	0	2	3	25	75	100
		Foundation Course	U24FCBC11	Introduction to Biochemistry	2	1	1	0	0	2	3	25	75	100
			TOTAL		**30**	**18**	**6**	**6**	**0**	**21**	-	-	-	**700**
II	I	Language Course-II	U24LC202	Pothu Tamil– II Tamil Elakkiya Varalaru-II	6	5	1	0	0	3	3	25	75	100
	II	English Language Course-II	U24ELC202	General English -II	6	5	1	0	0	3	3	25	75	100
	III	Core Course–II	U24BC203	Cell Biology	5	4	1	0	0	5	3	25	75	100
		Core Practical-II	U24BC204P	Cell Biology Practical	4	0	0	4	0	4	3	25	75	100
		Allied Course-II	U24ACH203	Allied Chemistry- II	3	2	1	0	0	2	3	25	75	100
		Allied Practical-I	U24ACH102P	Allied Chemistry Practical	2	0	0	2	0	2	3	25	75	100
	IV	Non Major Elective-II		-	2	1	1	0	0	2	3	25	75	100
		Skill Enhancement Course-I	U24SEBC21	Biomedical Instrumentation	2	1	1	0	0	2	3	25	75	100
			TOTAL		**30**	**18**	**6**	**6**	**0**	**23**	-	-	-	**800**
III	I	Language Course-III		Pothu Tamil-III Tamilaga Varalarum Panpadum	6	5	1	0	0	3	3	25	75	100
	II	English Language Course-III		General English -III	6	5	1	0	0	3	3	25	75	100
	III	Core Course-III		Biomolecules	5	4	1	0	0	5	3	25	75	100
		Core Practical-III		Biomolecules Practical	4	0	0	4	0	4	3	25	75	100
		Allied Course-III		Basic Microbiology	3	2	1	0	0	2	3	25	75	100
		Allied Practical-II		Microbiology Practical	2	0	0	2	0	-	--	--	--	--
	IV	Skill Enhancement Course–II		First Aid	2	1	1	0	0	2	3	25	75	100
		Skill Enhancement Course –III		Basics of Forensic Science	2	1	1	0	0	2	3	25	75	100
			TOTAL		**30**	**18**	**6**	**6**	**0**	**21**	-	-	-	**700**
	I	Language Course-IV		Pothu Tamil-IV Tamilum Ariviyalum	6	5	1	0	0	3	3	25	75	100
	II	English Language Course-IV		General English-IV	6	5	1	0	0	3	3	25	75	100

Semester	Part	Course	Course Code	Title of the Course	Ins. Hours/ Week	Ins.Hours/ Week				Credit	Exam Hours	Marks		Total
						L	T	P	S			CIA	ESE	
IV	III	Core Course-IV		Biochemical Techniques	5	4	1	0	0	5	3	25	75	100
		Core Practical-IV		Biochemical Techniques Practical	4	0	0	4	0	4	3	25	75	100
		Allied Course-IV		Medical Microbiology	3	2	1	0	0	2	3	25	75	100
		Allied Practical-II		Microbiology Practical	2	0	0	2	0	2	3	25	75	100
	IV	Skill Enhancement Course–IV		Medical Coding	2	1	1	0	0	2	3	25	75	100
		Skill Enhancement Course–V		Medical Laboratory Techniques	2	1	1	0	0	2	3	25	75	100
			TOTAL		**30**	**18**	**6**	**6**	**0**	**23**	-	-	-	**800**
V	III	Core Course-V		Enzymes	5	4	1	0	0	5	3	25	75	100
		Core Course-VI		Intermediary Metabolism	5	4	1	0	0	4	3	25	75	100
		Core Course-VII		Clinical Biochemistry	6	5	1	0	0	5	3	25	75	100
		Core Practical-V		Clinical Biochemistry Practical	4	0	0	4	0	4	3	25	75	100
		Elective Course–I		Human Physiology/ Plant Biochemistry & Plant Therapeutics/ Food and Nutrition	4	3	1	0	0	3	3	25	75	100
		Elective Course–II		Research Methodology/ Biotechnology/ Genetic Engineering	4	2	1	1	0	3	3	25	75	100
	IV	EVS		Environmental Studies	2	2	0	0	0	2	3	25	75	100
		Internship/ Industrial Visit/ Field Visit		Internship/ Industrial Visit/ Field Visit	0	0	0	0	0	2	-	-	-	-
			TOTAL		**30**	**20**	**5**	**5**	**0**	**28**	-	-	-	**700**
VI	III	Core Course-VIII		Molecular Biology	6	5	1	0	0	4	3	25	75	100
		Core Practical-VI		Molecular Biology Practical	6	0	0	6	0	4	3	25	75	100
		Core Project		Project with viva-voce/ Group Project	5	0	1	4	0	5	3	25	75	100
		Elective Course-III		Endocrinology/ Biochemical Pharmacology/ Genetics	4	3	1	0	0	3	3	25	75	100
		Elective Course-IV		Immunology/ Bioinformatics/ Pharmaceutical Biochemistry	4	3	1	0	0	3	3	25	75	100
	IV	Value Education		Value Education	2	2	0	0	0	2	3	25	75	100
		Professional Competency Course		Bioentrepreneurship	2	2	0	0	0	2	3	25	75	100
	V	Gender Studies		Gender Studies	1	1	0	0	0	1	3	25	75	100
		Extension activity		Extension activity	0	0	0	0	0	1	-	-	-	-
			TOTAL		**30**	**16**	**4**	**10**	**0**	**25**	-	-	-	**800**
				GRAND TOTAL	**180**	**108**	**33**	**39**	**0**	**141**	-	-	-	**4500**
Extra Credit				MOOC/SWAYAM/NPTEL	**-**	-	**-**	**-**	**-**	**2**	-	-	-	**-**
				Value Added Courses (Atleast One Per Year)	**-**	-	**-**	**-**	**-**	**2**	-	-	-	**-**

L-Lecture **T-Tutorial** **P-Practical** **S-Seminar**

CREDIT DISTRIBUTION FOR UG PROGRAMME

S.No.	Part	Courses	No. of Courses	Total Credits
1	I	Language Course	4	12
2	II	English Language Course	4	12
3	III	Core Course-Theory	8	38
4		Core Practical	6	24
5		Core Project	1	05
6		Allied Course - Theory	4	08
7		Allied Course - Practical	2	04
8		Elective Course	4	12
9	IV	Non-Major Elective	2	04
10		Foundation Course	1	02
11		Skill Enhancement Course	5	10
12		Internship/ Industrial visit/ Field visit	1	02
13		Environmental Studies	1	02
14		Value Education	1	02
15		Professional Competency Course	1	02
16	V	Gender Studies	1	01
17		Extension Activity	1	01
Total			**47**	**141**

Note:

		CIA	ESE
1	Theory	25	75
2	Practical	25	75

3 Separate passing minimum is prescribed for Internal and External marks

FOR THEORY

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]

The passing minimum for University Examinations shall be 40% out of 75 marks [i.e. 30 marks]

FOR PRACTICAL

The passing minimum for CIA shall be 40% out of 25 marks [i.e. 10 marks]

The passing minimum for University Examinations shall be 40% out of 75 marks [i.e. 30 marks]

NME OFFERED BY THE DEPARTMENT

Semester	Part	Course	Course Code	Title of the Course
I	IV	NME-I	U24NMEBC11	Health and Diseases
II		NME-II	U24NMEBC22	Life Style Diseases

SEMESTER - I

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(Autonomous)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2024 – 2025)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: I-CC-I: Nutritional Biochemistry

Ins. Hrs./Week: 5 **Course Credit: 5** **Course Code:** U24BC101

UNIT-I: Concepts of food and nutrition **(18 Hours)**

Basic food groups-energy yielding, body building and functional foods. Modules of energy. Calorific and nutritive value of foods. Measurement of calories by bomb calorimeter. Basal Metabolic Rate (BMR) - definition, determination and factors affecting BMR. Respiratory Quotient (RQ) of nutrients and factors affecting the RQ. SDA-definition and determination-Anthropometric measurement and indices – Height, weight, chest and waist circumference BMI.

UNIT-II: Significance of Biomolecules **(18 Hours)**

Evaluation of proteins by nitrogen balance method- Biological value of proteins- Digestibility coefficient, Protein Energy Ratio and Net Protein Utilization. Protein Energy Malnutrition – Kwashiorkar and Marasmus, Obesity-Types and preventive measures.

UNIT-III: Balanced diet with field project **(18 Hours)**

Example of low and high cost balanced diet- for infants, children, adolescents, adults and elderly people. ICMR classification of five food groups and its significance, food pyramid. Junk foods- definition and its adverse effects.

UNIT- IV: Food additives **(18 Hours)**

Structure, chemistry, function and application of preservatives, emulsifying agents, buffering agents, stabilizing agents, natural and artificial sweeteners, bleaching, starch modifiers, antimicrobials, food emulsions, fat replacers, viscosity agents, gelling agents and maturing agents. Food colors, flavors, anti-caking agent, antioxidants. Safety assessment of food additives.

UNIT-V: Nutraceuticals and Functional Foods **(18 Hours)**

Definition, properties and function of Nutraceuticals, food Supplements, dietary supplements prebiotics and probiotics and functional Foods. Food as medicine. Natural pigments from plants– carotenoids, anthocyanins and its benefits.

Total Instruction Hours-90

COURSE OUTCOME

The students are able to,

1. Cognizance of basic food groups viz. carbohydrates, proteins and lipids and their nutritional aspects as well as calorific value
2. Identify and explain nutrients in foods and the specific functions in maintaining health.
3. Classify the food groups and its significance
4. Understand the effect of food additives
5. Describe the importance of nutraceuticals and pigments

TEXT BOOK(S)

1. Linda Kelly De Bruyne and Kathryn Pinna. (2023). Nutrition for Health and Health Care (Mind Tap Course List), 7th Edition, Cengage Learning publisher, USA.
2. Gaile Moe, Danita Kelley, Jacqueline Berning and Carol Byrd-Bredbenner. (2016). Wardlaw's Perspectives in Nutrition: A Functional Approach. McGraw-Hill, Inc., NY, USA.
3. Swaminadhan M. (2015). Principles of Nutrition and Dietics. Bappco.
4. Tom Brody. (2018). Nutritional Biochemistry (2^{nd} ed), Academic press, USA.
5. Garrow JS, James WPT and Ralph A. (2000). Human Nutrition and Dietetics (10^{th} ed), Churchill Livingstone.
6. Andreas M. Papas. (2013). Antioxidant Status, Diet, Nutrition, and Health (1^{st} ed), CRC.

REFERENCE BOOK(S)

1. Phyllis A. Balch CNC. (2023). Prescription for Nutritional Healing: A Practical A-to-Z Reference to Drug-Free Remedies Using Vitamins, Minerals, Herbs, & Food Supplements, Sixth Edition, Avery publisher, USA.
2. Branen AL, Davidson PM and Salminen S. (2001). Food Additives (2^{nd} ed.), Marcel Dekker.
3. Gerorge AB. (1996). Encyclopedia of Food and Color Additives, Vol. III. CRC Press.
4. Fatih Yildiz. (2010). Advances in food Biochemistry, CRC Press, Boca Raton, USA.
5. Hui YH. (2006). Food Biochemistry and Food Processing, Blackwell Publishing, Oxford, UK.
6. Geoffrey Campbell Platt. (2009). Food Science and Technology, Wiley-Blackwell, UK.

E-RESOURCES

1. http://old.noise.ac.in/SecHmscicour/english/LESSON O3.pdf
2. https://study.com/academy/lesson/energy-yielding-nutrients-carbohydratesfat-protein.html
3. https://www.nhsinform.scot/healthy-living/food-and-nutrition/eatingwell/vitamins-and minerals
4. https://ncert.nic.in/textbook/pdf/kehe103.pdf
5. https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SBC1101.pdf

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	3	3	3	3
CO2	3		3	3						2	3	3		3
CO3	3	2	3	3				3		2	3	1		3
CO4	3	2	3	3				3		2	3	3		3
CO5	3		3	3	2	2		3	3	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 2024 – 2025)
DEPARTMENT OF BIOCHEMISTRY
B.Sc., BIOCHEMISTRY

Semester: I-CP-I: **Nutritional Biochemistry Practical**

Ins. Hrs./Week: 4 **Course Credit**: 4 **Course Code**:U24BC102P

TITRIMETRY

1. Estimation of ascorbic acid in a citrus fruit.
2. Estimation of calcium in milk.
3. Estimation of glucose by Benedict's method in honey.
4. Estimation of phosphorous (Plant source)

BIOCHEMICAL PREPARATIONS

Preparation of the following substances and its qualitative tests

5. Lecithin from egg yolk.
6. Starch from potato.
7. Casein and Lactalbumin from milk.

GROUP EXPERIMENT

8. Determination of ash content and moisture content in food sample
9. Extraction of lipid by Soxhlet's method.

Total Instruction Hours-60

COURSE OUTCOMES

The students are able to,

1. Estimate the important biochemical constituents in the food samples.
2. Prepare the macronutrients from the rich sources.
3. Determine the ash and moisture content of the food samples
4. Extract oil from its sources

TEXT BOOK(S)

1. Geetha Damodaran K. (2023). Practical Biochemistry, 2nd Edition, Jaypee Brothers Medical Publishers (P) Ltd, Newdelhi.
2. Jayaraman, J. (2011). Laboratory manual in Biochemistry, 2nd ed, New Age International Publishers.
3. David T. Plummer . (2001). An Introduction to Practical Biochemistry, 3 rd ed, Tata McGraw-Hill Publishing Company Limited.

REFERENCE BOOK(S)

1. Dr. Anju Jain, Dr. S.K. Gupta and Dr. Veena Singh Ghalaut. (2022). Manual of Practical Biochemistry, APC Books publishers, USA.
2. Sadasivam S and Manickam A. (2016). Biochemical Methods, 4th ed, New Age International Publishers.
3. Swaminathan MS. (2008). Essentials of Food and Nutrition, Vol. I & II.
4. Bowman and Robert M. (2006). Present Knowledge in Nutrition. 9th ed, International Life Sciences Publishers.
5. Indrani TK. (2003). Nursing Manual of Nutrition and Therapeutic Diet, 1st edition Jaypee Brothers medical publishers.
6. Martha H and Marie A. (2012). Biochemical, Physiological and Molecular Aspects of Human Nutrition, 3rd ed, Chand Publishers.

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/Bioc hemistry/ Dr.%20Jagarti%20Jha/Techniques%20In%20Biochemistry%20Lab.pdf
3. https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochem istrypdf.pdf?sequence=1&isAllowed=y
4. https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochem istrypdf.pdf?sequence=1&isAllowed=y

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
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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

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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DEPARTMENT OF CHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: I -AC-I: Allied Chemistry-I

Ins. Hrs./Week: 3 **Course Credit: 2** **Course Code:** U24ACH101

UNIT -I: Chemical bonding and nuclear chemistry (9 Hours)

Chemical Bonding: Molecular Orbital Theory-bonding, antibonding and non-bonding orbitals. M.O diagrams for Hydrogen, Helium, Nitrogen; discussion of bond order and magnetic properties.

Metallic Bond: Electron gas, Pauling and band theories, semiconductors – intrinsic, extrinsic – type and p- type semiconductors.

Nuclear Chemistry: Fundamental particles - Isotopes, Isobars, Isotones and Isomers- Differences between chemical reactions and nuclear reactions- Nuclear fission and nuclear fusion - differences – Stellar energy. Applications of radioisotopes - carbon dating, rock dating and medicinal applications.

UNIT- II: Industrial Chemistry (9 Hours)

Fuels: Fuel gases: Natural gas, water gas, semi water gas, carbureted water gas, producer gas, CNG, LPG, Gobar gas and oil gas (manufacturing details not required).

Silicones: Synthesis, properties and uses of silicones.

Fertilizers: Urea, ammonium sulphate, potassium nitrate NPK fertilizer, superphosphate, triple superphosphate-soaps and detergents.

UNIT- III: Fundamental Concepts in Organic Chemistry (9 Hours)

Hybridization: Orbital overlap hybridization and geometry of CH_4, C_2H_4, C_2H_2 and C_6H_6. Polar effects: Inductive effect and `consequences on Ka and Kb of organic acids and bases, electromeric, mesomeric, hyper conjugation and steric-examples and explanation.

Reaction Mechanisms: Types of reactions- aromaticity-aromatic electrophilic substitution; nitration, halogenation, Friedel-Craft's alkylation and acylation. Heterocyclic compounds: Preparation, properties of pyrrole and pyridine.

UNIT -IV: Drugs and Speciality Chemicals (9 Hours)

Definition, structure and uses: Antibiotics viz., Penicillin, Chloramphenicol and Streptomycin; Anesthetics viz., Chloroform and ether; Antipyretics viz., aspirin, paracetamol and ibuprofen; Artificial Sweeteners viz., saccharin, Aspartame and cyclamate; Organic Halogen compounds viz., Freon, Teflon.

Chemotherapy: Explanation with two examples each for analgesics, antibacterial, anti-inflammatory, antibiotics, antiseptic and disinfectant, anesthetics local and general (Structures not necessary).

UNIT- V: Analytical and Surface Chemistry **(9 Hours)**

Introduction -qualitative and quantitative analysis. Principles of volumetric analysis. Separation and purification techniques: extraction, distillation and crystallization. Chromatography: principle and application of column, paper and thin layer chromatography**.**

Surface Chemistry: Emulsions, gels- Preparation, Properties and uses- Electroph0resis and its applications**.**

Total Lecture Hours: 45

COURSE OUTCOME

The student should be able to

1. State the theories of chemical bonding, nuclear reactions and its applications.
2. Evaluate the efficiencies and uses of various fuels and fertilizers.
3. Explain the type of hybridization, electronic effect and mechanism involved in the organic reactions.
4. Demonstrate the structure and uses of antibiotics, an aesthetics, antipyretics and artificial sugars.
5. Analyze various methods to identify an appropriate method for the separation of chemical components.

TEXT BOOK(S):

1. V. Veeraiyan, Textbook of Ancillary Chemistry; High mount publishing house, Chennai, first edition,2009
2. S. Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur, 2000.
3. ArunBahl, B.S.Bahl, Advanced Organic Chemistry; S.Chand and Company, New Delhi, twenty third edition,2012
4. P. L. Soni, H.M. Chawla, Text Book of Inorganic Chemistry; Sultan Chand & sons, New Delhi, 29 thedition, 2007.
5. V.Veeraiyan,TextbookofAncillaryChemistry;Highmountpublishinghouse,Chennai,firstedition, 2009.

REFERENCE BOOK(S)

1. P. L Soni, Mohan Katyal, Text book of Inorganic chemistry; Sultan Chand and Company, New Delhi, twentieth edition, 2007.
2. B. K, Sharma, Industrial Chemistry; GOEL publishing house, Meerut, sixteenth edition, 2014.
3. Jayashree gosh, Fundamental Concepts of Applied Chemistry; Sultan & Chand, Edition,2006.
4. B. R. Puri, L.R. Sharma, M.S.Pathania, Textbook Physical Chemistry; Vishal Publishing Co., New Delhi, forty 7th editions,2018.
5. Arun Bahl, B.S.Bahl, Advanced Organic Chemistry; S. Chand and Company, New Delhi, 23rd edition, 2012.
6. B.R.Puri, Sharma, Kalia, 'Principles of Inorganic Chemistry" 33rd edition, Vishal Publishing Co, Pvt Ltd, 2020.

E- RESOURCES:

1. https://www.chem.tamu.edu/class/majors/chem470/Notes.html
2. https://ncert.nic.in/textbook/pdf/kech104.pdf
3. https://www.amazon.in/Fundamental-Organic-Chesmistry-R -
4. https://www.pharmamanufacturing.com/ebooks
5. https://open.umn.edu/opentextbooks/textbooks/486

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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CO1	3	3	3					3	2		3	3		
CO2	3	3	3					3	3	3	3	3	3	
CO3	3	3	3					3	2		3	3		
CO4	3	3	3	2				3	3	3	3	3	3	
CO5	3	3	3	2				3	3	3	3	3	3	3

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(For the Candidates admitted in the academic year 2024 – 2025)

DEPARTMENT OF CHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: I & II-AP-I: Allied Chemistry Practical

Ins. Hrs./Week: 4 **Course Credit: 2** **Course Code:** U24ACH102P

I. VOLUMETRIC ANALYSIS (**40 Hours**)

1. Estimation of sodium hydroxide using standard sodium carbonate.
2. Estimation of hydrochloric acid using standard oxalic acid.
3. Estimation of ferrous sulphate using standard Mohr's salt.
4. Estimation of oxalic acid using standard ferrous sulphate.
5. Estimation of potassium permanganate using standard sodium hydroxide.
6. Estimation of magnesium using EDTA.
7. Estimation of ferrous ion using diphenyl amine as indicator

II. QUALITATIVE ORGANIC NALYSIS **(20 Hours)**

Analyze the following organic Compounds.

1. Carbohydrate
2. Amide
3. Aldehyde
4. Ketone
5. Acid
6. Amine

Total Hours: 60

Scheme of Valuation:		**Max. Marks**
Record		10 (Marks)
Procedure Writing		10(Marks)
Volumetric analysis		**35 Marks**
Results		
<1%	-	35Marks
1-2%	-	35Marks
2-3%	-	25Marks
3-4%	-	15Marks
>4%	-	10Marks

Qualitative Organic analysis - **20** Marks

TOTAL MARKS: 75

COURSE OUTCOME

The student should be able to

1. Gain an understanding of the use of standard flask and volumetric pipettes, burette.
2. Design, carry out, record and interpret the results of volumetric titration.
3. Apply their skill in the analysis of water/hardness.
4. Analyze the chemical constituents in allied chemical products.
5. Acquire the Knowledge of handling of chemicals

TEXT BOOK(S)

1. Gopalan R. 2000. Elements of analytical Chemistry, S. Chand, New Delhi.
2. Gnanapragasam, N.S,Ramamurthy G.1998.Organic Chemistry Lab Manual, S. Viswanathan and Co. Pvt. Ltd. Chennai.
3. Manna, A.K. Practical Organic Chemistry, Books andAllied:India,2018.
4. McPherson Peter, Practical Volumetric Analysis, Royal Society of Chemistry, 2014.
5. Henry. W. Schimpf, A Text Book of Volumetric Analysis**,** Legare Street Press, 2023.

REFERENCE BOOK(S)

1. Venkateswaran,V. Veeraswamy, R.; Kulandaivelu, A.R. Basic Principles of Practical Chemistry, 2nd Ed. Sultan Chand: NewDelhi,2012.
2. Vogel's. Text book of Quantitative Chemical Analysis, 6th Ed.; Pearson Education Ltd:New Delhi, 2000.
3. McPherson Peter , Practical Volumetric Analysis, Royal Society of Chemistry, 2014.
4. Nad, A.K. Mahapatra, B.; Ghoshal, A.; An advanced course in Practical Chemistry, 3rd Ed.; New Central Book Agency:Kolkata,2007.
5. Thomas Edward Thorpe: Quantitative Chemical Analysis, Legare Street Press, 2022.

E-RESOURCES

1. https://chemistryvce.weebly.com/volumetric-analysis.html
2. https://chem.libretexts.org/Bookshelves/Analytical_Chemistry/Supplemental_Modules_(Analytical_Chemistry)/Quantifying_Nature/Volumetric_Chemical_Analysis_(Shiundu)/14.2%3A_Learning_Activity
3. https://byjus.com/chemistry/volumetric-analysis/
4. https://www.researchgate.net/publication/344658899_Volumetric_Analysis_-Titration_for_Beginners
5. https://chemdictionary.org/titration-indicator/

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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CO1	2	2				3				3				3
CO2	3	3	3					3	3	3	3			3
CO3	3	3	3			3		2	2	2	3	3		
CO4	3	3	3			3		1	2	2			3	3
CO5	2	2	3			3		3	2	2		2	3	2

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DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: I- FC: Introduction to Biochemistry

Ins. Hrs. /Week : 2 **Credit:2** **Course Code :**U24FCBC11

UNIT-I: Biochemistry **(5 Hours)**

Scope of Biochemistry in different fields, Major Areas of Biochemistry, Importance of Biochemistry, Application of Biochemistry- in Agriculture and in Medicine

UNIT-II: Basic Concepts of Biochemistry **(6 Hours)**

Acids and bases-Acids and bases in biological systems, pH Scale, Buffers, Henderson–Hasselbalch equation, uses of Buffers, Formation of lymph and blood, functions of blood, Regulation of Acid-Base balance, Role of Lung, Role of Kidney.

UNIT-III: Cell **(6 Hours)**

Cell, two major classes of cells- prokaryotes and eukaryotes, shape and structure of cell, structure and functions of sub cellular organelles-cell membrane, cell wall- Bacterial cell wall, Plant cell wall, Nucleus, Mitochondria, Endoplasmic reticulum (ER), Golgi apparatus, Ribosomes, Lysosomes, Cytoplasm and Chloroplasts.

UNIT-IV: Biological significance of Biomolecules **(7 Hours)**

Biological significance of carbohydrates-glycosaminoglycans, proteoglycans; proteins-collagen, keratin, histone; lipids- phospholipids, shingolipids.

UNIT-V: Physiology of sensory organs **(6 Hours)**

Structure Eye and ear-Internal and external structure; nose; skin-epidermis, dermis, hypodermis; tongue-tip, body and base. Physiology of vision, hearing, smell, touch and taste.

Total Lecture Hours-30

COURSE OUTCOME

The students are able to,

1. Gain knowledge of scope, applications of Biochemistry in day today life
2. Acquire knowledge on basic concepts of Biochemistry
3. Understand structure and functions of cellorganelles
4. Illustrate classification and biological significances of biomolecules
5. Summarize the structure and functions of sensory organs

TEXT BOOK(S)

1. Peter. J. Kennelly, Kathleen M. Botham and Victor W. Rodwell. (2023). Harper's Illustrated Biochemistry, 32nd Edition, McGraw Hill publishers, Noida.

2. Sathyanarayana U and Chakrapani U. (2013). Biochemistry, 5th edition, Elsevier India Pvt. Ltd.
3. Jain JL, Sunjay Jain, Nitin Jain. (2013). Fundamentals of Biochemistry, 7th edition, S. Chand and Company Ltd.
4. Chatterjea MN and Rana Shinde. (2002). Textbook of Medical Biochemistry, 8th edition, Jaypee Brothers.

REFERENCE BOOK(S)

1. David L. Nelson, Michael M. Cox. (2005). Principles of Biochemistry, 4th edition W. H. Freeman and Company.
2. Voet D, Voet JG and Pratt CW. (2004). Principles of Biochemistry, 4th edition, John Wiley & Sons Inc.
3. Zubay GL. (1995). Principles of Biochemistry, 1st edition, Wm C. Brown Publishers.

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://www.nhsinform.scot/healthy-living/food-and-nutrition/eatingwell/vitamins-and minerals
5. https://ncert.nic.in/textbook/pdf/kehe103.pdf
6. https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SBC1101.pdf

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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CO1	3		3	3				3		2	3	3	3	3
CO2	3		3	2					1	3	3	3	3	3
CO3	3			3		2		2	1	3	3	3	3	3
CO4	3			3		2		2		3	3	3	3	3
CO5	3			3		2		2		3	3	3	3	3

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SEMESTER - II

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

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DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: II- CC II: Cell Biology

Ins. Hrs./Week: 5 **Course Credit**: 5 **Course Code**: U24BC203

UNIT-I: Architecture of cells (18 Hours)

Structural organization of prokaryotic and eukaryotic cells microbial, plant and animal cells. The ultrastructure of nucleus, mitochondria, RER, SER, golgi apparatus, lysosome, peroxisome and their functions

UNIT-II: Cytoskeleton (18 Hours)

Micro filament, microtubules and intermediary filament- structure, composition and functions. Organization of Genome -prokaryotic, and eukaryotic genome. Organization of chromatin – histones, nucleosome concept, formation of chromatin structure. Special types of chromosomes – lamp brush chromosomes, polytene chromosomes.

UNIT-III: Biomembranes (18 Hours)

Structural organization of bilipid layer model and basic functions, transport across cell membranes- uniport, symport and antiport. Passive and active transport.

UNIT-IV: Cell cycle (18 Hours)

Definition and Phases of Cell cycle- cytokinesis, karyokinesis- Interphase, M phase- Prophase, Metaphase, Anaphase, Telophase, check points; Cell division-Mitosis and Meiosis and its significance.

UNIT-V: Extracellular matrix (18 Hours)

Collagen, laminin, fibronectin and proteoglycans- structure and biological role. Structure and role of cadherin, selectins, integrins, Cell -cell interactions- Types-gap junctions, tight junctions and Desmosomes.

Total Lecture Hours-90

COURSE OUTCOME

The students are able to,

1. Explain the structure and functions of basic components of prokaryotic and eukaryotic cells, especially the organelles
2. Familiarize the cytoskeleton and chromatin
3. Illustrate the structure, composition and functions of cell membrane related to membrane transport
4. Elaborate the phases of cell cycle and cell division-mitosis and meiosis and characteristics of cancer cells
5. Relate the structure and biological role of extra cellular matrix in cellular interactions

TEXT BOOK(S)

1. Bruce Alberts, Karen Hopkin, Alexander Johnson, David Morgan, Keith Roberts, Peter Walter, Rebecca Heald. (2024). Essential Cell Biology, 2nd Edition, W. W. Norton & Company publishers
2. Arumugam N. (2019). Cell biology, Saras publication (10^{ed}, paperback).
3. Devasena T. (2012). Cell Biology. Oxford University Press India.
4. Bruce Alberts and Dennis Bray. (2013). Essential Cell Biology,(4^{th} ed), Garland Science.

REFERENCE BOOK(S)

1. Bruce Alberts, Karen Hopkin, Alexander Johnson, David Morgan, Peter Walter, Rebecca Heald. (2023). Essential Cell Biology, 6th Edition, W. W. Norton & Company publishers
2. Cooper GA. (2020). The Cell: A Molecular Approach. Sinauer Associates.
3. Lippincott Williams. (2006). Cell and Molecular Biology, Wilkins Philadelphia.
4. Lodish HA, Berk CA, Kaiser M, Krieger MP, Scott A, Bretscher H, Ploegh and Matsudaira. (2007). Molecular Cell Biology, 6^{th} Edition, WH. Freeman Publishers, New York, USA.

E- RESOURCES

1. https://nicholls.edu/biol-ds/bio1155/Lectures/Cell%20Biology.pdf
2. https://www.medicalnewstoday.com/article/320878.php
3. https://biologydictionary.net /cell

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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

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DEPARTMENT OF BIOCHEMISTRY
B.Sc., BIOCHEMISTRY

Semester: II- CP II: Cell Biology Practical

Ins. Hrs./Week: 4 **Course Credit**: 4 **Course Code**: U24BC204P

MICROSCOPY AND STAINING TECHNIQUES

1. Study the parts of light and compound microscope
2. Preparation of Slides and Micrometry
3. Examination of prokaryotic and eukaryotic cell
4. Visualization of animal and plant cell by methylene blue
5. Visualization of nuclear fraction by acetocarmine stain
6. Staining and visualization of mitochondria by Janus green stain
7. Staining- Gram staining, Acid fast staining

GROUP EXPERIMENT

8. Identification of different stages of mitosis in onion root tip
9. Identification of different stages of meiosis in onion bulb

SPOTTERS

10. a) Cells: Nerve, plant and Animal cell
    b) Organelles: Mitochondria, Chloroplast, Endoplasmic reticulum,
    c) Mitosis stages–Prophase, Anaphase, Metaphase, Telophase

Total Lecture Hours-60

COURSE OUTCOME

The students are able to,

1. Identify the parts of microscope.
2. Preparation of Slides
3. Identify the stages of mitosis & meiosis
4. Visualize nucleus and mitochondria by staining methods
5. Identify the spotters of cells, organelles and stages of cell division

TEXT BOOK(S)

1. Mark Anestis, Kelcey Burris. (2024).5 Steps to a 5: AP Biology, 1st Edition, McGraw Hill Publisher.
2. Rickwood D and Harris JR. (2016). Cell Biology: Essential Techniques, Johnwikey.
3. Davis JM. (1994). Basic Cell culture: A practical approach, IRL.

4. Ganesh MK. and Shivashankara AR. (2012). Laboratory Manual for Practical Biochemistry Jaypee publications, 2nd Edn.

REFERENCE BOOK(S)

1. Debarati Das. (2021). Essential practical handbook of Cell biology, Genetics and Microbiology-A Practical manual- Academic publishers.
2. Venugupta. (2018). Cell biology Practical, Prestige publisher.
3. DeRobertis. (2007). Cell and Molecularbiology, 8th edition.

E- RESOURCES

1. http://amrita.olabs.edu.in/?sub=79&brch=18&sim=237&cnt=1
2. https://www.microscopemaster.com/organelles.html
3. https://www.pdfdrive.com/biochemistry-books.htm
4. http://medcell.med.yale.edu/histology/cell_lab.php#:~:text=The%20electron%20microscope%20is%20necessary,and%20small%20granules%20and%20vesicles
5. http://amrita.olabs.edu.in/?sub=79&brch=18&sim=237&cnt=1
6. https://www.khanacademy.org/science/ap-biology/heredity/meiosis-and-geneticdiversity/a/phases-of-meiosis
7. https://www.microscopemaster.com/organelles.html
8. https://www.pdfdrive.com/biochemistry-books.html

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

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 2024 – 2025)

DEPARTMENT OF CHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: II-AC-II: Allied Chemistry-II

Ins. Hrs./Week: 3 **Course Credit**: 2 **Course Code**: U24ACH203

UNIT-I: Co-ordination chemistry and water technology (10 Hours)

Co-ordination Chemistry: Definition of terms - IUPAC Nomenclature - Werner's theory, and - EAN rule - Pauling's theory – Postulates - Applications to [Ni(CO)4], [Ni(CN)4] 2- ,[Co(CN)6] 3- Chelation -, Biological role of Hemoglobin and Chlorophyll (elementary idea) - Applications in qualitative and quantitative analysis.

Water Technology: Hardness of water, determination of hardness of water using EDTA method, zeolite method-Purification techniques – BOD and COD

UNIT -II: Carbohydrates (8 Hours)

Classification, preparation and properties of glucose and fructose. Discussion of open chain ring structures of glucose and fructose. Glucose-fructose interconversion. Preparation and properties of sucrose, starch and cellulose.

UNIT- III: Amino acids and essential elements of Biosystem (9 Hours)

Classification -Essential and non- essentials amino acids-preparation and properties of alanine, preparation of dipeptides using Bergmann method. - Proteins classification – structure - Color reactions – Biological functions – nucleosides -nucleotides – RNA and DNA – structure. Essentials of trace metals in biological system-Na, Cu, K, Zn, Fe, Mg

UNIT -IV: Electrochemistry and phase rule (10 Hours)

Galvanic cells - Standard hydrogen electrode - calomel electrode - standard electrode potentials -electrochemical series. Strong and weak electrolytes - ionic product of water -pH, pKa, pKb. Conductometric titrations - pH determination by colorimetric method – buffer solutions and its biological applications - electroplating - Nickel and chrome plating – Types of cells -fuel cells-corrosion and its prevention.

Phase Rule: Phase, component, degree of Freedom, phase rule definitions – one component system – water system.

UNIT-V: Photochemistry (8 Hours)

Photochemical reaction- definition- Laws of photochemistry - Grothus - Drapper's law and Stark-Einstein's law of photochemical equivalence, Quantum yield - Hydrogen -chloride reaction. Phosphorescence, fluorescence, chemiluminescence and photosensitization and photosynthesis (definition with examples) and applications.

Total Lecture Hours: 45

COURSE OUTCOME

The students are able to,

1. Write the IUPAC name for complex, different theories to explain the bonding in coordination compounds and water technology.
2. Explain the preparation and property of carbohydrate.
3. Enlighten the biological role of transition metals, amino acids and nucleic acids.
4. Apply/demonstrate the electrochemistry principles in corrosion, electroplating and fuel cells.
5. Outline the various type of photochemical process.

TEXT BOOK(S):

1. V.Veeraiyan, Textbook of Ancillary Chemistry; High mount publishing house, Chennai, first edition, 2009.
2. S.Vaithyanathan, Text book of Ancillary Chemistry; Priya Publications, Karur, 2006.
3. Arun Bahl, B.S.Bahl, Advanced Organic Chemistry; S.Chand and Company, New Delhi, twenty third edition,
4. P.L.Soni, H.M.Chawla, Text Book of Organic Chemistry; Sultan Chand & sons, New Delhi, twenty ninth edition, 2007.
5. Gurudeep Raj,(2001), Advanced Inorganic Chemistry Vol–I,26th Ed., Goel Publishing House, Meerut

REFERENCE BOOK(S):

1. Bahl, B.S, and Bahl, A., Advanced Organic Chemistry, (12th edition), 2010. New Delhi, Sultan Chand & C
2. P.L.Soni, Mohan Katyal, Text book of Inorganic Chemistry; Sultan Chand and Company, New Delhi, twentieth edition, 2007.
3. B. R.Puri, L.R.Sharma, M.S.Pathania, Text book Physical Chemistry; Vishal Publishing Co., New Delhi, forty seventh edition, 2018.
4. B.K,Sharma, Industrial Chemistry; GOEL publishing house, Meerut, sixteenth edition, 2014.
5. Huheey J E,(1993),Inorganic Chemistry: Principles of Structure and Reactivity,4th Ed., Addison Wesley Publishing Company, India.

E-RESOURCES

1. https://onlinelibrary.wiley.com/doi/book/10.1002/9783527618255
2. https://www.amazon.in/Amino-Acids-Nutrition-Health-Experimental-ebook/dp/B08FD6ZH86
3. https://www.freebookcentre.net/Chemistry/ElectroChemistry-Books-Download.html
4. authors.library.caltech.edu/25034/21/BPOCchapter20.pdf
5. https://chandand.weebly.com/uploads/9/2/2/7/92278224/_inorganic_chemistry__a_textbook_series__lawrance_g.a.-introduction_to_coordination_chemistry-wiley__2010_.pdf

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		
CO2	3	3	3					3	3	3	2	3	3	
CO3	3	3	3					3	2		3	3		
CO4	3	3	3	2				3	3	3	3	3	3	
CO5	3	2	3					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 2024 – 2025)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: II-SEC-I: Biomedical Instrumentation

Ins. Hrs./Week: 2 **Course Credit: 2** **Course Code:** U24SEBC21

UNIT-I: Diagnosis of Cardiovascular Diseases **(6 Hours)**

Measurement of blood pressure – sphygmomanometer. Cardiac output – Cardiac rate – Heart sound – Stethoscope, ECG – EEG – EMG – ERG.

UNIT- II: Diagnosis of Respiratory Diseases **(6 Hours)**

Monitoring of inspired/expired anaesthetic gases, capnograph, inhalators, nebulizers, aspirators, infant respirator, plethysmography.

UNIT- III: Medical imaging **(6 Hours)**

X-ray machine - Radiographic and fluoroscopic techniques – Computed tomography – MRI – PET, Ultrasonography – Endoscopy – Thermography.

UNIT-IV: Assisting equipments **(6 Hours)**

Pacemakers – Types, Procedure, Precautions. Defibrillators – Types, Uses and purpose. Ventilators- types and uses.

UNIT-V: Therapeutic equipments **(6 Hours)**

Nerve and muscle stimulators –Diathermy – Heart – Lung machine – Audio meters – Dialyzers.

Total Lecture Hours-30

COURSE OUTCOME

The students are able to,

1. Illustrate the functions of instruments used for measuring blood pressure
2. Elaborate the devices required for monitoring of respiratory gases
3. Understand the operation of the imaging and sonographic instruments
4. Differentiate between the action of pacemakers, defibrillators and ventilators
5. Demonstrate the function of therapeutic equipments

TEXT BOOK(S)

1. Vibhav Sachan, Shahid Malik, Ruchita Gautam, Parvin Kumar. (2023). Advances in AI for Biomedical Instrumentation, CRC Press, London
2. Arumugam M. (2021). Bio-Medical Instrumentation, Anuradha Agencies.

3. Geddes LA and Baker LE. 2016. Principles of Applied Bio-Medical Instrumentation, John Wiley & Sons.
4. Webster J. (2003). Medical Instrumentation, John Wiley and Sons.
5. Rajarao C and Guha SK. (1996). Principles of Medical Electronics and Bio-medical Instrumentation, Universities (India) Ltd, Orient Longman Ltd.

REFERENCE BOOK(S)

1. Raghbir Singh Khandpur. (2023). Compendium of Biomedical Instrumentation John Wiley & Sons, Ltd.
2. Fred J. Weibell, Erich A. Pfeiffer and Leslie Cromwell. (2022). Bio-Medical Instrumentation and Measurements, 2nd ed, Pearson Education.
3. Khandpur RS. Handbook of Bio-Medical instrumentation, Tata McGraw Hill Publishing Co Ltd.

E-RESOURCES

1. https://youtu.be/GkUCmb0cKwo?list=PLCZ9KmODEcu138IlVeHClJ4nskArYr1Dg

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
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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

S-Strong (3) M-Medium (2) L-Low (1)

NON MAJOR ELECTIVE (NME)
OFFERED BY THE DEPARTMENT

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(Autonomous)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2024 – 2025)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: I- NME-I: Health and Diseases

Ins. Hrs./Week: 2 **Course Credit**: 2 **Course Code**: U24NMEBC11

UNIT- I: Introduction to Health and Diseases (6 Hours)

Electrolytes and acid-base balance – Regulation of electrolyte content of body fluids-Respiratory & renal mechanism, Acidosis & alkalosis. Specimen collection and processing (blood, urine and feaces). Anti-coagulant and préservatives for blood and urine.

UNIT- II: Disorders of Carbohydrate Metabolism (6 Hours)

Diabetes mellitus, glucose and galactose tolerance tests, sugar levels in blood, renal threshold for glucose, factors influencing blood glucose level, glycogen storage diseases.

UNIT- III: Disorders of Lipids and Proteins Metabolism (6 Hours)

Plasma lipoproteins, cholesterol, triglycerides & phospholipids in health and disease, hyperlipidemia, hyperlipoproteinemia, Gauchers disease, Tay-Sachs and Niemann-Pick disease, ketone bodies. Abnormalities in Nitrogen Metabolism-Uremia, hyperuricemia.

UNIT- IV: Disorders of liver and kidney (6 Hours)

Jaundice, fatty liver, normal and abnormal functions of liver and kidney, Liver function test, Renal function test. Diagnostic Enzymes – Enzymes in health and diseases. Biochemical diagnosis of diseases by enzyme assays SGOT, SGPT.

UNIT- V: Inborn Errors of Metabolism (6 Hours)

Phenylketonuria, alkaptonuria, albinism, tyrosinosis, maple syrup urine disease, Lesch-Nyban syndrome, sickle cell anemia.

Total Lecture Hours: 30

COURSE OUTCOMES

The students are able to,

1. Understand about the importance of health
2. Discuss the evidence for the relationship between health and carbohydrate metabolism
3. Interpret the key determinants of health in the aetiology, prevention of disorders of lipids and proteins metabolism
4. Explain, at an introductory level, biological processes essential for the maintenance of health and the mechanisms underlying the cause, consequence of disorder of liver and kidney.
5. Evaluate the gaps in our knowledge of health and disorder and gain insight into the contemporary process of inborn error of metabolism

TEXT BOOK(S)

1. Seth Kwabena Amponsah, Emmanuel Kwaku Ofori, Yashwant V. Pathak. (2023). Current Trends in the Diagnosis and Management of Metabolic Disorders, 1st Edition, CRC Press, Boca Raton.
2. Maxine A. Papadakis, Stephen J. McPhee. Michael W. Rabow and Kenneth R. McQuaid. (2023). CURRENT Medical Diagnosis and Treatment , 62th Edition, McGraw Hill
3. Cart A. Burdis and Edward R. Ashwood. (2009). Text Book of clinical Biochemistry, John Wiley & Sons Inc
4. Davidson S and Passmore JR. (1996). Human Nutrition and Dietetics, 8th ed, Churchill Livingstone.
5. Garrow JS, Philip W, James T, Ralph A. (2020). Human health and Diseases, 10th ed, Churchill Livingstone.
6. Swaminathan M. (2005). Principles of Nutrition and Dietetics, Bappco.

REFERENCE BOOK(S)

1. Carl A. Burtis, Edward. Ashwood and David E. Bruns. (2021). Tietz Textbook of Clinical Chemistry and Molecular Diagnostics, 5th edition, Saunders Publishers, United States.
2. Kaplan A, Jack KE, Opheim B, Toivola B and Lyon AW. 1995. Clinical Chemistry Interpretation and techniques, 4th edition, Williams and Wilkins Publishers, United States.
3. Simon Langley-Evans. 2015. Nutrition, health and disease: A lifespan approach, 2nd edition, John Wiley & Sons Publishers, New Jersey, United States
4. Margaret Mc Williams. (2022). Food Fundamentals, 10th ed, Prentice Hall.
5. David L. Nelson, Michael M. Cox. (2015). Principles of Biochemistry, 4th edition W. H. Freeman and Company.
6. Voet D, Voet JG and Pratt CW. (2014). Principles of Biochemistry, 4th edition, John Wiley & Sons Inc.
7. Zubay GL. (1995). Principles of Biochemistry, 1st edition, Wm C. Brown Publishers.

E-RESOURCE(S)

1. https://www.slideshare.net/slideshow/unit-1-health-and-illness/249848751
2. https://www.jsscacs.edu.in/sites/default/files/Department%20Files/Disease%20associated%20with%20carbohydrate%20metabolism.pdf
3. https://www.britannica.com/science/inborn-error-of-metabolism

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
CO1	3			2		2	2	2	2	3	3	3	3	3
CO2	3	3	3	3		2	2	3	3	3	3	3	3	3
CO3	3	3	3	3		2	2	3	3	3	3	3	3	3
CO4	3	3	3	3		2	2	3	3	3	3	3	3	3
CO5	3	3	3	3		2	2	3	3	3	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 2024 – 2025)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., BIOCHEMISTRY

Semester: II- NME-II: Life Style Diseases

Ins. Hrs./Week: 2 **Course Credit**: 2 **Course Code**: U24NMEBC22

UNIT- I: Lifestyle diseases **(6 Hours)**

Definition, Factors contributing to lifestyle diseases – Physical inactivity, Poor food habits, disturbed biological clock, sleep deprivation.

UNIT- II: Top lifestyle diseases **(6 Hours)**

Obesity, Type 2 diabetes- Impact of Lifestyle diseases on family, society and economy of country.

UNIT -III: **Common diseases** **(6 Hours)**

Causes, symptoms, types, preventive measures and treatment of obesity, cardio vascular diseases, diabetes and cancer.

UNIT -IV: Women's lifestyle diseases **(6 Hours)**

Polycystic Ovarian Disease, Infertility, Breast and cervical cancer and Osteoporosis.

UNIT- V: Prevention of lifestyle diseases **(6 Hours)**

Balanced diet, sufficient intake of water, physical activity, sleep-wake cycle, stress management and meditation.

Total Lecture Hours-30

COURSE OUTCOME

The students are able to,

1. Describe Life style diseases and its contributing factors
2. Enumerate the top lifestyle diseases and its impact on life
3. Elaborate the treatment and prevention measures of common lifestyle diseases
4. Highlight the lifestyle diseases that affects the women's health
5. Illustrate the various measures for prevention of lifestyle diseases

TEXT BOOK(S)

1. Thomas A Wadden and George A Bray. (2023). Handbook of Obesity Treatment, 2nd Edition, Guilford Publications.
2. James MR. (2023). Lifestyle Medicine, 2nd Edition, CRC Press.
3. Akira Miyazaki. (2018). New Frontiers in Life style-Related Disease, Springer.

REFERENCE BOOK(S)

1. Steyn K. (1994). Lifestyle and related risk factors for chronic diseases.
2. Willett WC. (2023). Prevention of chronic disease by means of diet and lifestyle.
3. Kumar M and Kumar R. (2021). Guide to prevention of lifestyle diseases. Deep publications.

E- RESOURCES

1. https://ccrum.res.in/writereaddata/UploadFile/Lifestyle0Diseases0English0Folder_1104.pdf
2. https://www.indushealthplus.com/corporate-checkups/lifestyle-diseases-emerging-issue-in-working-women.html
3. https://youtu.be/jDdL2bMQXfE
4. https://youtu.be/7WnpSB14nDM
5. https://ebooks.inflibnet.ac.in/antp16/chapter/lifestyle-diseases-quality-of-life/

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

S-Strong (3) M-Medium (2) L-Low (1)

ALLIED BIOCHEMISTRY
OFFERED BY THE DEPARTMENT

SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

UNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2024 – 2025)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., MICROBIOLOGY

Semester: I-AC-I: General Biochemistry

Ins. Hrs./Week: **Course Credit**: **Course Code**:

UNIT-I: Carbohydrates **(14 Hours)**

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

UNIT- II: Aminoacids and Proteins **(14 Hours)**

Definition, Structure, properties and classification based on structure, 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 **(14 Hours)**

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

UNIT-IV: Nucleicacids **(14 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 **(14 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.

Total Lecture Hours- 60

COURSE OUTCOME

The students should be able to,

1. Analyze the study the chemical and biochemical properties of biomolecules
2. Evaluate the structure and functions of carbohydrate
3. Understand relationship between biological molecules and human health
4. Realize the classification, structure and importance of amino acids and proteins.
5. Illustrate the role of biochemistry and their function of vitamins.

TEXT BOOK(S)

1. Linda Kelly De Bruyne and Kathryn Pinna. (2023). Nutrition for Health and Health Care (Mind Tap Course List), 7th Edition, Cengage Learning publisher, USA.
2. Jain JL, Sunjay Jain and Nitin Jain. 2018. Fundamentals of Biochemistry. Updated edition. 2020. S.Chand Publishers, New Delhi.
3. RituSingh and Rajeev Goyal.2020. Illustrated Reviews Biochemistry (SAE). Wolterskluwer Publisher
4. Poonam Agarwal. 2020. Review of Biochemistry. 5th Edition. CBS Publishers.
5. Deb AC. 2016. Fundamentals of Biochemistry. 7th edition, NCBA Publishers,New Delhi.
6. Vasudevan DM. 2018. Biochemistry. 9th edition. Aypee Brothers Medical Publishers

REFERENCE BOOK(S)

1. Peter. J. Kennelly, Kathleen M. Botham and Victor W. Rodwell. (2023). Harper's Illustrated Biochemistry, 32nd Edition, McGraw Hill publishers, Noida.
2. David L. Nelson and Michael M. Cox. 2017. Lehninger Principles of Biochemistry. 7th edition. WH Freeman Publishers.
3. Berg, JM.TymoczkoJL and. Stryer. 2019. Biochemistry. 9th edition. WH. Freeman Publishers.
4. Anders Liljas. 2019. Textbook of Structural Biology. 2nd edition. World Scientific Publishers.
5. Satyanarayana Uand. Chakrapani. U2020. Biochemistry. 5th Updated Edition. Elsevier Publishers.
6. Lehninger AL, Nelson DL and Cox MM. 2020. Principles of Biochemistry. 8th Edition. WH Freeman Publishers.

E-RESOURCES

1. https://www.e-booksdirectory.com
2. https://libguides.ug.edu.gh/c.php
3. https://www.pdfdrive.com/biochemistry-books.html
4. https://drive.google.com/file/d/10C4EYN0Sv2LPI9ZzhoV-

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

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

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SENGAMALA THAYAAR EDUCATIONAL TRUST WOMEN'S COLLEGE

(AUTONOMOUS)

SUNDARAKKOTTAI, MANNARGUDI- 614016

(For the Candidates admitted in the academic year 2024 – 2025)

DEPARTMENT OF BIOCHEMISTRY

B.Sc., MICROBIOLOGY

Semester: I & II-AP-I: General Biochemistry Practical

Ins. Hrs./Week: **Course Credit**: **Course Code**:

PRACTICAL

1. Qualitative analysis of Carbohydrates –Glucose, Fructose, Galactose, Maltose, Lactose, Sucrose.
2. Qualitative analysis of Aminoacids-Tyrosine, Tryptophan, Histidine, Arginine, Proline and Phenyl Alanine, Methionine, Cystine
3. Qualitative analysis of Proteins- Egg Albumin, Gelatin, Caesin.
4. Qualitative analysis of Lipids- Gingelly oil, Coconut oil
5. Qualitative analysis of Nucleicacids- DNA and RNA
6. Quantitative estimation of glucose by Benedict's method
7. Quantitative estimation of Ascorbic acid-2,6-Dichlorophenol Indophenol dye method (from biological sample)
8. Quantitative estimation of Amino acid by formal titration

COURSE OUTCOME

The students should be able to,

1. Exposed to importance of biological macromolecules
2. Acquire knowledge in the qualitative analysis of biomolecules
3. Describe reducing sugars and predict results of tests for reducing sugars.
4. Analyze the influence and role of structure in reactivity of biomolecules
5. Acquire practical training for quantitative analysis of biological molecules such as glucose, ascorbic acid, amino acids, nucleic acid and their estimation using standard methods

TEXT BOOK(S)

1. Geetha Damodaran K. (2023). Practical Biochemistry, 2nd Edition, Jaypee Brothers Medical Publishers (P) Ltd, Newdelhi.
2. Anil Kumar, Sarika Garg and Neha Garg. 2012. Biochemical Tests – Principles and Protocols. 1st Edition. Vinod Vasishtha Viva Publishers.
3. Jayaraman J. 2011. Manuals in Biochemistry. 1st Edition. New Age International Publishers.
4. Sadasivam S and Manickam VA. 2006. Biochemical methods. 3rd Edition. New Age international Publishers.

REFERENCE BOOK(S)

1. Homie DJ. and Peck H. 2003. Analytical Biochemistry. 1st edition, Longman group – Rastogic CBS Publishers.
2. Keith Wilson and John Walker. 2015. Principles and Techniques of Practical Biochemistry. 6th Edition, Cambridge University press Publishers.
3. Sergio Caroli and Zyula. 2017. Analytical Techniques for Clinical Chemistry, 1 st edition, John Wiley & Sons Inc Publishers.

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

MAPPING WITH PROGRAMME OUTCOMES AND PROGRAMME SPECIFIC OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
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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

S-Strong (3) M-Medium (2) L-Low (1)