## **CAUVERYCOLLEGE FOR WOMEN(AUTONOMOUS)**

Nationally Accredited with 'A+' Grade by NAAC

## TIRUCHIRAPPALLI

## PG AND RESEARCH DEPARTMENT OF MICROBIOLOGY



# B.Sc., MICROBIOLOGY SYLLABUS 2025 -2026 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  |
|------|---|
| PEO1 | <b>LEARNING ENVIRONMENT</b><br>To facilitate value-based holistic and comprehensive learning by integrating<br>innovative learning practices to match the highest quality standards and train<br>the students to be effective leaders in their chosen fields. |
| PEO2 | ACADEMIC EXCELLENCE<br>To provide a conducive environment to unleash their hidden talents and to<br>nurture the spirit of critical thinking and encourage them to achieve their<br>goal.  |
| PEO3 | <b>EMPLOYABILITY</b><br>To equip students with the required skills in order to adapt to the changing<br>global scenario and gain access to versatile career opportunities in<br>multidisciplinary domains.  |
| PEO4 | <b>PROFESSIONAL ETHICS AND SOCIAL RESPONSIBILITY</b><br>To develop a sense of social responsibility by formulating ethics and equity<br>to transform students into committed professionals with a strong attitude<br>towards the development of the nation.   |
| PEO5 | <b>GREEN SUSTAINABILITY</b><br>To understand the impact of professional solutions in societal and<br>environmental contexts and demonstrate the knowledge for an overall<br>sustainable development.  |

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

| PONO. | On completion of B.Sc., Microbiology, the students will be able to                       |
|-------|--|
| PO1   | Academic Excellence and Competence: Elicit firm fundamental knowledge in                 |
| 101   | theory as well as practical for coherent understanding of academic field to pursue multi |
|       | and inter disciplinary science careers in future.  |
| PO2   | Holistic and Social approach: Create novel ideas related to the scientific research      |
|       | concepts through advanced technology and sensitivity towards sustainable                 |
|       | Environmental practices as well as social issues.  |
| PO3   | Professional ethics and Team Work: Explore professional responsibility                   |
| 105   | through projects, internships, field trip/industrial visit and mentorship                |
|       | Programmes to transmit communication skills.   |
| PO4   | Critical and Scientific thinking: Equip training skills in Internships, Research         |
| 104   | Projects to do higher studies in multidisciplinary path with higher level of             |
|       | specialization to become professionals of high-quality standards.                        |
| PO5   | Social Responsibility with ethical values: Ensure ethical, social and holistic           |
| 105   | values in the minds of learners and attain ender parity for building a healthy           |
|       | nation.  |

#### PSO Students of B.Sc., Microbiology will be able to Pos NO. Addressed Improve their knowledge on the basic concepts for retaining **PSO1** competence and confidence which enables them to develop interest **PO1, PO5** in the new arena of Microbiology Acquire expertise in practical work within dependent equipment Handling skill along with collection and interpretation of scientific PSO2 **PO2, PO3** data Legitimize knowledge by emerging multiple aspects of current research. PSO3 **PO3**, **PO5** Pursue the importance of substantial original Research to meet the current and future expectation. **PSO4 PO4, PO1** Beware of the ethical issues for the benefit of the society by adding skilled scientific work for across the country. PSO5 **PO5, PO2**

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



### Cauvery College for Women (Autonomous) PG & Research Department of Microbiology B.Sc., Microbiology Learning Outcome Based Curriculum Framework (CBCS-LOCF) (For the Candidates admitted from the Academic year 2025-2026 and onwards)

| er   | er              |   | Course Code   |                                      |               |      | Exam |       |     |      |
|------|-----------------|---|---|--------------------------------------|---------------|------|------|-------|-----|------|
| lest | art             | Course  | Title   |                                      |               | lits |      | Marks | 5   | Ξ    |
| Sem  | Ρ               | course  | The   |                                      | Inst.<br>Hrs. | Cred | Hrs. | Int   | Ext | Tota |
| Ι    | Ι               | Language<br>Course-I (LC)<br>Tamil / other<br>languages | தமிழ் இலக்கிய வரலாறு<br>– I<br>Poetry, Grammar and<br>History of Sanskrit<br>Literature<br>Hindi Ka Samanya Gyan<br>aur Nibandh<br>Foundation Course:<br>PaperI- French-I | 25ULT1<br>23ULS1<br>23ULH1<br>23ULF1 | 6             | 3    | 3    | 25    | 75  | 100  |
|      | II              | English Language<br>Course- I(ELC)                      | General English -I  | 23UE1                                | 6             | 3    | 3    | 25    | 75  | 100  |
|      |                 | Core Course – I(CC)                                     | Fundamentals of<br>Microbiology and<br>Microbial Diversity  | 23UMB1CC1                            | 5             | 5    | 3    | 25    | 75  | 100  |
|      | III             | Core Practical - I (CP)                                 | Fundamentals of<br>Microbiology and<br>Microbial Diversity (P)  | 23UMB1CC1P                           | 3             | 3    | 3    | 25    | 75  | 100  |
|      |                 | First Allied Course- I<br>(AC)                          | Biochemistry I  | 23UMB1AC1                            | 4             | 3    | 3    | 25    | 75  | 100  |
|      |                 | First Allied Course- II<br>(AC)                         | Biochemistry I (P)  | 23UMB1AC1P                           | 4             | 3    | 3    | 25    | 75  | 100  |
|      | IV              | Ability Enhancement<br>Compulsory Course-I<br>(AECC)    | UGC Jeevan Kaushal<br>Universal Human Values  | 25UGVE                               | 2             | 2    | 3    | 25    | 75  | 100  |
|      | TOTAL 30 22 700 |   |   |                                      |               |      |      |       |     | 700  |

**Courses & Credits for UG Science Programmes** LEARNING OUTCOME BASED CURRICULUM FRAMEWORK (CBCS - LOCF) (For the Candidates admitted from the Academic year 2025-2026and onwards)

| Part | Course                  | No. of  | Hours/ | Credits | Total Credits |
|------|-------------------------|---------|--------|---------|---------------|
|      |                         | Courses | Course |         |               |
| Ι    | Tamil/ Other Language   | 4       | 6      | 12      | 12            |
| II   | English                 | 4       | 6      | 12      | 12            |
|      | Core (Theory)           | 9       | 5/6    | 9*5=45  |               |
|      | Core (Practical)        | 6       | 3/4    | 6*3=18  |               |
|      | CC/CP-III               | 1       | 2      | 1*2=2   | 98            |
| III  | Cyber Security          | 1       | 5      | 1*4=4   |               |
|      | Project Work            | 1       | 4      | 3       |               |
|      | Internship              | 1       | -      | 2       |               |
|      | First Allied            | 3       | 3/4    | 3*3=9   |               |
|      | Second Allied           | 3       | 3/4    | 3*3=9   |               |
|      | DSE                     | 2       | 5      | 2*3=6   |               |
|      | GEC                     | 2       | 2      | 2*2=4   |               |
|      | SEC                     | 2       | 2      | 2*2=4   |               |
| IV   | AECC-I -Universal Human | 1       | 2      | 2       |               |
|      | Values                  |         |        |         | 17            |
|      | AECC-II-Environmental   | 1       | 2      | 2       |               |
|      | Studies                 |         |        |         |               |
|      | AECC-III-Innovation and | 1       | 2      | 1       |               |
|      | Entrepreneurship        |         |        |         |               |
|      | AECC-IV- Health and     | 1       | -      | 1       |               |
|      | Wellness                |         |        |         |               |
|      | AECC-V Professional     | 1       | 2      | 2       |               |
|      | Skills                  |         |        |         |               |
|      | AECC-VI Gender Studies  | 1       | 1      | 1       |               |
|      |                         |         |        |         |               |
| V    | Extension Activities    | 0       | -      | 1       | 01            |
|      |                         | 45      |        | 140     | 140           |

#### Internal and external marks for theory and

#### practical papers are as follows:

| Subject   | Internal Marks | <b>External Marks</b> |
|-----------|----------------|-----------------------|
| Theory    | 25             | 75                    |
| Practical | 40             | 60                    |

#### For Theory:

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

#### For Practical:

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

#### Internal Component (Theory) Component (Practical)

#### Internal

| Component              | Marks |
|------------------------|-------|
| Quiz                   | 10    |
| Assignment<br>&Seminar | 10    |
| CIA -I                 | 05    |
| Total                  | 25    |

| Component                | Marks |
|--------------------------|-------|
| Record Note              | 10    |
| Continuous Performancein | 15    |
| Practical(Attendance and |       |
| Observation)             |       |
|                          |       |
| CIA                      | 15    |
|                          | 40    |

Question Paper Pattern for different courses+

| Semester: I    | Internal Mar  | rks : 25 |               | External Marks : 75 |
|----------------|---|----------|---------------|---------------------|
| COURSE<br>CODE | COURSE TITLE  | CATEGORY | Hrs./<br>Week | CREDITS             |
| 23UMB1CC1      | FUNDAMENTALS OF<br>MICROBIOLOGY AND<br>MICROBIAL<br>DIVERSITY | CORE     | 5             | 5                   |

- 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**

| CO<br>Number | CO Statement  | Cognitive level |
|--------------|---|-----------------|
| CO 1         | Remember and understand the Development of Microbiology           | K1, K2          |
| CO 2         | Analyze the Size and Shape of Microorganisms using Microscope     | K3              |
| CO 3         | Evaluate the knowledge about Bacteria and Viruses                 | K4              |
| CO 4         | Compare the various Preservation Methods for preserving Microbes. | K5              |
| CO 5         | Summarize various modes of classification of microbes             | K5              |

#### Mapping of CO with PO and PSO

| COs | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|-----|------|------|------|------|------|-----|-----|-----|-----|-----|
| CO1 | 3    | 3    | 1    | 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   |

"2" – Moderate (Medium) Correlation

"1" – Slight (Low) Correlation "3" – Substantial (High) Correlation

"-"indicates there is no correlation

| UNIT | CONTENT   | HOURS | COs                                  | COGNITIVE<br>LEVEL              |
|------|---|-------|--------------------------------------|---------------------------------|
| Ι    | History and scope of Microbiology -<br>Contributions of Anton von Leeuwenhoek,<br>Louis Pasteur, Robert Koch, Joseph Lister,<br>Alexander Flemming. Role of<br>microorganisms in fermentation, Germ<br>theory of disease, Development of<br>variousmicrobiological techniques<br>and golden era of microbiology.<br>Microscopy: Principles and applications of<br>bright field, dark field, phase contrast,<br>fluorescent SEM and TEM. | 15    | CO1,<br>CO2,<br>CO3,<br>CO4,<br>CO5. | K1,<br>K2,<br>K3,<br>K4,<br>K5. |
| II   | General characteristics of cellular<br>microorganisms (Bacteria, Algae, Fungi<br>and Protozoa) and acellular<br>microorganisms - (Viruses, Viroids,<br>Prions), Differences between prokaryotic<br>and eukaryotic microorganisms.<br>Structure of Bacterial cell wall, cell<br>membrane, capsule, flagella, pili,<br>mesosomes, spores, and gas vesicles.   | 15    | CO1,<br>CO2,<br>CO3,<br>CO4,<br>CO5. | K1,<br>K2,<br>K3,<br>K4,<br>K5. |
| III  | Sterilization: Principles and methods –<br>physical methods- moist heat, dry heat,<br>filtration and media preparation.<br>Cultivation of microbes- Types of culture<br>media-Stab, slant, broth, semisolid, solid<br>media. Aerobic and Anaerobic culture<br>techniques- Pure culture techniques –<br>Maintenance and preservation of microbes.<br>Principles and types of staining– Simple,<br>differential, Capsule staining.        | 15    | CO1,<br>CO2,<br>CO3,<br>CO4,<br>CO5. | K1,<br>K2,<br>K3,<br>K4,<br>K5. |
| IV   | Introduction to microbial biodiversity<br>Classification – Three kingdom, five<br>kingdom, six kingdom and eight kingdom.<br>Ecological niche. Basic concepts of<br>Eubacteria, Archaebacteria and Eucarya.<br>Conservation biodiversity  | 15    | CO1,<br>CO2,<br>CO3,<br>CO4,<br>CO5. | K1,<br>K2,<br>K3,<br>K4,<br>K5. |
| V    | International codes of nomenclature.<br>Binomial nomenclature – species concept<br>– Kingdom, division, class, order, family,<br>and genus. Principles of classification –<br>morphological, physiological biochemical<br>basis of classification. Molecular basis of<br>classification – chemotaxonomy &<br>numerical taxonomy.  | 15    | CO1,<br>CO2,<br>CO3,<br>CO4,<br>CO5. | K1,<br>K2,<br>K3,<br>K4,<br>K5. |

| VI | Self Study for Enrichment   | - | CO1, | K1, |
|----|---|---|------|-----|
|    | (Not to be included for External  |   | СО2, | K2, |
|    | Examination)  |   | СОЗ, | КЗ, |
|    | Microscopic operations, Criteria for  |   | СО4, | K4, |
|    | Classification of Microorganisms,<br>cellular organizations, Isolation and<br>identification of Microorganisms, |   | CO5  | K5  |

#### **Text Books**

- 1. Dubey RC and Maheswari DK. (2015). *A Text Book of Microbiology*. 5th Edition. SChand, NewDelhi.
- 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. BookCo. 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*. 9<sup>th</sup> Edition, Pearson Education, Singapore.
- 3. Black JG. (2018). *Microbiology-principles and explorations*, 6<sup>th</sup> edition. John Wiley and Sons, Inc. New York.
- 4. Moselio Schaechter and Joshua Leaderberg (2019). *The Desk encyclopedia ofMicrobiology*.2<sup>nd</sup> edition. Elseiver Academic press, California.
- 5. Madigan MT, Martinko JM, and Parker J. (2019). *Biology of Microorganisms*, 12<sup>th</sup> 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/archaebacteria/
- 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.P.Bhuvaneswari

| Semester : I   | Internal Marks: 4  | External Marks: 60 |          |         |  |
|----------------|--|--------------------|----------|---------|--|
| COURSE<br>CODE | COURSE TITLE   | CATEGORY           | HRS/WEEK | CREDITS |  |
| 23UMB1CC1P     | FUNDAMENTALS OF<br>MICROBIOLOGY AND<br>MICROBIAL DIVERSITY (P) | CORE<br>PRACTICAL  | 3        | 3       |  |

- To understand the rules and procedures to be observed in a laboratory.
- To know and familiarize with equipment and apparatus used in microbiology practical exercises.
- To familiarize and understand the parts and use of microscopes.
- To appreciate the abundance and diversity of microorganisms in different habitats

#### Course Outcome and Cognitive Level Mapping

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

| CO<br>Number | CO Statement   | Cognitive Level |
|--------------|--|-----------------|
| CO1          | Recall the safety practice in microbiological laboratory | K1              |
| CO2          | Demonstrate the pure culture technique                   | K2              |
| CO3          | Develop the microscopic techniques and staining methods  | К3              |
| CO4          | Determine about preparation of different media           | K4              |
| CO5          | Discuss different microorganisms in different media      | K6              |

#### Mapping of CO with PO and PSO

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

"1"-Slight (Low) Correlation

"2" - Moderate(Medium) Correlation

"3"-Substantial (High) Correlation

"-"indicates there is no correlation

- 1. Cleaning of glass wares, Microbiological good laboratory practice and safety. Sterilization and assessment of sterility Autoclave, hot air oven, and membrane filtration.
- 2. Media preparation: liquid media, solid media, semi-solid media, agar slants and agar plates.
- 3. Preparation of basal, differential, enriched, enrichment, transport, and selective media preparationquality control of media, growth supporting properties, sterility check of media.
- 4. Pure culture techniques: Spread plate, streak plate and pour plate, decimal dilution.
- 5. Culture characteristics of microorganisms: growth on different media, growth characteristics, and description. Demonstration of pigment production.
- 6. Microscopy: light microscopy and bright field microscopy.
- 7. Staining techniques: smear preparation, simple staining, Gram's staining and endospore staining.
- 8. Study on Microbial Diversity using Hay Infusion Broth-Wet mount to show different types of microbes, hanging drop method.

#### **Text Books**

- Saha, R (2022).Microbiology Practical Manual (2<sup>nd</sup> edition) CBS Publishers & Distributors Pvt. Ltd. India.
- Das, S (2020).Microbiology Practical Manual (1<sup>st</sup> edition) CBS Publishers & Distributors Pvt. Ltd. India.
- 3. Gunasekaran, P. (2018). Laboratory manual in Microbiology. New Age International Ld., Publishers, New Delhi.
- 4. R C Dubey and D K Maheswari (2010). Practical Microbiology. S. Chand Publishing.
- 5. James G Cappucino and N. Sherman MB(2013). A lab manual Benjamin Cummins, New York.

#### **Reference Books**

- 1. Atlas.R (1997). Principles of Microbiology, 2<sup>nd</sup> Edition, Wm.C. Brown publishers.
- 2. Amita J, Jyotsna A and Vimala V (2018). Microbiology Practical Manual. (1st Edition). Elsevier India
- 3. Talib VH (2019). Handbook Medical Laboratory Technology. (2<sup>nd</sup> Edition). CBS
- 4. Wheelis M, (2010). Principles of Modern Microbiology, 1st Edition. Jones and BartlettPublication.
- 5. Lim D. (1998). Microbiology, 2<sup>nd</sup> Edition, WCB McGraw Hill Publications.

#### Web References

- http://www.biologydiscussion.com/micro-biology/sterilisation-and-disinfection-methods-andprinciples-microbiology/24403.
- 2. https://www.ebooks.cambridge.org/ebook.jsf?bid=CBO9781139170635
- 3. https://www.grsmu.by/files/file/university/cafedry//files/essential\_microbiology.pdf
- 4. https://microbiologyinfo.com/top-and-best-microbiology-books/

#### Pedagogy

Chalk and talk, Power Point Presentation and Group Discussions

#### **Course Designer**

Dr. E.Priya

| Semester : I | Internal Marks:25     | External Marks:75 |          |         |  |
|--------------|-----------------------|-------------------|----------|---------|--|
| COURSE CODE  | COURSE TITLE          | CATEGORY          | HRS/WEEK | CREDITS |  |
| 23UMB1AC1    | <b>BIOCHEMISTRY I</b> | FIRST             | 4        | 3       |  |
|              |                       | ALLIED            |          |         |  |
|              |                       | COURSE - I        |          |         |  |

• 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

| CO<br>Number | CO Statement  | Cognitive<br>level |
|--------------|---|--------------------|
| CO1          | Remember and understand the concept of macromolecules           | K1,K2              |
| CO2          | Illustrate an idea about structure and function macromolecules  | K2,K3              |
| CO3          | Categorize the sources of macromolecules                        | K4                 |
| CO4          | Classify and relate properties o macromolecules                 | K3,K4              |
| CO5          | Recommend the daily allowances of vitamins and its Significance | K5                 |

#### Mapping of CO with PO and PSO

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

| UNIT | CONTENT   | HOURS | COS                                 | COGNITIV<br>FLEVEL             |
|------|---|-------|-------------------------------------|--------------------------------|
| I    | <b>Carbohydrates</b> : Definition, sources, classification-<br>monosaccharide, disaccharide,oligosaccharide and<br>Polysaccharide, biological significance, digestion<br>and absorption of carbohydrates  | 12    | CO1,<br>CO2,<br>CO3,<br>CO4         | K1,<br>K2,<br>K3,<br>K4        |
| II   | <b>Proteins</b> : Definition, sources, classification and structure of proteins - structural and nonstructural proteins, Amino acids–structure classification - essential and nonessential, protein and non-protein amino acids.Biological Significance of Proteins.  | 12    | CO1,<br>CO2,<br>CO3,<br>CO4         | K1,<br>K2,<br>K3,<br>K4        |
| III  | <b>Lipids:</b> Definition, Properties, Sources,<br>Classification of lipids and fatty acids- saturated,<br>unsaturated and polyunsaturated. Compound lipids<br>- Structure and functions of phospholipids and<br>glycolipids. Biological significance of lipids   | 12    | CO1,<br>CO2,<br>CO3,<br>CO4         | K1,<br>K2,<br>K3,<br>K4        |
| IV   | <b>Vitamins:</b> Definition, sources and functionsof Fat soluble vitamins (A, D, E and K) andWater soluble vitamins (B complex and C).  | 12    | CO1,<br>CO2,<br>CO3,<br>CO4         | K1,<br>K2,<br>K3,<br>K4        |
| V    | <b>Disorders of Metabolism:</b> Disorders of<br>carbohydrate metabolism: diabetes mellitus,<br>hypoglycemia, Disorders of amino acid<br>metabolism: alkaptonuria, phenylketonuria,<br>Disorders of lipid metabolism: hyperlipidemia,<br>hyperlipoproteinemia and hypercholesterolemia.<br>Disorders of vitamin metabolism – Night blindness,<br>Ricketts,Scurvy, sterility, beriberi and anemia | 12    | CO1,<br>CO2,<br>CO3,<br>CO4,<br>CO5 | K1,<br>K2,<br>K3,<br>K4,<br>K5 |
| VI   | Self Study for Enrichment<br>(Not to be included for External Examination)<br>Lactose intolerance - Inborn errors in aminoacid<br>metabolism- Atherosclerosis –<br>Myocardial infarction  | -     | CO1,<br>CO2,<br>CO3,<br>CO4,<br>CO5 | K1,<br>K2,<br>K3,<br>K4,<br>K5 |

#### **Text Books**

- 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,2<sup>nd</sup> edition, Universities Press, (India) Pvt. Ltd, Hyderabad, India.
- 3. Charlotte W Prattand Sathya narayana U and Chakrapani U (2013) Biochemistry, 4<sup>th</sup> edition, Elsevier publishers.
- DebAC (2011). Fundamentals of Biochemistry, 10<sup>th</sup> edition, New Central Book Agency (p) ltd, London
- 5. Rajagopal G (2010). Concise textbookofbiochemistry,2<sup>nd</sup>edition, Ahuja Publishing House.

#### **Reference Books**

- 1. Lubert Stryer; Jeremy Berg; John Tymoczko; Gregory Gatto (2019). *Biochemistry*, 9<sup>th</sup> Edition. Macmillon Publication.
- 2. Denise R Ferrier, (2013) *Biochemistry*,6<sup>th</sup> edition, LWW publishers.
- 3. Reginald H Garrett and Charles M Grisham (2012). *Biochemistry*, 5<sup>th</sup> edition. Brooks Colepublishers.
- 4. Albert L Lehninger, David L Nelson and Michael MCox, (2010). *Lehninger Principles of Biochemistry*, 2<sup>nd</sup> 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%20f ibrous%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 ma               | External mark:60 |           |         |  |
|------------|---------------------------|------------------|-----------|---------|--|
| COURSECODE | COURSE TITLE              | CATEGORY         | HRS/WEEKS | CREDITS |  |
| 23UMB1AC1P | <b>BIOCHEMISTRY I (P)</b> | ALLIED           | 4         | 3       |  |

• 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<br>NUMBER | CO STATEMENT  | Cognitive<br>Level |
|--------------|---|--------------------|
| CO 1         | Acquire knowledge about preparation of Buffer, principle of colorimeter             | K4                 |
| CO 2         | Analyse the constituents of carbohydrates and proteins                              | K1                 |
| CO 3         | Analyse the constituents of lipids, Titrimetric estimation of Glucose               | K6                 |
| CO 4         | Titrimetric estimation Ascorbic acid and colorimetric estimation of DNA             | K6                 |
| CO 5         | Determination of Amino acids by Paper chromatography &<br>Thin layer chromatography | K5                 |

Mapping of CO with PO and PSO

| Cos  | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PO1 | PO2 | PO3 | PO4 | PO5 |
|------|------|------|------|------|------|-----|-----|-----|-----|-----|
| CO 1 | 3    | 3    | 3    | 3    | 3    | 3   | 3   | 3   | 3   | 3   |
| CO 2 | 3    | 3    | 3    | 3    | 2    | 1   | 3   | 3   | 3   | 3   |
| CO 3 | 3    | 3    | 1    | 3    | 3    | 3   | 2   | 2   | 2   | 3   |
| CO 4 | 3    | 3    | 2    | 3    | 3    | 3   | 3   | 1   | 3   | 2   |
| CO 5 | 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

- 1. Preparation of Buffer & estimation of pH
- 2. Verification of Beer Lambert's Law
- 3. Qualitative Analysis of Carbohydrates
- 4. Qualitative Analysis of Proteins
- 5. Qualitative Analysis of Lipids
- 6. Quantitative estimation of Glucose by Benedict's method
- 7. Quantitative estimation of Ascorbic acid
- 8. Qualitative estimation of DNA by Diphenyl amine method
- 9. Separation of Amino acids by paper chromatography (Demonstration)
- 10. Separation of Amino acids by Thin layer chromatography (Demonstration)

#### **Text Books**

- 1. 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 (2006). Experiments in Biochemistry: A Hands on Approach-A manual for the undergraduate laboratory, Thomson Learning, Inc., Australia.

#### **Reference Books**

- 1. 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 (2006). 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

#### Pedagogy

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

#### **Course Designer**

Dr. N.Pushpa