

# **CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)**

**Nationally Accredited with 'A' Grade by NAAC**

**ISO 9001:2015 Certified**

**TIRUCHIRAPPALLI**

## **PG AND RESEARCH DEPARTMENT OF MICROBIOLOGY**



**B.Sc., MICROBIOLOGY**

**SYLLABUS**

**2022 -2023 and Onwards**

## **CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS)**

### **PG AND RESEARCH DEPARTMENT OF MICROBIOLOGY**

#### **VISION**

Our vision is to encourage eminent research work through the conception of an attractive and vibrant environment to achieve goals of our department.

#### **MISSION**

- To impart relevant, ultimate, principle-oriented education and practical expertise in the field of Microbiology.
- To strive to provide quality education conjugated with innovative technology so as to be able to gain technical and educational expertise locally, nationally, internationally.
- Our prime focus is to enrich the ambitions of our students, staff and steer with constructive collaboration towards excellence.

## PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEOs	Statements
<b>PEO1</b>	<b>LEARNING ENVIRONMENT</b>  To facilitate value-based holistic and comprehensive learning by integrating innovative learning practices to match the highest quality standards and train the students to be effective leaders in their chosen fields.
<b>PEO2</b>	<b>ACADEMIC EXCELLENCE</b>  To provide a conducive environment to unleash their hidden talents and to nurture the spirit of critical thinking and encourage them to achieve their goal.
<b>PEO3</b>	<b>EMPLOYABILITY</b>  To equip students with the required skills in order to adapt to the changing global scenario and gain access to versatile career opportunities in multidisciplinary domains.
<b>PEO4</b>	<b>PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY</b>  To develop a sense of social responsibility by formulating ethics and equity to transform students into committed professionals with a strong attitude towards the development of the nation.
<b>PEO5</b>	<b>GREEN SUSTAINABILITY</b>  To understand the impact of professional solutions in societal and environmental contexts and demonstrate the knowledge for an overall sustainable development.

**PROGRAMME OUTCOMES FOR B.Sc., MICROBIOLOGY PROGRAMME**

<b>PO NO.</b>	<b>On completion of B.Sc., Microbiology, the students will be able to</b>
<b>PO1</b>	<b>Academic Excellence and Competence:</b> Elicit firm fundamental knowledge in theory as well as practical for coherent understanding of academic field to pursue multi and interdisciplinary science careers in future.
<b>PO2</b>	<b>Holistic and Social approach:</b> Create novel ideas related to the scientific research concepts through advanced technology and sensitivity towards sustainable environmental practices as well as social issues.
<b>PO3</b>	<b>Professional ethics and Team Work:</b> Explore professional responsibility through projects, internships, field trip/industrial visits and mentorship programmes to transmit communication skills.
<b>PO4</b>	<b>Critical and Scientific thinking:</b> Equip training skills in Internships, Research Projects to do higher studies in multidisciplinary path with higher level of specialization to become professionals of high quality standards.
<b>PO5</b>	<b>Social Responsibility with ethical values:</b> Ensure ethical, social and holistic values in the minds of learners and attain gender parity for building a healthy nation.

**PROGRAMME SPECIFIC OUTCOMES FOR B.Sc., MICROBIOLOGY**

<b>PSO NO.</b>	<b>Students of B.Sc., Microbiology will be able to</b>	<b>POs Addressed</b>
<b>PSO 1</b>	Improve their knowledge on the basic concepts for retaining competence and confidence which enables them to develop interest in the new arena of Microbiology	<b>PO1, PO5</b>
<b>PSO 2</b>	Acquire expertise in practical work with independent equipment handling skill along with collection and interpretation of scientific data	<b>PO2, PO3</b>
<b>PSO 3</b>	Legitimize knowledge by emerging multiple aspects of current research.	<b>PO3, PO5</b>
<b>PSO 4</b>	Pursue the importance of substantial original Research to meet the current and future expectation.	<b>PO4, PO1</b>
<b>PSO 5</b>	Be aware of the ethical issues for the benefit of the society by adding skilled scientific work force across the country	<b>PO5, PO2</b>

**CAUVERY COLLEGE FOR WOMEN (AUTONOMOUS), TRICHY-18**

**B.Sc., Microbiology Programme Structure under CBCS**

(For the Candidates admitted from the Academic year 2022-2023 onwards)

Semester	Part	Course	Title	Course Code	Inst. Hrs. / week	Credits	Exam			Total
							Hrs.	Marks		
								Int .	Ext .	
I	I	Language Course I (LC) Tamil*/Other Languages*	இக்கால இலக்கியம்	22ULT1	6	3	3	25	75	100
			Hindi Literature & Grammar-I	22ULH1						
			Communication in French-I	22ULF1						
			History of Popular Tales Literature and Sanskrit Story	22ULS1						
	II	English Language Course- I(ELC)	Functional English for Effective Communication-I	22UE1	6	3	3	25	75	100
	III	Core Course – I(CC)	General Microbiology	22UMB1CC1	5	5	3	25	75	100
		Core Practical - I (CP)	General Microbiology Practical	22UMB1CC1P	3	3	3	40	60	100
		First Allied I	Fundamentals of Biochemistry	22UMB1AC1	4	3	3	25	75	100
		First Allied II	Fundamentals of Biochemistry Practical	22UMB1AC1P	4	3	3	40	60	100
	IV	UGC Jeevan Kaushal	Universal Human Values	22UGVE	2	2	3	25	75	100
	TOTAL				30	22				700
II	I	Language Course- II(LC) Tamil*/Other Languages*	இடைக்கால இலக்கியமும் புதினமும்	22ULT2	5	3	3	25	75	100
			Hindi Literature & Grammar- II	22ULH2						
			Communication in French-II	22ULF2						
			Poetry Textual Grammar and Alakara	22ULS2						
	II	English Language Course- II(ELC)	Functional English for Effective Communication-II	22UE2	6	3	3	25	75	100
	III	Core Course – II (CC)	Microbial Physiology		5	5	3	25	75	100
		Core Practical - II (CP)	Microbial physiology Practical		3	3	3	40	60	100
		First Allied III	Animal and Plant Biochemistry		4	3	3	25	75	100
		Core Practical – III (CP)	Biomolecules Practical		3	3	3	40	60	100
	IV	Ability Enhancement Compulsory Course (AECC)-I	Environmental Studies		2	2	3	25	75	100
Ability Enhancement Compulsory Course (AECC)-II		Innovation and Entrepreneurship		2	1	3	25	75	100	

Extra Credit Course	SWAYAM	SWAYAM	As per UGC Recommendation				
<b>TOTAL</b>			<b>30</b>	<b>23</b>			<b>800</b>

III	I	Language Course-III (LC) Tamil*/Other Languages*	காப்பியமும் நாடகமும்	22ULT3	5	3	3	25	75	100
			Hindi Literature & Grammar-III	22ULH3						
			Communication in French-III	22ULF3						
			Prose,Textual Grammar and Vakyarachana	22ULS3						
	II	English Language Course-II(ELC)	Learning Grammar Through Literature-I	22UE3	6	3	3	25	75	100
	III	Core Course– III(CC)	Virology		6	5	3	25	75	100
		Core Practical – IV (CP)	Virology Practical		3	3	3	40	60	100
		Second Allied I	Biostatistics		4	3	3	25	75	100
		Second Allied II	Biostatistics Practical		4	3	3	40	60	100
	IV	Generic Elective(GE) I	Mushroom Technology		2	2	3	25	75	100
			Basic Tamil							
			Special Tamil							
	Extra Credit Course	SWAYAM		As per UGC Recommendation						
	TOTAL				30	22				700

### 15 Days INTERNSHIP during Semester Holidays

IV	I	Language Course - IV (LC) Tamil*/Other Languages*	பண்டைய இலக்கியம்	22ULT4	6	3	3	25	75	100
			Hindi Literature & Functional Hindi	22ULH4						
			Communication in French-IV	22ULF4						
			Drama, History of Drama Literature	22ULS4						
	II	English Language Course - IV(ELC)	Learning Grammar Through Literature-II	22UE4	6	3	3	25	75	100
	III	Core Course – IV(CC)	Immunology and Immunotechnology		6	5	3	25	75	100
		Core Practical - V(CP)	Immunology and Immunotechnology practical		4	3	3	40	60	100
		Second Allied III	Bioinformatics		4	3	3	25	75	100
		Internship				2	-	-	-	100
	IV	Generic Elective(GE) II	Biofertilizer Technology		2	2	3	25	75	100
			Basic Tamil							
			Special Tamil							
		Skill Enhancement Course(SEC) – I	Herbal Medicine		2	2	3	25	75	100
		Extra Credit Course	SWAYAM	SWAYAM	As per UGC Recommendation					
<b>TOTAL</b>					<b>30</b>	<b>23</b>				<b>800</b>

V	III	Core Course – V(CC)	Clinical Microbiology		5	4	3	2 5	75	100	
		Core Practical – VI (CP)	Clinical Microbiology, Agricultural Microbiology and Molecular Biology practical		3	3	3	4 0	60	100	
		Core Course - VI(CC)	Agricultural Microbiology		5	4	3	2 5	75	100	
		Core Course – VII(CC)	Molecular Biology		6	5	3	2 5	75	100	
		Discipline Specific Elective(DSE) – I	Organic Farming		5	4	3	25	75	100	
	Clinical Parasitology										
	Fundamentals of Botany and Zoology										
	IV	UGC Jeevan Kaushal	Professional Skills		2	1	3	25	75	100	
		Skill Enhancement Course(SEC) – II	Biofertilizer Technology Practical		2	2	3	40	60	100	
			Solid Waste Management Practical								
		Skill Enhancement Course(SEC) – III	Medical Laboratory Technology Practical		2	2	3	40	60	100	
			Vermitechnology Practical								
	Extra Credit Course		SWAYAM	SWAYAM	As per UGC Recommendation						
	TOTAL					30	25				800

VI	III	Core Course – VIII(CC)	Fermentation Technology		6	5	3	25	75	100
		Core Course – IX(CC)	Food Processing Technology		5	4	3	25	75	100
		Core Practical – VII (CP)	Fermentation technology and Food processing technology practical		3	3	3	40	60	100
		Discipline Specific Elective(DSE) – II	Microbial Genetics		5	4	3	25	75	100
			Food Adulteration							
			Biological Techniques							
		Discipline Specific Elective (DSE)– III	Microbial Biotechnology		5	4	3	25	75	100
			Intellectual Property rights							
			Microbial Nanotechnology							
	Project Work			5	3	-	-	-	100	
	V	Gender Studies	Gender Studies		1	1	3	25	75	100
		Extension activity				1		-	-	-
	TOTAL				30	25				700
GRAND TOTAL				180	140				4500	

### Programme Structure for Science Departments

1	Course	No of Courses	Credits	Total Credits
I	Tamil/ Other Language	4	12	12
II	English	4	12	12
III	Core (Theory& Practical)	16		98
	Project Work	1		
	Internship	1	2	
	First Allied	3	9	
	Second Allied	3	9	
	Discipline Specific Elective	3		
IV	Generic Elective	2	4	16
	Skill Enhancement Course	3	6	
	Universal Human Values	1	2	
	AECC-I-Environmental Studies	1	2	
	Professional Skills	1	1	
	AECC-II-Entrepreneurial Development	1	1	
V	Gender Studies	1	1	02
	Extension Activities	-	1	
		<b>4500</b>		<b>140</b>

The

Internal and external marks for theory and practical papers are as follows:

Subject	Internal Marks	External Marks
Theory	25	75
Practical	40	60

#### For Theory:

- The passing minimum for CIA shall be 40% out of 25 marks (i.e. 10 marks)
- The passing minimum for End Semester Examinations shall be 40% out of 75 marks (i.e. 30 marks)

#### For Practical:

- The passing minimum for CIA shall be 40% out of 40 marks (i.e. 16 marks)
- The passing minimum for End Semester Examinations shall be 40% out of 60 marks (i.e., 24 marks)

#### Internal Component (Theory)

Component	Marks
Quiz	05
Assignment & Seminar	10
CIA -I	05
Total	25

#### Internal Component (Practical)

Component	Marks
Record Note	05
Continuous Performance in Practical (Attendance and Observation)	15
CIA	15
	40





## Cauvery College for Women (Autonomous), Trichy

### B.Sc., Microbiology

(For the candidates admitted from the Academic year 2022-2023 and onwards)

Semester	Part	Course	Title	Course Code	Inst. Hrs. / week	Credits	Exam			Total
							Hrs.	Marks		
								Int .	Ext .	
I	I	Language Course I (LC) Tamil*/Other Languages*	இக்கால இலக்கியம்	22ULT1	6	3	3	25	75	100
			Hindi Literature & Grammar-I	22ULH1						
			History of popular tales, Literature and Sanskrit story	22ULS1						
			Basic French – I	22ULF1						
	II	English Language Course- I(ELC)	Functional English for Effective Communication-I	22UE1	6	3	3	25	75	100
	III	Core Course – I(CC)	General Microbiology	22UMB1CC1	5	5	3	25	75	100
		Core Practical - I (CP)	General Microbiology Practical	22UMB1CC1P	3	3	3	40	60	100
		First Allied I	Fundamentals of Biochemistry	22UMB1AC1	4	3	3	25	75	100
		First Allied II	Fundamentals of Biochemistry Practical	22UMB1AC1P	4	3	3	40	60	100
	IV	Ability Enhancement Compulsory Course-I (AECC)	UGC Jeevan Kaushal- Universal Human Values	22UGVE	2	2	-	100		100
Total					30	22				700

<b>Semester I</b>	<b>Internal Marks : 25</b>		<b>External Marks : 75</b>	
<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATEGORY</b>	<b>Hrs./Week</b>	<b>CREDITS</b>
<b>22UMB1CC1</b>	<b>GENERAL MICROBIOLOGY</b>	<b>CORE</b>	<b>5</b>	<b>5</b>

### Course Objective

- This subject aims to introduce the history and development of Microbiology. The contents of this course will help students understand history, biology of microorganisms, growth and control of microbes.
- Thus the beginners are rightly exposed to foundation of Microbiology which would lead them towards progressive advancement of the subject.

### Course Outcome and Cognitive level Mapping

On the successful completion of the course, students will be able to

<b>CO Number</b>	<b>CO Statement</b>	<b>Cognitive level</b>
CO 1	Recite the Development of Microbiology	K1
CO 2	Explain the Size and Shape of Microorganisms using Microscope	K2
CO 3	Illustrate the knowledge about Bacteria and Viruses	K2
CO 4	Revise the systematic classification of bacteria	K3
CO 5	Apply various technology for microbial cultivation	K3

### Mapping of CO with PO and PSO

COs	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	2	3	3	3	3	2	3
CO2	3	2	3	3	2	2	3	2	3	3
CO3	3	2	2	3	3	3	2	3	3	2
CO4	2	3	3	2	3	3	3	2	3	2
CO5	3	3	2	3	2	3	3	3	2	2

“1” – Slight (Low) Correlation

“2” – Moderate (Medium) Correlation

“3” – Substantial ( High) Correlation

“-“ indicates there is no correlation

### Syllabus

#### UNIT I

**(15 Hours)**

**History and Scope of Microbiology:** Introduction- Definition, scope and Spontaneous generation vs. biogenesis. History of Microbiology- Domain and kingdom concepts, Contributions of Anton von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Flemming Role of microorganisms in fermentation, Germ theory of disease, Development of various microbiological techniques and golden era of microbiology. Microscopy: Principles and applications of bright field, dark field, phase contrast, fluorescent SEM and TEM.

#### UNIT II

**(15 Hours)**

**Structure of Bacteria :** Difference between prokaryotic and eukaryotic microorganisms. Brief outline of Bergey’s manual of systemic bacteriology. Structural organization of bacteria – Size, shape and arrangement of bacterial cells - Ultrastructure of a bacterial cell - cell wall, cell membrane, ribosomes, nucleoid, slime, capsule, flagella, fimbriae, spores, cysts, plasmid, mesosomes and cytoplasmic inclusions.

#### UNIT III

**(15 Hours)**

**Cellular and Acellular organisms :**General characteristics and nature of Cellular and

Acellular organisms-Archaeobacteria, Mycoplasma, Rickettsiae, Chlamydia, Spirochaetes, Actinobacteria, Protozoa, Algae, Fungi, lichens, Viruses, viroids and prions.

#### UNIT IV

(15 Hours)

**Pure culture techniques** :Sterilization: Principles and methods – physical methods- moist heat, dry heat, filtration and media preparation. Cultivation of microbes- Types of culture media- Stab, slant, broth, semisolid, solid media. Aerobic and Anaerobic culture techniques- Pure culture techniques – Maintenance and preservation of microbes. Principles and types of staining– Simple, differential, Capsule staining.

#### UNIT V

(15 Hours)

**Extremophiles**: Introduction to Extremophiles – Thermophiles, Psychrophiles, barophiles, Halophiles, Alkanophiles, Acidophiles, Methanogenesis and their applications.

#### UNIT VI – Self Study for Enrichment (Not to be included for External Examination)

Microscopic operations, Criteria for Classification of Microorganisms, cellular organizations, Isolation and identification of Microorganisms, Cultivation methods for Extremophiles.

#### Text Books

1. Dubey RC and Maheswari DK. (2015). *A Text Book of Microbiology*. 5th Edition. S Chand, New Delhi.
2. Ananthanarayan Paniker (2020). *A Text book of Microbiology*. 11th Edition. University Press. Singapore.
3. Madigan MT, Martinko JM, and Parker J.(2019). *Biology of Microorganisms*. 12th Edition, MacMillan Press.England.
4. Pelczar MJ, Chan ECS and Kreig NR. (2015). *Microbiology*, 5th edition. McGraw-Hill.Book Co. Singapore.
5. Atlas RA and Bartha R.(2019). *Microbial Ecology. Fundamentals and Application*. 4th edition Benjamin Cummings, New York.

#### Reference Books

1. Prescott L.M, Harley,J.P. and Helin, D.A. (2017). *Microbiology*, 5th Edition. McGraw Hill.
2. Tortora GJ, Funke BR and Case CL.(2020). *Microbiology: An Introduction*. 9th Edition, Pearson Education, Singapore.
3. Black JG. (2018). *Microbiology-principles and explorations*, 6th edition. John Wiley and Sons, Inc. New York.
4. Moselio Schaechter and Joshua Leaderberg (2019). *The Desk encyclopedia of Microbiology*. 2nd edition. Elsevier Academic press, California.
5. Madigan MT, Martinko JM, and Parker J.(2019). *Biology of Microorganisms*, 12th Edition. MacMillan Press, England.

#### Web Reference

- 1.<https://microbenotes.com/history-of-microbiology/>
- 2.<https://byjus.com/biology/prokaryotic-and-eukaryotic-cells/>
- 3.<https://byjus.com/biology/archaeobacteria/>
- 4.<https://thebiologynotes.com/sterilization-physical-and-chemical-methods/>
- 5.<https://microbenotes.com/microbiology-of-extreme-environments/>

#### Pedagogy

Chalk and talk, PPT, Discussion, Assignment, Demo, Quiz, Seminar.

#### Course Designer

Dr.V.Aruna

Semester I	Internal Marks : 40		External Marks : 60	
COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
22UMB1CC1P	GENERAL MICROBIOLOGY PRACTICAL	CORE PRACTICAL	3	3

### Course Objective

- To enable the students to understand the basic knowledge of aseptic techniques, preparation and sterilization of media, pure culture techniques
- To acquire adequate skill to handle microscope to visualize microbes.

### Course Outcomes and Cognitive Level Mapping

On the successful completion of the course, students will be able to

CO Number	CO Statement	Cognitive level
CO 1	Recall the safety practice in microbiological laboratory	K1
CO 2	Explain the accuracy of sterilization	K2
CO 3	Develop skills to observe microbes using microscopes	K2
CO 4	Competently prepare and cultivate bacteria, fungi and cyanobacteria using media	K3
CO 5	Compute various pure culture techniques	K3

### Mapping of CO with PO and PSO

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	3	3	3	2	2	2	3
CO2	3	2	3	3	2	3	2	2	3	3
CO3	3	3	3	2	2	3	2	3	3	2
CO4	3	3	2	3	2	3	2	2	3	2
CO5	3	3	3	2	2	3	3	3	3	2

“1” – Slight (Low) Correlation

“3” – Substantial (High) Correlation

“2” – Moderate (Medium) Correlation

“-“ indicates there is no correlation

### Syllabus

#### General Microbiology: 45 Hours

- Safety & Good laboratory practices
- Basic concepts of Microscope and its operation
- Principles and operations – Autoclave, Hot Air Oven, Incubators, Laminar Air Flow chamber, Filtration, colony counter, Centrifuge, pH meter, Colorimeter and Spectrophotometer
- Cleaning and sterilization of glassware.
- Preparation of culture media – solid, semi-solid and liquid.
- Isolation of bacteria, fungi and cyanobacteria from soil and water
- Enumeration of bacterial numbers by viable count (Plate count)
- Pure culture techniques - Streak plate, Pour plate and Spread plate.
- Test for motility of bacteria – Hanging drop method
- Staining techniques – Simple staining, Gram's staining, Spore-staining, Capsular staining, LCB mount and Saline mount

- Observation of permanent slides to study the structural characteristics of algae (*Anabaena*, *Nostoc*,

*Spirulina, Oscillatoria*), fungi (*Pythium, Rhizopus, Saccharomyces, Penicillium, Aspergillus, Agaricus*) and protozoa (*Entamoeba histolytica* and *Plasmodium spp.*).

### Reference Books

1. Bharti Arora, D.R. Arora (2020), *Practical Microbiology*, CBS Publishers & Distributors
2. Mudili J (2020), *Introductory Practical Microbiology*, Narosa Das S (2020), *Microbiology Practical Manual*, CBS Publishers
3. Saravanan R , D. Dhachinamoorthi , CH. MM. Prasada Rao , (2019), *A Handbook of Practical Microbiology*, LAP LAMBERT Academic Publishing.
4. Shukla Das and Rumpa Saha (2019). *Microbiology Practical Manual*, 1st Edition CBS Publishers and Distributors.
5. Amita Jain , Jyotsna Agarwal , Vimala Venkatesh (2018), *Microbiology Practical Manual*, 1<sup>st</sup> Edition, Elsevier India.
6. Cappuccino and Sherman (2016), *Microbiology – A Laboratory Manual*, 11th Edition, Dorling Kindersley (India) Pvt. Ltd., New Delhi.
7. R.C.Dubey, Dr.D.K. Maheswari (2010), *Practical Microbiology*, Kindle Edition

### Web References

1. <https://unitedvrg.com/2019/03/28/microbiology-a-laboratory-manual-11th-edition-2016-pdf/>
2. <https://www.youtube.com/watch?v=hxausVA8a3E>
3. <https://www.youtube.com/watch?v=sxa46xKfIOY>
4. <https://www.youtube.com/watch?v=lu9CvIF20pc>
5. <https://study.com/learn/lesson/simple-differential-staining-techniques.html>
6. <https://www.youtube.com/watch?v=xjYdOcT6s1Y>
7. <https://bitesizebio.com/853/5-laboratory-sterilisation-methods/>
8. <https://www.youtube.com/watch?v=QqWcUzpZgw>

### Pedagogy

Power point presentations, Group Discussion, Quiz, Brain Storming Activity.

### Course Designer

Dr.P.Bhuvaneswari

<b>Semester I</b>	<b>Internal Marks : 40</b>		<b>External Marks : 60</b>	
<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATEGORY</b>	<b>HRS/WEEK</b>	<b>CREDITS</b>
<b>22UMB1AC1</b>	<b>FUNDAMENTALS OF BIOCHEMISTRY</b>	<b>ALLIED</b>	<b>4</b>	<b>3</b>

### Course Objective

- To understand the structure, functions of various biomolecules and consequences of deviation from normal

### Course Outcome and Cognitive Level Mapping

On the successful completion of the course, students will be able to

<b>CO Number</b>	<b>CO Statement</b>	<b>Cognitive level</b>
CO 1	Recite the views of carbohydrates and their classification	K1
CO 2	Explain the structure of protein	K2
CO 3	Illustrate an idea about structure and function of nucleic acids	K2
CO 4	Relate the structure and properties of lipids	K3
CO 5	Compile view of vitamins and their deficiency diseases	K5

### Mapping of CO with PO and PSO

<b>Cos</b>	<b>PSO1</b>	<b>PSO2</b>	<b>PSO3</b>	<b>PSO4</b>	<b>PSO5</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>
<b>CO1</b>	2	2	3	3	3	2	2	3	2	3
<b>CO2</b>	3	3	1	3	3	2	2	3	3	3
<b>CO3</b>	2	3	3	2	3	3	3	1	3	3
<b>CO4</b>	2	3	3	3	1	3	2	3	3	3
<b>CO5</b>	3	3	2	3	3	3	3	2	3	3

“1” – Slight (Low) Correlation

“2” – Moderate (Medium) Correlation

“3” – Substantial (High) Correlation

“-“ indicates there is no correlation

### Syllabus

#### UNIT I

(12 Hours)

**Carbohydrates:** Introduction – concepts of macromolecules - Carbohydrate– Definition, sources, classification-monosaccharide, disaccharide and polysaccharide, biological significance, digestion and absorption of carbohydrates

#### UNIT II

(12 Hours) **Proteins:**

Definition, sources, classification and structure of proteins - structural and non- structural proteins, Amino acids–structure- classification - essential and nonessential, protein and non-protein amino acids. Biological Significance of Proteins.

#### UNIT III

(12 Hours)

**Lipids:** Definition, basic ideas about the biochemical functions of lipids. Classification of lipids with examples, classification of fatty acids, List of Essential and non-essential fatty acids. Compound lipids: Structure and

functions of phospholipids and glycolipids.

#### UNIT IV

(12 Hours)

**Nucleic acids:** Definition, structure – Nucleoside, Nucleotides, forms and functions of DNA. Types, structure and functions of RNA. Difference between DNA & RNA (mRNA, tRNA, rRNA).

#### UNIT V

(12 Hours)

**Vitamins:** Definition, sources, deficiency disorders and functions of Fat soluble vitamins (A, D, E and K) and Water soluble vitamins (B complex and C).

#### UNIT VI – Self Study for Enrichment (Not to be included for External Examination)

Diabetes mellitus – Blood Plasma protein – Lipoprotein – Phosphodiester bond – structure of vitamins.

#### Text Books

1. Ambika Shanmugam (2016). *Fundamentals of Biochemistry for Medical students*. 8<sup>th</sup> Edition, Wolters Kluwer (India) Pvt Ltd.
2. Rafi MD, (2014) *Textbook of Biochemistry for medical students*, 2nd edition, Universities Press, (India) Pvt. Ltd, Hyderabad, India.
3. Charlotte W Pratt and Sathyanarayana U and Chakrapani U (2013) *Biochemistry*, 4th edition, Elsevier publishers.
4. Deb AC (2011). *Fundamentals of Biochemistry*, 10th edition, New Central Book Agency (p) ltd, London
5. Rajagopal G (2010). *Concise textbook of biochemistry*, 2nd edition, Ahuja Publishing House.

#### Reference Books

1. Lubert Stryer; Jeremy Berg; John Tymoczko; Gregory Gatto (2019). *Biochemistry*, 9<sup>th</sup> Edition. Mac millon Publication.
2. Denise R Ferrier, (2013) *Biochemistry*, 6th edition, LWW publishers.
3. Reginald H Garrett and Charles M Grisham (2012). *Biochemistry*, 5th edition. Brooks Cole publishers.
4. Albert L Lehninger, David L Nelson and Michael M Cox, (2010). *Lehninger Principles of Biochemistry*, 2nd edition, Wiley publisher

#### Web References

1. <https://www.slideshare.net/namarta28/monosaccharides>
2. <https://www.tuscany-diet.net/proteins/classification/#:~:text=egg%20yolk%20phosvitin.>
3. <http://www.Protein%20classification%20based%20on%20shape,two%20classes%3A%20fibrous%20and%20globular.>
4. <https://byjus.com/biology/lipids/#:~:text=There%20are%20two%20major%20types,than%20alcohol%20and%20fatty%20acids.>
5. <https://www.thoughtco.com/dna-versus-rna-608191>

#### Pedagogy

Chalk and talk, PPT, Discussion, Assignment, Quiz, Seminar

#### Course Designer

Dr. B. Thamilmaraiselvi

Semester I	Internal Marks : 40		External Marks : 60	
COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
22UMB1AC1P	FUNDAMENTALS OF BIOCHEMISTRY PRACTICAL	ALLIED PRACTICAL	4	3

### Course Objective

- This course enables the students to explore the basic biochemistry practical skills.

### Course Outcome and Cognitive Level Mapping

On the successful completion of the course, students will be able to

CO Number	CO Statement	Cognitive level
CO 1	Identify the carbohydrates, amino acids, proteins present in the given sample	K1
CO 2	Interpret the amount of glucose present in the given sample by Anthrone method.	K2
CO3	Calculate the amount of amino acid present in the given sample by Ninhydrin method	K2
CO4	Analyse the amount of cholesterol present in the given sample by Zak's method	K4
CO5	Evaluate the amount of DNA present in the given sample by Diphenylamine (DPA) method	K3

### Mapping of CO with PO and PSO

Cos	PSO1	PSO2	PSO3	PSO4	PSO5	PO1	PO2	PO3	PO4	PO5
CO1	3	3	3	3	3	3	3	3	3	3
CO2	3	3	3	3	2	1	3	3	3	3
CO3	3	3	1	3	3	3	2	2	2	3
CO4	3	3	2	3	3	3	3	1	3	2
CO5	3	3	3	2	2	3	3	2	2	3

“1” – Slight (Low) Correlation

“2” – Moderate (Medium) Correlation

“3” – Substantial (High) Correlation

“-“ indicates there is no correlation

### Syllabus

#### Fundamentals of Biochemistry Practical

(60 Hours)

- Qualitative analysis of carbohydrates, amino acids and proteins.
- Quantitative estimation of Glucose by Anthrone Method
- Quantitative estimation of Amino acids by Ninhydrin Method
- Quantitative estimation of Protein by Lowry's Method
- Quantitative estimation of Cholesterol by Jacks Method
- Quantitative estimation of DNA by Diphenylamine (DPA) Method

### Reference Books

- Vasudevan and Sabir Kumar Doss (2022). *Practical Text book of Biochemistry for Medical students*



2. Damodaran Geetha K.(2016), *Practical Biochemistry*, JB brother medical publisher.
3. Ranjna Chawla.(2014). *Practical clinical Biochemistry*, JB brother medical publisher.
4. Manipal manual of clinical Biochemistry.2013, JB brother medical publisher.
5. Shawn O' Farrell and Ryan T Ranallo (2000). *Experiments in Biochemistry: A Hands on Approach-A manual for the undergraduate laboratory*, Thomson Learning, Inc., Australia.

### **Web References**

1. <https://www.youtube.com/watch?v=wmhmAESv72E>
2. <https://www.youtube.com/watch?v=VzYDk4t97Ok>
3. <https://www.youtube.com/watch?v=JdXbTWfOc18>
4. [https://www.youtube.com/watch?v=2LiA\\_yNMIVs](https://www.youtube.com/watch?v=2LiA_yNMIVs)

### **Pedagogy**

Chalk and talk, PPT, Discussion, Assignment, Quiz, Seminar

### **Course Designer**

Dr. B. Thamilmaraiselvi