



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

(Affiliated to Bharathidasan University, Tiruchirappalli)
Accredited by NAAC-An ISO 9001:2015 Certified Institution
SUNDARAKKOTTAI, MANNARGUDI-614016.
TAMILNADU, INDIA.

B.Sc., MICROBIOLOGY
CHOICE BASED CREDIT SYSTEM- LEARNING OUTCOMES BASED
CURRICULUM FRAME WORK (CBCS-LOCF)
(For the candidates admitted in the academic year 2023-2024)

CHOICE BASED CREDIT SYSTEM

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

OUTCOME-BASED EDUCATION (OBE)

LEARNING OUTCOME-BASED CURRICULUM FRAMEWORK (LOCF)

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

institutions an important point of reference for designing teaching-learning strategies, assessing student learning levels, and periodic review of programmes and academic standards.

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

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

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

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

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

Some important terminologies repeatedly used in LOCF.

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 studied in school level or b) Special Tamil if Tamil language was studied upto 10th & 12th 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 %

Assignment-3	=	30%
Test-3 (Best 2 out of 3)	=	50%
Seminar	=	10%
Attendance	=	10%

Question Paper Pattern

Part A:

Part A 1 (10X1=10 marks)

One word question/ Fill in/ Match the following/True or False/ Multiple Choice Questions
Two Questions from Each unit

Part A 2 (5X2=10 marks)

Short Answers

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/Analysing	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)		20
II. (No choice ,Two Mark) ONE question from each unit					(5x2 =10)		
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	K1	K2	K3	K4	K5	K6	Total Marks
PART							
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:

$\text{GPA} = \frac{\sum_{i=1}^n C_i G_i}{\sum_{i=1}^n C_i}$	$\text{WAM (Weighted Average Marks)} = \frac{\sum_{i=1}^n C_i M_i}{\sum_{i=1}^n C_i}$
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-3: 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

Empowering the women students with quality education on utility of microbes, microbial processes, products, to make them academics and entrepreneurs to serve for the welfare of society.

MISSION

- To initiate, promote, develop, sustain quality and innovative research using sophisticated instruments in the field of Microbiology.
- To motivate the students so as to exploit the potentiality of microbes and microbial processes for the betterment of the society

PROGRAMME OUTCOMES FOR B.Sc..DEGREE PROGRAMMES

PO No.	Programme Outcomes (Upon completion of the B.Sc. Degree Programme, the Undergraduate will be able to)
PO-1	Disciplinary knowledge: Demonstrate comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate 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 synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints; critically evaluate ideas, evidence, and experiences from an open minded and reasoned perspective.
PO-4	Research-related Skills: develop a sense of capability for relevant/appropriate inquiry and asking questions, synthesize, articulate and report results and to recognize and predict cause and effect relationships, define problems, formulate and establish hypothesis, analyze and interpret and draw conclusions from data, execute and report the results of an experiment or investigation.
PO-5	Digital literacy and Effective Communication: use ICT in a variety of learning situations and speak, read, write and listen clearly in person and through electronic media in English and in one or more Indian languages, and make meaning of the world by connecting people, ideas , books, media and technology; efficiently communicate thoughts and ideas in a clear and concise manner.
PO-6	Individual and Team Work: effectively accomplish tasks individually as well as work effectively and respectfully as member or leader with diverse teams, facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interest so for a common cause and work efficiently as a member of a team.
PO-7	Multicultural Competence and Social Interaction: understand the values and beliefs of multiple cultures, global perspectives, engage and interact respectfully with diverse groups and elicit views of others, mediate disagreements and help reach conclusions in group settings.
PO-8	Awareness of Ethical issues, Human values and Gender Issues: embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work and understand the value of relationship between self and the community and aware of the various issues concerning women and society.
PO-9	Awareness of Environment and Sustainability: understand the impacts of technology and business practices in societal and environmental contexts, and sustainable development.
PO-10	Self directed and Lifelong learning: acquire knowledge and skills, including learning "how to learn", that are necessary for participating in learning activities throughout life and to engage in independent and life-long learning in the broadest context of socio-technological changes.

PROGRAMME SPECIFIC OUTCOME (PSO)

PSO No.	Program Specific Outcomes (B.Sc., Microbiology)
PSO1	Placement : Prepare the students in all disciplines like agriculture, industry-medical, pharma, dairy, hotel, food and food processing, immunologicals, cosmetics, vermitechnology and water treatment for effective and respectful placement.
PSO2	Entrepreneur : To create effective entrepreneur by enhancing their critical thinking, problem solving, decision making and leadership skill that will facilitate startups and high potential organizations.
PSO3	Research and Development : Design and implement HR systems that comply with good laboratory practices, following ethical values, leading the organization towards growth and development.
PSO4	Contribution to society: To contribute to the development of society and produce microbiological products, by collaborating with stake holders, related to the betterment of environment and mankind at the national and global level.



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B.Sc., MICROBIOLOGY
CHOICE BASED CREDIT SYSTEM – LEARNING OUTCOMES BASED
CURRICULUM FRAMEWORK (CBCS – LOCF)
(For the candidates admitted in the academic year 2023 – 2024)
ELIGIBILITY: A Pass in 10+2 with Biology as one of the core subjects

Sem	Part	Course	Course Code	Title of the Paper	Ins. Hour s/ Week	L	T	P	S	Credit	Exam Hours	Marks		Total
												CIA	ESE	
I	I	Language Course-I	U23LC101	Pothu Tamil-1	6	5	1	-	-	3	3	25	75	100
	II	English Language Course-I	U23ELC101	General English – I	6	5	1	-	-	3	3	25	75	100
	III	Core Course-I	U23MB101	Fundamentals of Microbiology and Microbial Diversity	5	4	1	-	-	5	3	25	75	100
			U23MB102P	Fundamentals of Microbiology and Microbial Diversity	4	1	-	3	-	4	3	25	75	100
		Allied Course-I	U23ABC101	Basic and Clinical Biochemistry	3	2	1	-	-	2	3	25	75	100
			U23ABC102P	Basic and Clinical Biochemistry	2	-	-	2	-	--	--	---	--	--
	IV	Non Major Elective -I	U23NMEMB11		2	2	-	-	-	2	3	25	75	100
		Foundation Course	U23FCMB11	Introduction to Microbial World	2	2	-	-	-	2	3	25	75	100
	TOTAL					30	21	4	5		21	-	-	-
II	I	Language Course-II	U23LC202	Pothu Tamil-II	6	5	1	-	-	3	3	25	75	100
	II	English Language Course-II	U23ELC202	General English –II	6	5	1	-	-	3	3	25	75	100
	III	Core Course-II	U23MB203	Microbial Physiology and Metabolism	5	4	1	-	-	5	3	25	75	100
			U23MB204P	Microbial Physiology and Metabolism	4	1	-	3	-	4	3	25	75	100
		Allied Course-II	U23AMB201	Bioinstrumentation	3	2	1	-	-	2	3	25	75	100
			U23ABC102P	Basic and Clinical Biochemistry	2	-	-	2	-	2	3	25	75	100
	IV	Non Major Elective -II	U23NMEMB22	Non Major Elective-II-	2	2	-	-	-	2	3	25	75	100
		Skill Enhancement Course-I	U23SECMB21	Sericulture	2	2	-	-	-	2	3	25	75	100
	Total					30	21	4	5		23	-	-	-
III	I	Language Course-III		Pothu Tamil-III	6	5	1	-	-	3	3	25	75	100
	II	English Language Course-III		General English –III	6	5	1	-	-	3	3	25	75	100
	III	Core Course-III		Molecular Biology and Microbial Genetics	5	4	1	-	-	5	3	25	75	100
				Molecular Biology and Microbial Genetics	4	1	-	3	-	4	3	25	75	100

Sem	Part	Course	Course Code	Title of the Paper	Ins. Hour s/ Week	L	T	P	S	Credit	Exam Hours	Marks		Total
												CIA	ESE	
III		Allied Course-III		Clinical Laboratory Technology	3	2	1	-	-	2	3	25	75	100
		Allied Practical –II		Clinical Laboratory Technology	2	-	-	2	-	--	--	--	--	--
	IV	Skill Enhancement Course –II		Organic farming and Biofertilizer Technology	2	2	-	-	-	2	3	25	75	100
		Skill Enhancement Course –III		Aquaculture	2	2	-	-	-	2	3	25	75	100
	TOTAL					30	21	4	5	-	21		-	-
IV	I	Language Course-IV		Pothu Tamil-IV	6	5	1	-	-	3	3	25	75	100
	II	English Language Course-IV		General English –IV	6	5	1	-	-	3	3	25	75	100
	III	Core Course- IV		Immunology and Immunotechnology	5	4	1	-	-	5	3	25	75	100
		Core Practical - IV		Immunology and Immunotechnology	4	1	-	3	-	4	3	25	75	100
		Allied Practical- II		Clinical Laboratory Technology	2	-	-	2	-	2	3	25	75	100
	IV	Allied Course- VI		Food Processing Technology	3	2	1	-	-	2	3	25	75	100
		Skill Enhancement Course –IV		Vaccine Technology	2	2	-	-	-	2	3	25	75	100
		Skill Enhancement Course –V		Skill Enhancement Course –V- Apiculture	2	2	-	-	-	2	3	25	75	100
		TOTAL					30	21	4	5	-	23	-	-
V	III	Core Course-V		Bacteriology and Mycology	6	5	1	-	-	5	3	25	75	100
		Core Course –VI		Virology and Parasitology	5	4	1	-	-	4	3	25	75	100
		Core Course –VII		Environmental and Agriculture Microbiology	5	4	1	-	-	5	3	25	75	100
	Core Practical- V			4	-	-	4	-	4	3	25	75	100	
	Elective Course -I		Recombinant DNA Technology	4	3	1	-	-	3	3	25	75	100	
	Elective Course -II		Biosafety and Bioethics	4	3	1	-	-	3	3	25	75	100	
	Internship/ Industrial visit/ Field visit		Internship/ Industrial visit/ Field visit	-	-	-	-	-	2	-	-	-	-	
	EVS		Environmental Studies	2	2	-	-	-	2	3	25	75	100	
TOTAL					30	21	5	4	-	28	-	-	700	
VI		Core Course -VIII		Food, Dairy and Probiotic Microbiology	6	5	1	-	-	4	3	25	75	100
		Core Practical –VI		Food, Dairy and Probiotic Microbiology, Environmental and Agriculture Microbiology	6	5	1	-	-	4	3	25	75	100
	III	Core Project		Project with viva- voce/ Group Project	5	-	1	4	-	5	3	25	75	100
	Elective Course-III		Pharmaceutical Microbiology	4	3	1	-	-	3	3	25	75	100	
	Elective Course-IV		Entrepreneurship and Bio-Business	4	3	1	-	-	3	3	25	75	100	

Sem	Part	Course	Course Code	Title of the Paper	Ins. Hour s/ Week	L	T	P	S	Credit	Exam Hours	Marks		Total
												CIA	ESE	
	IV	Value Education		Value Education	2	2	-	-	-	2	3	25	75	100
		Professional competency skill		Microbial Quality Control and Testing	2	2	-	-	-	2	3	25	75	100
	V	Extension activity		Extension activity	-	-	-	-	-	1	-	-	-	-
		Gender Studies		Gender Studies	1	1	-	-	-	1	3	25	75	100
	TOTAL					30	21	5	4	-	25	-	-	-
GRAND TOTAL					180	127	25	28	-	141	-	-	-	4500
	Extra Credit			MOOC/SWAYAM/NPTEL (At least one per Year)	-	-	-	-	-	2	-	-	-	-
				Value added Courses (At least one per Year)	-	-	-	-	-	2	-	-	-	-

L-Lecture

T-Tutorial

P-Practical

S-Seminar

Credit Distribution for B.Sc., Microbiology

S.No	Part	Subject	No. of Courses	Total Credits
1.	I	Language	4	12
2.	II	English	4	12
3.	III	Core Course –Theory	8	38
4.		Core Practical	6	24
5.		Core Course-Project	1	5
6.		Allied Course	4	08
7.		Allied Course Practical	2	4
8.		Elective Course	4	12
9.	IV	Non-Major Elective	2	04
10		Foundation Course – FC	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 skill	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
NON MAJOR ELECTIVE (NME) OFFERED BY THE DEPARTMENT

Semester	Part	Course	Course Code	Title of the Paper
I	IV	NME-I	U23NMEMB11	Social and Preventive Medicine
II		NME-II	U23NMEMB21	Nutrition and Health Hygiene

EXTRA CREDIT COURSE -VALUE ADDED COURSE OFFERED BY THE DEPARTMENT

Semester	Course	Course Code	Title of The Paper
I	VAC-I	U23MBVA1	Spinster's Hygiene and Health
II	VAC-II	U23MBVA2	Organic Handmade Products

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(For the Candidates admitted in the academic year 2023-2024)

DEPARTMENT OF MICROBIOLOGY

B.Sc., MICROBIOLOGY

Semester: I- CC-I: Fundamentals of Microbiology and Microbial Diversity

Ins. Hours / Week: 5

Course Credit: 5

Course Code:U23MB101

UNIT- I

(15 Hours)

History and Evolution of Microbiology, Classification – Three kingdom, five kingdom, six kingdom and eight kingdom. Microbial biodiversity: Introduction to microbial biodiversity-ecological niche. Basic concepts of Eubacteria, Archaeobacteria and Eucarya. Conservation of Biodiversity.

UNIT-II:

(15 Hours)

General characteristics of cellular microorganisms (Bacteria, Algae, Fungi and Protozoa) and acellular microorganisms - (Viruses, Viroids, Prions), Differences between prokaryotic and eukaryotic microorganisms. Structure of Bacterial cell wall, cell membrane, capsule, flagella, pili, mesosomes, chlorosomes, phycobilisomes, spores, and gas vesicles. Structure of fungi (Mold and Yeast), Structure of microalgae.

UNIT-III:

(15 Hours)

Bacterial culture media and pure culture techniques. Mode of cell division, Quantitative measurement of growth. Anaerobic culture techniques.

UNIT-IV:

(15 Hours)

Microscopy – Simple, bright field, dark field, phase contrast, fluorescent, electron microscope – TEM & SEM, Confocal microscopy, and Atomic Force Microscopy. Stains and staining methods.

UNIT-V:

(15 Hours)

Sterilization–moist heat - autoclaving, dry heat – Hot air oven, radiation – UV, Ionization, filtration – membrane filter and disinfection, antiseptic; Antimicrobial agents.

Total Lecture Hours – 75

COURSE OUTCOME

After the completion of the course, students should be able to,

1. Study the historical events that led to the discoveries and inventions and understand the Classification of Microorganisms.
2. Gain Knowledge of detailed structure and functions of prokaryotic cell organelles.
3. Understand the various microbiological techniques, different types of media, and techniques involved in culturing microorganisms.
4. Explain the principles and working mechanism of different microscopes/Microscope, their function and scope of application.
5. Explain the principles and working mechanism of different microscopes/Microscope, their function and scope of application.

TEXT BOOKS

1. Boyd, R.F. (1998). General Microbiology, 2nd Edition., Times Mirror, Mosby College Publishing, St Louis.
2. Pelczar.M. J., Chan E.C.S. and Noel. R.K. (2007). Microbiology. 7th Edition., McGraw – Hill, New York.
3. Salle. A.J (1992). Fundamental Principles of Bacteriology. 7th Edition., McGraw Hill Inc. New York.
4. Tortora, G.J., Funke, B.R., Case, C.L. (2013). Microbiology. An Introduction 11th Edition., A La Carte Pearson.
5. Willey J., Sherwood L., and Woolverton C. J., (2017). Prescott's Microbiology. 10th Edition., McGraw-Hill International edition.

REFERENCE BOOK(S)

1. Jeffrey C. Pommerville., Alcamo's Fundamentals of Microbiology (9th Edition). Jones & Bartlett learning 2010.
2. Madigan M.T., Martinko J.M., Stahl D.A, and Clark D. P. (2010). Brock - Biology of Microorganisms, 13th Edition Benjamin-Cummings Pub Co.
3. Nester E., Anderson D., Roberts C. E., and Nester M. (2006). Microbiology-A Human Perspective, 5th Edition., McGraw Hill Publications.

4. Stanier R.Y, Ingraham J. L., Wheelis M. L., and Painter R. R. (2010). General Microbiology, 5th Edition., MacMillan Press Ltd
5. Tortora, G.J., Funke, B.R. and, Case, C.L (2013). Microbiology-An Introduction, 11th Edition., Benjamin Cummings.

E-RESOURCES

1. <https://www.cliffsnotes.com/study-guides/biology/microbiology/introduction-to-microbiology/a-brief-history-of-microbiology>
2. <https://www.keyence.com/ss/products/microscope/bz-x/study/principle/structure.jsp>
3. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6604941/#>
4. <https://bio.libretexts.org/@go/page/9188>
5. <https://courses.lumenlearning.com/boundless-microbiology/chapter/microbial-nutrition/>

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



SUNDARAKKOTTAI, MANNARGUDI-614016.
(For the Candidates admitted in the academic year 2023-2024)

DEPARTMENT OF MICROBIOLOGY

B.Sc., MICROBIOLOGY

Semester: I- CC-II: Practical –I- Fundamentals of Microbiology and Microbial Diversity

Ins. Hours / Week: 4

Course Credit: 4

Course Code:U23MB102P

UNIT- I (12 Hours)

Cleaning of glass wares, Microbiological good laboratory practice and safety. Sterilization and assessment of sterility– Autoclave, hot air oven, and membrane filtration.

UNIT-II: (12 Hours)

Media preparation: liquid media, solid media, semi-solid media, agar slants, agar deeps, agar plates.

UNIT-III: (12 Hours)

Preparation of basal, differential, enriched, enrichment, transport, and selective media preparation- quality control of media, growth supporting properties, sterility check of media. Pure culture techniques: streak plate, pour plate, decimal dilution.

UNIT-IV: (12 Hours)

Culture characteristics of microorganisms: growth on different media, growth characteristics, and description. Demonstration of pigment production. Microscopy: light microscopy and bright field microscopy.

UNIT-V: (12 Hours)

Staining techniques: smear preparation, simple staining, Gram's staining and endospore staining. Study on Microbial Diversity using Hay Infusion Broth-Wet mount to show different types of microbes, hanging drop.

Total Lecture Hours - 60

COURSE OUTCOME

After the completion of the course, students should be able to,

1. Practice sterilization methods; learn to prepare media and their quality control.

2. Learn streak plate, pour plate and serial dilution and pigment production of microbes.
3. Understand Microscopy methods, different Staining techniques and motility test.
4. Observe culture characteristics of microorganisms.
5. Study on Microbial Diversity using Hay Infusion Broth-Wet mount

TEXT BOOKS

1. James G Cappucino and N. Sherman MB(1996). A lab manual Benjamin Cummins, New York 1996.
2. Kannan. N (1996). Laboratory manual in General Microbiology. Palani Publications.
3. Sundararaj T (2005). Microbiology Lab Manual (1st edition) publications.
4. Gunasekaran, P. (1996). Laboratory manual in Microbiology. New Age International Ltd., Publishers, New Delhi.
5. R C Dubey and D K Maheswari (2002). Practical Microbiology. S. Chand Publishing.

REFERENCE BOOK(S)

1. Atlas.R (1997). Principles of Microbiology, 2nd 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. (2nd Edition). CBS
4. Wheelis M, (2010). Principles of Modern Microbiology, 1st Edition. Jones and Bartlett Publication.
5. Wheelis M, (2010). Principles of Modern Microbiology, 1st Edition. Jones and Bartlett Publication.

E-RESOURCES

1. <http://www.biologydiscussion.com/micro-biology/sterilisation-and-disinfection-methods-and-principles-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/>
5. <https://www.cliffsnotes.com/studyguides/biology/microbiology/introduction-to-microbiology/a-brief-history-of-microbiology>

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(For the Candidates admitted in the academic year 2023-2024)

DEPARTMENT OF MICROBIOLOGY

B.Sc., MICROBIOLOGY

Semester: I- AC-I: Basic and Clinical Biochemistry

Ins. Hours / Week: 3

Course Credit: 2

Course Code:U23ABC101

UNIT- I

(9 Hours)

Biomolecules -Carbohydrate – General properties, function, structure, classification– monosaccharides (Glucose, Fructose, Galactose), Oligoaccharides (Sucrose, Maltose, Lactose) and polysaccharides (Starch, Glycogen,) and biological significance. Lipids – General properties, functions, structure, classification (Simple, Derived and Complex), Cholesterol, LDL, HDL – biological significance.

UNIT-II:

(9 Hours)

Biomolecules - Amino acids – General properties, functions, structure, classification and biological significance. Proteins– General structure, Properties, functions, classification and biological significance.

UNIT-III:

(9 Hours)

Disorders of Metabolism: Disorders of carbohydrate metabolism: diabetes mellitus, ketoacidosis, hypoglycemia, glycogen storage diseases, galactosemia and lactose intolerance. Disorders of lipid metabolism: hyperlipidemia, hyperlipoproteinemia, hypercholesterolemia, hypertriglyceridemia, sphingolipidosis.

UNIT-IV:

(9 Hours)

Disorders of Metabolism: Disorders of amino acid metabolism: alkaptonuria, phenylketonuria, phenylalaninemia, homocystinuria, tyrosinemia, aminoacidurias.

UNIT-V:

(9 Hours)

Evaluation of organ function tests: Assessment and clinical manifestations of renal, hepatic, pancreatic, gastric and intestinal functions. Diagnostic enzymes: Principles of diagnostic enzymology. Clinical significance of aspartate aminotransferase, alanine aminotransferase, creatine kinase, aldolase and lactate dehydrogenase.

Total Lecture Hours - 45

COURSE OUTCOME

After the completion of the course, students should be able to,

1. Explain the structure, classification, biochemical functions and significance of carbohydrates and lipids

2. Differentiate essential and non-essential amino acids, biologically important modified amino acids and their functions, Illustrate the role, classification of Proteins and recognize the structural level organization of proteins, its functions and denaturation.
3. Assess defective enzymes and Inborn errors. Recognize diseases related to carbohydrate and lipid metabolism.
4. Discuss and evaluate the pathology of aminoacid metabolic disorders.
5. Appraise the imbalances of enzymes in organ function and relate the role of Clinical Biochemistry in screening and diagnosis.

TEXT BOOKS

1. Satyanarayana, U. and Chakrapani, U(2014).Biochemistry,4th Edition, Made Simple Publisher.
2. Jain J L, Sunjay Jain and Nitin Jain (2016).Fundamentals of Biochemistry, 7th Edition, S Chand Company.
3. AmbikaShanmugam's (2016). Fundamentals of Biochemistry for Medical Students, 8th Edition. Wolters Kluwer India Pvt Ltd.
4. Vasudevan. D.M.Sreekumari.S, Kannan Vaidyanathan (2019). Textbook Of Biochemistry For Medical Students. Kindle edition, Jaypee Brothers Medical Publishers
5. Jeremy M. Berg,LubertStryer, John L. Tymoczko, Gregory J. Gatto (2015). Biochemistry, 8th edition. WH Freeman publisher.

REFERENCE BOOK(S)

1. AmitKessel&Nir Ben-Tal (2018). Introduction to Proteins: structure, function and motion. 2nd Edition, Chapman and Hall.
2. David L. Nelson and Michael M. Cox (2017).Lehninger Principles of Biochemistry, 7th Edition W.H. Freeman and Co., NY.
3. Lupert Styrrer, Jeremy M. Berg, John L. Tymaczko, Gatto Jr., Gregory J (2019). Biochemistry. 9th Edition ,W.H.Freeman& Co. New York.
4. Donald Voet, Judith Voet, Charlotte Pratt (2016). Fundamentals of Biochemistry: Life at the Molecular Level, 5th Edition, Wiley.
5. Joy PP, Surya S. and AswathyC (2015). Laboratory Manual of Biochemistry, Edition 1.Publisher:Kerala agricultural university.

E-RESOURCES

1. <https://www.abebooks.com> › plp
2. <https://kau.in/document/laboratory-manual-biochemistry>
3. <https://metacyc.org>
4. <https://www.medicalnewstoday.com>
5. <https://journals.indexcopernicus.com>

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DEPARTMENT OF MICROBIOLOGY

B.Sc., MICROBIOLOGY

Semester: I- AC-II: Allied Practical –I- Basic and Clinical Biochemistry

Ins. Hours / Week: 2

Course Credit: 2

Course Code:U23ABC102PP

I. Qualitative analysis

- Carbohydrate
- Protein

II. Quantitative analysis

- Estimation of glucose by anthrone method

III. Demonstration

- RBC Counting
- Total and differential count of white blood cells
- Erythrocyte sedimentation rate
- Blood grouping

COURSE OUTCOME

After the completion of the course, students should be able to,

1. Qualitatively analyze the carbohydrate and protein and report the type of carbohydrate and protein based on specific tests.
2. Quantitatively estimate the important biomolecules carbohydrates in biological samples and relate their clinical significance.
3. Perform the routine haematological tests.

TEXT BOOKS

1. Alan H Gowenlock. (1998). Varley's Practical Clinical Biochemistry, 6th edition, CBS Publishers, India.
2. David T. Plummer (2001.)An Introduction to Practical Biochemistry, , 3 rd edition, Tata McGraw-Hill Publishing Company Limited,
3. Godkar.B 2020. Textbook of Medical Laboratory Technology Vol 1 & 2 Paperback, 3rd edition, Bhalani Publishers.

4. Jayaraman.J, (2011) Laboratory manual in Biochemistry, 2nd edition, New Age International Publishers,
5. Sadasivam S and Manickam A, (2016) Biochemical Methods, 4h edition, New Age International Publishers, Delhi

REFERENCE BOOKS

1. Ashwood, B. a. (2001). Tietz Fundamentals of Clinical chemistry. WB Saunders Company, Oxford Science Publications USA - ISBN 10: 0721686346 / ISBN 13: 978072168634
2. Henry. R. D: (1974) Clinical Chemistry- Principles and Techniques 2nd Edition, *Harper and Row*, Hagerstown, MD.
3. Max *Trumper*, Abraham Cantarow (1945) *Clinical Biochemistry* 3rd Edition. Saunders, University of California.
4. Singh,S.K.(2005).IntroductoryPracticalBiochemistry(2nded.).AlphaScience International, Ltd- ISBN 10: 8173193029 / ISBN 13: 9788173193026

E RESOURCES

1. <https://www.elsevier.com/journals/clinical-biochemistry/0009-9120/guide-for-authors>
2. <http://rajswashya.nic.in/RHSDP%20Training%20Modules/Lab.%20Tech/Biochemistry/r.%20Jagarti%20Jha/Techniques%20In%20Biochemistry%20Lab.pdf3>.
3. https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistrypdf.pdf?sequence=1&isAllowed=y
4. https://dspace.cuni.cz/bitstream/handle/20.500.11956/111493/Clinical_biochemistrypdf.pdf?sequence=1&isAllowed=y *

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DEPARTMENT OF MICROBIOLOGY

B.Sc., MICROBIOLOGY

Semester: I- NME-I: Social and Preventive Medicine

Ins. Hours / Week: 2

Course Credit: 2

Course Code:U23NMEMB11

UNIT- I: Introduction to social medicine (6 Hours)

History of social medicine-concepts of health and disease-social determinants of health and disease-Health and quality of life-Health information system- measures of population health-health policies.

UNIT-II: Health Management (6 Hours)

Applications of behavioral sciences and psychology in health management- nutritional programs for health management-water and sanitation in human health-national programs for communicable and non-communicable diseases- environmental and occupational hazards and their control.

UNIT-III: Health care and services (6 Hours)

Health care of the community-information, education, communication and training in health-maternal & child health-school health services- Geriatrics-care and welfare of the aged-mental health-health services through general practitioners.

UNIT-IV: Preventive Medicine (6 Hours)

Introduction- role of preventive medicine- levels of prevention-Risk assessment in communities and vulnerable population –surveillance, monitoring and reporting of disease outbreaks - forecasting and control measures in community setting – early detection methods.

UNIT-V: Prevention through alternate medicine (6 Hours)

Unani, Ayurveda, Homeopathy, Naturopathy systems in epidemic and pandemic outbreaks. International health regulations. Infectious disease outbreak case studies and precautionary response during SARS and MERS coronavirus, Ebola and novel SARS-COV2 outbreaks.

Total Lecture Hours - 30

COURSE OUTCOME

After the completion of the course, students should be able to,

1. Identify the health information system
2. Associate various factors with health management system
3. Choose the appropriate health care services
4. Appraise the role of preventive medicine in community setting
5. Recommend the usage of alternate medicine during outbreaks

TEXT BOOKS

1. Park.K (2021). Textbook of preventive and social medicine, 26th edition. Banarsidas Bhanot publishers.
2. Mahajan& Gupta (2013). Text book of preventive and social medicine, 4th edition. Jaypee brothers medical publishers.
3. Chun-Su Yuan, Eric J. Bieber, Brent Bauer (2006). Textbook of Complementary and Alternative Medicine. Second Edition. Routledge publishers.
4. Vivek Jain (2020). Review of Preventive and Social Medicine: Including Biostatistics. 12th edition, Jaypee Brothers Medical Publishers.
5. Lal Adarsh Pankaj Sunder (2011). Textbook of Community Medicine: Preventive and Social Medicine, CBS publisher.

REFERENCE BOOK(S)

1. Howard Waitzkin, Alina Pérez, Matt Anderson (2021). Social Medicine and the coming Transformation. First Edition. Routledge publishers.
2. GN Prabhakara (2010). Short Textbook of Preventive and Social Medicine. Second Edition. Jaypee publishers
3. Jerry M. Suls, Karina W. Davidson, Robert M. Kaplan (2010). Handbook of Health Psychology and Behavioral Medicine. Guilford Press.
4. Marie Eloïse Muller, Marie Muller, MarthieBezuidenhout, KarienJooste (2006). Health Care Service Management. Juta and Company Ltd.
5. Geoffrey Rose (2008). Rose's Strategy of Preventive Medicine: The Complete. OUP Oxford.

E-RESOURCES

1. <https://www.omicsonline.org/scholarly/social--preventive-medicine-journals-articles-ppts-list.php>
2. https://www.teacheron.com/online-md_preventive_and_social_medicine-tutors
3. <https://www.futurelearn.com>
4. <https://www.healthcare-management-degree.net>
5. <https://www.conestogac.on.health-care-administration-and-service-management>

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DEPARTMENT OF MICROBIOLOGY

B.Sc., MICROBIOLOGY

Semester: I- FC-I: Introduction to Microbial World

Ins. Hours / Week: 2

Course Credit: 2

Course Code:U23FCMB11

UNIT- I: Introduction to microbiology (6 Hours)

Scope and origin of microbiology. Microorganisms – introduction – bacteria, archaea, algae, fungi, protozoa and viruses. Beneficial and harmful microorganisms. Importance of Microbiology.

UNIT – II: Basic techniques in microbiology (6 Hours)

Microscope and its operations. Preparation of media; Sterilization methods. Isolation of bacteria, algae, fungi and protozoa. Test for motility of bacteria. Staining and biochemical tests for identification of bacteria.

UNIT- III: Microbial Physiology (6 Hours)

Microbial metabolism-Microbial enzymes- Industrially important microorganism Role of microbe in Biogeochemical cycles. Microbes in Environment cleanup and waste water treatment.

UNIT- IV: Microbes in Health (6 Hours)

Normal flora of the human body - Probiotics. Medically important microbes – Pathogenesis of COVID 19. Hospital acquired infections. Vaccines and Antimicrobial antibiotics.

UNIT –V: Applications of microbiology (6 Hours)

Agriculture – biofertilizers; food and dairy industry – bread, cheese, yogurt, beer and wine production. Mushroom cultivation; Biogas production.

Total Lecture Hours - 30

COURSE OUTCOMES

After the completion of the course, student should be able to,

1. Recall the milestones in Microbiology that leads to discoveries, inventions and contributions
2. Compare the different types of microscopes, functions and its applications

3. Differentiate the group of Microorganisms based on Staining techniques
4. Identify the beneficial and harmful microbes that contribute human health
5. Analyse the applications microbes in Agriculture and Industrial production

TEXT BOOKS

1. Ananthanarayan R. and Paniker's. 2013. Text book of Microbiology. University Press (9th edition), Hyderabad.
2. David, B.D., Delbecco,. R., Eisen, H.N and Ginsburg, H.S .1990. Microbiology 5th Edition. Harper & Row, New York.
3. Dubey H.C. 2009. Introduction to Fungi. Vikas publishing pvt. Ltd. New Delhi.
4. Dubey R.C and Maheswari D.K. 2010.A Text Book of Microbiology. S Chand, New Delhi.
5. Johri R.M, Snehlatha, SandhyaShrama.2010. A Textbook of Algae. Wisdom Press, New Delhi.
6. Kanika Sharma.2011. Textbook of Microbiology – Tools and Techniques. 1st edition, Ane Books Pvt. Ltd., New Delhi.
7. Nagamani, B.2018. General Microbiology and Microbial Physiology Margham Publication, Chennai
8. Rajan S and Selvi Christy R.2015. Essentials of Microbiology, Anjanaa Book House, Chennai.

REFERENCE BOOK(S)

1. Alcamo I.E. 2011.Fundamentals of Microbiology, sixth edition, Addison wesley Longman, Inc. California.
2. Alexopoulos C.J, Mims C.W and Blackwell M. 2000.Introductory Mycology. 5th edition John Wiley and Sons. Chichester.
3. Atlas R.A and Bartha R.2000. Microbial Ecology. Fundamentals and Application, Benjamin Cummings, New York.
4. Cappuccino and Sherman.2012. Microbiology – A Laboratory Manual. 7thedition, Dorling Kindersley (India) Pvt. Ltd., New Delhi.
5. Madigan M.T, Martinko J.M, Dunlap P.V and Clark D.P. 2014. Brock Biology of Microorganisms. 14th edition. Pearson International Edition, London.
6. MoselioSchaechter and Joshua Leaderberg.2004. The Desk encyclopedia of Microbiology. Elseiver Academic press, California.

7. Pelczar M.J, Chan E.C.S and Kreig N.R. 2009. Microbiology, fifth edition. McGraw- Hill. Book Co. Singapore.
8. Prescott L.M, Harley J.P, and Klein D.A. 2008. Microbiology (7th edition) McGraw Hill, New York.
9. Schlegel HG. 2008. General Microbiology, Cambridge University Press, U.K.
10. Stanier R.Y, Ingraham J.L, Wheelis M.L, and Painter P.R. 2005. General Microbiology. 5th edition. MacMillan, German
11. Tortora G.J, Funke B.R and Case C.L. 2009. Microbiology: An Introduction. 9th Edition, Pearson Education, Singapore.
12. Wiley J.M, Sherwood L.M and Woolverton C.J. 2013 Prescott's Microbiology. 9th Edition. McGraw Hill International. New York.

E- RESOURCES

1. <https://www.slideshare.net/SalmanAli83/historyintroduction-scope-of-microbiology-siws>
2. <https://www.slideshare.net/krish181958/types-of-microscope-70370614>
- 3.1. [https://bio.libretexts.org/Bookshelves/Microbiology/Book%3A_Microbiology_\(Kaiser\)/Unit_1%3_Introduction_to_Microbiology_and_Prokaryotic_Cell_Anatomy/1%3A_Fundamentals_of_Microbiology](https://bio.libretexts.org/Bookshelves/Microbiology/Book%3A_Microbiology_(Kaiser)/Unit_1%3_Introduction_to_Microbiology_and_Prokaryotic_Cell_Anatomy/1%3A_Fundamentals_of_Microbiology)
4. <http://www.wales.nhs.uk/sitesplus/888/agordogfen/149787>
5. <http://ecoursesonline.iasri.res.in/course/view.php?id=108>
6. <https://www.cliffsnotes.com/study-guides/biology/microbiology/microbial-cultivation-andgrowth/microbial-cultivation>

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(For the Candidates admitted in the academic year 2023-2024)

DEPARTMENT OF MICROBIOLOGY

B.Sc., MICROBIOLOGY

Semester: II: CC-III – Microbial Metabolism and Physiology

Ins. Hours / Week: 5

Course Credit: 5

Course Code:U23MB203

UNIT- I: (15 Hours)

Physiology of microbial growth: Batch – continuous - synchronous cultures; Growth Curve and measurement method (turbidity, biomass, and cell count). Control of microbial growth.

UNIT-II: (15 Hours)

Nutrition requirements - Photoautotrophs, Photoorganotrophs, Chemolithotrophs (Ammonia, Nitrite, Sulfur, Hydrogen, Iron oxidizing Bacteria), Chemoorganotrophs. Nutrition transport mechanisms – Passive diffusion and Active transport. Factors affecting microbial growth.

UNIT-III: (15 Hours)

An overview of Metabolism - Embden Meyerhof Pathway, Entner-Doudoroff Pathway, Pentose Phosphate Pathway, Tricarboxylic Acid Cycle. Electron Transport Chain and Oxidative Phosphorylation. ATP synthesis. Fermentation-Homolactic Fermentation, Heterolactic Fermentation, Mixed Acid Fermentation, Butanediol Fermentation.

UNIT-IV: (15 Hours)

Photosynthesis - An Overview of chloroplast structure. Photosynthetic Pigments, Light Reaction- Cyclic and non-cyclic Photophosphorylation. Dark Reaction - Calvin Cycle.

UNIT-V: (15 Hours)

Bacterial reproduction - Binary fission, Budding, Reproduction through conidia, cyst formation, endospore formation. Fungi asexual and sexual reproduction, Microalgae reproduction. Asexual and sexual reproduction of protozoa.

Total Lecture Hours - 75

COURSE OUTCOME

After the completion of the course, students should be able to,

1. Describe microorganisms based on nutrition
2. Know the concept of microbial growth and identify the factors affecting bacterial growth.
3. Explain the methods of nutrient uptake.
4. Describe anaerobic and aerobic energy production.
5. Elaborate on the process of bacterial photosynthesis and reproduction

TEXT BOOKS

1. Schlegel, H.G. (1993). General Microbiology, 7th Edition, Press syndicate of the University of Cambridge.
2. Rajapandian K. (2010). Microbial Physiology, Chennai: PBS Book Enterprises India.
3. Meena Kumari, S. Microbial Physiology, Chennai 1st Edition MJP Publishers 2006.
4. Dubey R.C. and Maheswari, S. (2003). A textbook of Microbiology, New Delhi: S. Chand & Co.
5. S. Ram Reddy, S.M. Reddy (2008). Microbial Physiology. Anmol Publications Pvt Ltd.

REFERENCE BOOK(S)

1. Robert K. Poole (2004). Advances in Microbial Physiology, Elsevier Academic Press, New York, Volume 49.
2. Kim B.H., Gadd G.M. (2008). Bacterial Physiology and Metabolism. Cambridge University Press, Cambridge.
3. Daniel R. Caldwell. (1995). Microbial Physiology & Metabolism Wm.C. Brown Communications, Inc. USA.
4. Moat, A.G and J.W Foaster (1995). Microbial Physiology, 3rd edition. Wiley – LISS, A John Wiley & Sons. Inc. Publications.
5. Bhanu Shrivastava. (2011). Microbial Physiology and Metabolism: Study of Microbial Physiology and Metabolism. Lambert academic Publication.

E-RESOURCES

1. <https://sites.google.com/site/microbialphysiologyoddsem/teaching-contents>
2. <https://courses.lumenlearning.com/boundless-microbiology/chapter/microbial-nutrition/>https://onlinecourses.swayam2.ac.in/cec20_bt14/preview
3. http://web.iitd.ac.in/~amittal/2007_Addy_Enzymes_Chapter.pdf
4. <https://www.frontiersin.org/microbial-physiology-and-metabolism>

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DEPARTMENT OF MICROBIOLOGY

B.Sc., MICROBIOLOGY

Semester: II- CC-IV: Practical –II – Microbial Physiology and Metabolism

Ins. Hours / Week: 4

Course Credit: 4

Course Code:U23MB204P

UNIT- I: (12 Hours)

Motility demonstration: hanging drop, wet mount preparation, semi-solid agar, Craigie's tube method. Staining techniques: Smear preparation, permanent specimen preparation, Capsular, and Acid-fast staining

UNIT-II: (12 Hours)

Direct counts – Direct cell count (Petroff-Hausser counting chamber), Turbidometry. Viable count - pour plate, spread plate. Bacterial growth curve.

UNIT-III: (12 Hours)

Anaerobic culture methods. Antibiotic sensitivity testing: Disc diffusion test- quality control with standard strains.

UNIT-IV: (12 Hours)

Morphological variations in algae, fungi and protozoa. Micrometry: Demonstration of the size of yeast, fungal filaments and protozoa.

UNIT-V: (12 Hours)

Methods of bacterial identification- morphological, physiological, and biochemical methods - IMViC test, H₂S, TSI, Oxidase, catalase, urease test, and Carbohydrate fermentation test. Maintenance of pure culture, paraffin method, stab culture, maintenance of mold culture.

Total Lecture Hours - 60

COURSE OUTCOME

After the completion of the course, students should be able to,

1. Describe hanging drop, wet mount preparation, semi-solid agar, Craigie's tube method

2. Demonstrate Smear preparation, permanent specimen preparation, Capsular, and Acid-fast staining.
3. Explain antibiotic sensitivity testing: Disc diffusion test- quality control with standard strains.
4. Describe demonstration of the size of yeast, fungal filaments and protozoa.
5. Elaborate on the bacterial identification- morphological, physiological, and biochemical methods.

TEXT BOOKS

1. James G Cappucino and N. Sherman MB (1996). A lab manual Benjamin Cummins, New York
2. Kannan. N (1996). Laboratory manual in General Microbiology. Palani Publications.
3. Sundararaj T (2005). Microbiology Lab Manual (1st edition) publications.
4. Gunasekaran. P (2007). Laboratory manual in Microbiology. New age international publisher.
5. Elsa Cooper (2018). Microbial Physiology: A Practical Approach. Callisto Reference publisher

REFERENCE BOOK(S)

1. David White., James Drummond., Clay Fuqua (2012) Physiology and Biochemistry of Prokaryotes. 4th Ed. Oxford University Press, New York.
2. Robert K. Poole (2004). Advances in Microbial Physiology, Elsevier Academic Press, New York, Volume 49.
3. Kim B.H., Gadd G.M. (2008). Bacterial Physiology and Metabolism. Cambridge University Press, Cambridge.
4. Dawes, I.W and Sutherland L.W (1992). Microbial Physiology (2nd edition), Oxford Blackwell Scientific Publications.
5. Moat, A.G and J.W Foaster, (1995). Microbial Physiology, 3rd edition. Wiley – LISS, A John Wiley & Sons. Inc. Publications.

E-RESOURCES

1. <https://sites.google.com/site/microbialphysiologyoddsem/teaching-contents>
2. <https://courses.lumenlearning.com/boundless-microbiology/chapter/microbial-Nutrition>

3. https://onlinecourses.swayam2.ac.in/cec20_bt14/preview
4. <https://www.studocu.com/microbial-physiology-practicals>
5. <https://www.agr.hokudai.ac.jp/microbial-physiology>

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DEPARTMENT OF MICROBIOLOGY

B.Sc., MICROBIOLOGY

Semester: II- AC-III: Bioinstrumentation

Ins. Hours / Week: 3

Course Credit: 2

Course Code:U23AMB201

UNIT- I: (9 Hours)

Basic instruments: pH meter, Buffer of biological importance, Centrifuge- Preparative, Analytical and Ultra, Laminar Air Flow, Autoclave, Hot Air Oven and Incubator. Biochemical calculations-preparations of Molar solutions - Buffers- Phosphate, Acetate, TE, TAE- calculation of Normality ,PPM- Ammonium sulphate precipitation.

UNIT- II: (9 Hours)

Spectroscopic Techniques: Spectroscopic Techniques: Colorimeter, Ultraviolet and visible, Infra red and Mass Spectroscopy.

UNIT- III: (9 Hours)

Chromatographic and Electrophoresis Techniques: Chromatographic Techniques: Paper, Thin Layer, Column, HPLC and GC. Electrophoresis Techniques: Starch Gel, AGE, PAGE.

UNIT- IV: (9 Hours)

Imaging techniques: Principle, Instrumentation and application of ECG, EEG, EMG, MRI, CT and PET scan radioisotopes.

UNIT- V: (9 Hours)

Fluorescence and radiation based techniques: Spectrofluorimeter, Flame photometer, Scintillation counter, Geiger Muller counter, Autoradiography.

Total Lecture Hours - 45

COURSE OUTCOME

After the completion of the course, students should be able to,

1. Gain knowledge about the basics of instrumentation.
2. Exemplify the structure of atoms and molecules by using the principles of spectroscopy.

3. Evaluate by separating and purifying the components.
4. Understand the need and applications of imaging techniques.
5. Categorize the working principle and applications of fluorescence and radiation.

TEXT BOOKS

1. Jayaraman J (2011). Laboratory Manual in Biochemistry, 2nd Edition. Wiley Eastern Ltd., New Delhi .
2. Ponmurugan. P and Gangathara PB (2012). Biotechniques.1st Edition. MJP publishers.
3. Veerakumari, L (2009).Bioinstrumentation- 5th Edition -.MJP publishers.
4. Upadhyay, Upadhyay and Nath (2002). Biophysical chemistry – Principles and techniques 3rd Edition. Himalaya publishing home.
5. Chatwal G and Anand (1989). Instrumental Methods of Chemical Analysis. S.Himalaya Publishing House, Mumbai.

REFERENCE BOOK(S)

1. Rodney.F.Boyer (2000). Modern Experimental Biochemistry, 3rd Edition. Pearson Publication.
2. SkoogA.,WestM (2014). Principles of Instrumental Analysis – 14th Edition W.B.SaundersCo.,Philadephia.
3. N.Gurumani. (2006). Research Methodology for biological sciences- 1st Edition – MJP Publishers .
4. Wilson K, and Walker J (2010). Principles and Techniques of Biochemistry and Molecular Biology.7th Edition. Cambridge University Press .
5. Webster, J.G. (2004). Bioinstrumentation- 4th Edition - John Wiley & Sons (Asia) Pvt. Ltd, Singapore.

E-RESOURCES

1. <http://www.biologydiscussion.com/biochemistry/centrifugation/centrifugeintroduction-types-uses-and-other-details-with-diagram/12489>
2. <https://study.com/academy/lesson/what-is-chromatography-definition-typesuses.html>
3. <https://www.watelectrical.com/biosensors-types-its-working-andapplications/>
4. <http://www.wikiscales.com/articles/electronic-analytical-balance/> Page 24 of 75
5. <http://www.rsc.org/learn-chemistry/collections/spectroscopy/introduction>

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



SUNDARAKKOTTAI, MANNARGUDI-614016.
(For the Candidates admitted in the academic year 2023-2024)

DEPARTMENT OF MICROBIOLOGY

B.Sc., MICROBIOLOGY

Semester: II- NME-II: Nutrition and Health Hygiene

Ins. Hours / Week: 2

Course Credit: 2

Course Code:U23NMEMB22

UNIT- I:

(6 Hours)

Nutrition – definition, importance, Good nutrition, and mal nutrition; Balanced Diet: Basics of Meal Planning. Carbohydrates, Lipids, Proteins and Vitamins –functions, dietary sources, effects of deficiency. Macro and micro minerals –functions, effects of deficiency; food sources of Calcium, Potassium, and Sodium; food sources of Iron, Iodine, and Zinc. Importance of water–functions, sources, requirements and effects of deficiency

UNIT- II:

(6 Hours)

Nutrition for Life Cycle: Balanced diet - Normal, Pregnant, lactating women, Infancy, young children Adolescents, Adults, and the Elderly; Diet Chart; Nutritive value of Indian foods.

UNIT- III:

(6 Hours)

Improper diets: Definition, Identification, Signs and Symptoms - malnutrition, under-nutrition, over-nutrition, Protein Energy Malnutrition, obesity; Nutritional Disease and Disorder - hypertension, diabetes, anemia, osteomalacia, cardiovascular disease.

UNIT- IV:

(6 Hours)

Health - Determinants of health, Key Health Indicators, Environment health & Public health; Health-Education: Principles and Strategies. Health Policy & Health Organizations: Health Indicators and National Health Policy of Govt. of India; Functioning of various nutrition and health organizations in India.

UNIT- V:

(6 Hours)

Hygiene – Definition; Personal, Community, Medical and Culinary hygiene; WASH (Water, Sanitation and Hygiene) programme. Rural Community Health: Village health sanitation & Nutritional committee. Community & Personal Hygiene: Environmental Sanitation and Sanitation in Public places.

COURSE OUTCOME

After the completion of the course, students should be able to,

1. Learn the importance of nutrition for a healthy life
2. Study the nutrition for life cycle
3. Know the health care programmes of India
4. Learn the importance of community and personal health & hygiene measures
5. Create awareness on community health and hygiene

TEXT BOOKS

1. Bamji, M.S., K. Krishnaswamy & G.N.V. Brahmam (2009) Textbook of Human Nutrition (3rd edition) Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi
2. Swaminathan (1995) Food & Nutrition (Vol I, Second Edition) The Bangalore Printing & Publishing Co Ltd., Bangalore
3. SK. Haldar (2022). Occupational Health and Hygiene in Industry. CBS Publishers.
4. Acharya, Sankar Kr, Rama Das, Minati Sen (2021). Health Hygiene and Nutrition Perception and Practices. Satish Serial Publishing House
5. Dass (2021). Public Health and Hygiene, Notion Press

REFERENCE BOOK(S)

1. Vijaya Khader (2000) Food, nutrition & health, Kalyan Publishers, New Delhi
2. Srilakshmi, B., (2010) Food Science, (5th Edition) New Age International Ltd., New Delhi
3. Arvind Kumar Goel (2005). A College Textbook of Health & Hygiene, ABD Publishers S
4. Sharma D. (2015). Textbook on Food Science and Human Nutrition. Daya Publishing House.
5. Revilla M. K. F., Titchenal A. and Draper J. (2020). Human Nutrition. University of Hawaii, Mānoa.

E-RESOURCES

1. National Rural Health Scheme:
<https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=969&lid=49>
2. National Urban Health Scheme:
<https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=970&lid=137>
3. Village health sanitation & Nutritional committee
<https://nhm.gov.in/index1.php?lang=1&level=1&sublinkid=149&lid=225>

4. Health Impact Assessment - <https://www.who.int/hia/about/faq/en/>
5. Healthy Living <https://www.nhp.gov.in/healthylivingViewall>

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DEPARTMENT OF MICROBIOLOGY

B.Sc., MICROBIOLOGY

Semester: II- SEC-I: Sericulture

Ins. Hours / Week: 2

Course Credit: 2

Course Code:U23SECMB21

UNIT- I: (6 Hours)

General introduction to Sericulture, its distribution in India. Botanical distribution and taxonomical characters of mulberry varieties and species. Biology of Mulberry plant and Mulberry crop cultivation and protection.

UNIT- II: (6 Hours)

Silkworm- biology-morphology of silkworm. Life cycle of silkworm- egg, larva, pupa, and moth.

UNIT- III: (6 Hours)

Silkworm pathology: Introduction to Parasitism, Commensalism, Symbiosis and Parasite relationship - Mulberry Silkworm Diseases: Introduction, types, Pebrine, Grasserie, Muscardine, Flacherie, Symptoms and Pathogens, Mode of Infection, Prevention and Control -Non – mulberry silkworm diseases: Pebrine, Bacterial and viral diseases. Brief Account of Pests and Predators of Silkworms, Nature of damage and control measures.

UNIT- IV: (6 Hours)

Rearing of silkworm. Cocoon assessment and processing technologies. Value added products of mulberry and silkworms.

UNIT- V: (6 Hours)

Entrepreneurship and rural development in sericulture: Planning for EDP, Project formulation, Marketing, Insectary facilities and equipments: Location, building specification, air conditioning and environmental control, furnishings and equipment, sanitation and equipment, subsidiary facilities.

COURSE OUTCOME

After the completion of the course, students should be able to,

1. Discuss the overall aspects of Sericulture and the biology and varieties of mulberry plant. Creates awareness among students about the economic importance and suitability of Sericulture in Indian conditions.
2. Familiarize with the lifecycle of silk worm.
3. Explain common diseases of silkworm encountered during rearing, sources of infection, disease symptoms, pre-disposing factors and their management practices.
4. Attain thorough knowledge about the cultivation of mulberry, maintenance of the farm, seed technology, silkworm rearing, post cocoon techniques like stifling, reeling, and utilization of by-products
5. Plan the facilities required for establishment of insectary. Competent to transfer the knowledge and technical skills to the Seri-farmers. Analyze the importance of sericulture in entrepreneurship development and emerge as potential entrepreneur.

TEXT BOOKS

1. Ganga, G. and Sulochana Chetty (2010). Introduction to Sericulture, J., Oxford and IBH Pub. Co. Pvt. Ltd., New Delhi.
2. Dr. R. K. Rajan & Dr. M. T. Himantharaj (2005). Silkworm Rearing Technology, Central Silk Board, Bangalore
3. Dandin S B, Jayant Jayaswal and Giridhar K (2010). Handbook of Sericulture technologies, Central Silk Board, Bangalore.
4. M. C. Devaiah, K. C. Narayanaswamy and V. G. Maribashetty (2010). Advances in Mulberry Sericulture, CVG Publications, Bangalore
5. T.V. Sathe and Jadhav. A.D. (2021). *Sericulture and Pest Management*, Daya Publishing House.

REFERENCE BOOK(S)

1. S. Morohoshi (2001). Development Physiology of Silkworms 2nd Edition, Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi
2. Hamamura, Y (2001). Silkworm rearing on Artificial Diet. Oxford & IBH publishing Co., Pvt. Ltd. New Delhi.
3. M. Johnson, M. Kesary (2019). Sericulture, 5th. Edition. Saras Publications.
4. Manisha Bhattacharyya (2019). Economics of Sericulture, Rajesh Publications.

5. Muzafar Ahmad Bhat, Suraksha Chanotra, Zafar Iqbal Buhroo, Abdul Aziz and Mohd. Azam (2020). A Textbook on Entrepreneurship Development Programme in Sericulture, IP Innovative Publication.

E-RESOURCES

1. <https://egyankosh.ac.in> › bitstream
2. <https://archive.org> › details › SericultureHandbook
3. <https://www.academic.oup.com>
4. <https://www.academic.oup.com>
5. <https://www.sericulture.karnataka.gov.in>
6. <https://www.silks.csb.gov.in>