

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE

(An Autonomous College)

Affiliated to Periyar University, Salem | Accredited by NAAC with 'A' Grade

Recognized by UGC under Section 2(f) & 12 (B)



ESTD-1994

**MUTHAYAMMAL
COLLEGE OF ARTS
AND SCIENCE**

(Autonomous)

A UNIT OF VANETRA GROUP

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DEGREE OF BACHELOR OF SCIENCE

Learning Outcomes - Based Curriculum Framework

- Choice Based Credit System

Syllabus for B.Sc., Microbiology (Semester Pattern)

(For Candidates admitted from the academic year
2021 -2022 and onwards)

MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE (AUTONOMOUS)

RASIPURAM - 637 408.

VISION

- ❖ To redefine the scope of higher education by infusing into each of our pursuits, initiatives that will encourage intellectual, emotional, social and spiritual growth, thereby nurturing a generation of committed, Knowledgeable and socially responsible citizens.

MISSION

- ❖ To Ensure State of the world learning experience
- ❖ To espouse value based Education
- ❖ To empower rural education
- ❖ To instill the sprite of entrepreneurship and enterprise
- ❖ To create a resource pool of socially responsible world citizens

QUALITY POLICY

To Seek – To Strive – To Achieve greater heights in Arts and Science, Engineering, Technological and Management Education without compromising on the Quality of Education.

DEPARTMENT OF MICROBIOLOGY

VISION

- ❖ To provide education that gives self employment and build a strong academic industry

MISSION

- ❖ To provide value and need based education

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- PEO1:** Graduates will be able to promote learning environment to meet the industry expectation.
- PEO2:** Graduates will be incorporated the critical thinking with good Communication and Leadership skills to become a self-employed
- PEO3:** Graduates will be uphold+A2 the human values and environmental sustenance for the betterment of the society..

GRADUATE ATTRIBUTES

Graduate Attributes of B.Sc., Microbiology are:

- | | |
|-----------------------------|-------------------------|
| GA 1 Analytical Reasoning | GA 5 Leadership Quality |
| GA 2 Critical Thinking | GA 6 Team work |
| GA 3 Problem Solving Skills | GA 7 Lifelong Learning |
| GA 4 Communication Skills | |

PROGRAMME OUTCOMES (POs)

- PO1:** Graduates will acquire dynamic skills through proper perception of the course objectives that leads to scientific and analytical comprehension of the concepts;
- PO2:** Graduates will focus on sustainable goals that might bring about spherical developments
- PO3:** Graduates will infuse a spirit converging on bricking a team work, interpersonal and administrative skills to think critically and execute effectively
- PO4:** Graduates will apply reasoning appropriately to scale the humps in learning and solute them to the core.
- PO5:** Graduates will engage the skills obtained in independent and collaborative learning as a perennial process.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

After the successful completion of B.Sc. Program, the students are expected to

PSO1: Learn recent development and techniques in Microbiology

PSO2: Understand the general course emphasizing distribution, morphology and physiology of microorganisms in addition to skills in aseptic procedures, isolation and identification of microorganisms

PSO3: Application of knowledge and techniques of basic sciences related to biological sciences

PSO4: Scale up of biochemical process after designing, optimization and analysis for developing products required for society

PSO5: Implementation of professional skills solutions for the betterment of society keeping the environmental context in mind, be aware of professional ethics and communicate effectively



S.No.	PART	STUDY COMPONENTS	COURSE_CODE	TITLE OF THE COURSE	Hrs./W		CREDIT POINTS	MAX.MARKS		
					Lect.	Lab.		CIA	ESE	TOTAL
SEMESTER - I										
1	I	LANGUAGE-I	21M1UFTA01	TAMIL - I	6		3	25	75	100
2	II	LANGUAGE-II	21M1UCEN01	COMMUNICATIVE ENGLISH - I	6		3	25	75	100
3	III	DSC THEORY - I	21M1UMBC01	BASICS OF MICROBIOLOGY	4		4	25	75	100
4	III	DSC PRACTICAL - I	21M1UMBCP01	PRACTICAL : BASICS OF MICROBIOLOGY		3	2	40	60	100
5	III	GEC THEORY - I	21M1UBCA01	ALLIED- BIOCHEMISTRY- I	4		4	25	75	100
6	III	GEC PRACTICAL - I	21M1UMBCP01	ALLIED: PRACTICAL -BIOCHEMISTRY		3				
7	IV	AECC - VALUE EDUCATION	21M1UVED01	YOGA	1		2	100		
8	IV	PROFESSIONAL ENGLISH - I	21M1UPEL01	PROFESSIONAL ENGLISH FOR LIFE SCIENCES -I	3		2	25	75	100
				TOTAL	24	6	20	265	435	600
SEMESTER - II										
1	I	LANGUAGE - I	21M2UFTA02	TAMIL - II	6		3	25	75	100
2	II	LANGUAGE - II	21M2UCEN02	COMMUNICATIVE ENGLISH - II	6		3	25	75	100
3	III	DSC THEORY - II	21M2UMBC02	MICROBIAL PHYSIOLOGY AND METABOLISM	4		4	25	75	100
4	III	DSC PRACTICAL - II	21M2UMBCP02	PRACTICAL: MICROBIAL PHYSIOLOGY		3	2	40	60	100
5	III	GEC THEORY - II	21M2UBCA02	ALLIED- BIOCHEMISTRY-II	4		4	25	75	100
6	III	GEC PRACTICAL - I	21M2UBCAP1	ALLIED: PRACTICAL -BIOCHEMISTRY		3	3	40	60	100
7	IV	AECC - ENVIRONMENTAL STUDIES	21M2UEVS01	ENVIRONMENTAL STUDIES	2		2	100		
8	IV	PROFESSIONAL ENGLISH - II	21M2UPEL02	PROFESSIONAL ENGLISH FOR LIFE SCIENCES-II	2		2	25	75	100
				TOTAL	24	6	23	305	495	700
SEMESTER - III										
1	I	LANGUAGE - I	21M3UFTA03	TAMIL - III	6		3	25	75	100
2	II	LANGUAGE - II	21M3UCEN03	COMMUNICATIVE ENGLISH - III	6		3	25	75	100
3	III	DSC THEORY - III	21M3UMBC03	MICROBIAL GENETICS AND MOLECULAR BIOLOGY	5		4	25	75	100
4	III	DSC PRACTICAL - III	21M3UMBCP03	PRACTICAL: MICROBIAL GENETICS		3	2	40	60	100
5	III	GEC THEORY - III	21M3USTA03	ALLIED- BIostatISTICS	5		4	25	75	100
6	IV	SEC - I	21M3UMBS01	SEC - I- BIOINSTRUMENTATION	3		2	25	75	100
7	IV	NMEC - I	21M3UBTN01	NMEC - I	2		2	25	75	100
				TOTAL	27	3	20	190	510	700



MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE(Autonomous) - Rasipuram - 637 408

Scheme of Examinations LOCF-CBCS Pattern

(for the Students Admitted from the Academic Year:2021-2022 Onwards)

Programme : B.Sc.MICROBIOLOGY

S.No.	PART	STUDY COMPONENTS	COURSE_CODE	TITLE OF THE COURSE	Hrs./W		CREDIT POINTS	MAX.MARKS		
					Lect.	Lab.		CIA	ESE	TOTAL
SEMESTER - IV										
1	I	LANGUAGE - I	21M4UFTA04	TAMIL - IV	5		3	25	75	100
2	II	LANGUAGE - II	21M4UCEN04	COMMUNICATIVE ENGLISH - IV	5		3	25	75	100
3	III	DSC THEORY - IV	21M4UMBC04	IMMUNOLOGY AND IMMUNOTECHNOLOGY	5		4	25	75	100
4	III	DSC PRACTICAL - IV	21M4UMBCP04	PRACTICAL : IMMUNOLOGY		3	2	40	60	100
5	III	GEC THEORY - IV	21M4UCSA05	COMPUTER APPLICATIONS IN BIOLOGY	4		3	25	75	100
6	III	GEC PRACTICAL - II	21M4UCSAP05	ALLIED: OFFICE AUTOMATION		3	2	40	60	100
7	IV	SEC - II	21M4UMBS02	SEC - II	2		2	25	75	100
8	IV	NMEC - II	21M4UBTN02	NMEC - II	2		2	25	75	100
				TOTAL	23	6	21	230	570	800
SEMESTER - V										
1	III	DSC THEORY - V	21M5UMBC05	MEDICAL BACTERIOLOGY AND MYCOLOGY	5		5	25	75	100
2	III	DSC THEORY - VI	21M5UMBC06	FOOD AND INDUSTRIAL MICROBIOLOGY	5		5	25	75	100
3	III	DSE - I	21M5UMBE01	ELECTIVE - I	5		5	25	75	100
4	III	DSE - II	21M5UMBE02	ELECTIVE - II	5		5	25	75	100
5	III	DSC PRACTICAL - V	21M5UMBCP05	PRACTICAL : MEDICAL MICROBIOLOGY & FOOD MICROBIOLOGY		3	2	40	60	100
6	IV	SEC - III	21M5UMBS03	SEC - III	3		2	25	75	100
				TOTAL	23	3	24	165	435	600
SEMESTER - VI										
1	III	DSC THEORY - VII	21M6UMBC07	AGRICULTURAL MICROBIOLOGY AND PLANT PATHOLOGY	5		5	25	75	100
2	III	DSC THEORY - VIII	21M6UMBC08	ENVIRONMENTAL MICROBIOLOGY AND BIODEGRADATION	5		5	25	75	100
3	III	DSE - III	21M6UMBE03	ELECTIVE - III	5		5	25	75	100
4	III	DSE - IV	21M6UMBE04	ELECTIVE - IV	5		5	25	75	100
5	III	DSC PRACTICAL -VI	21M6UMBCP06	PRACTICAL : AGRICULTURAL & ENVIRONMENTAL MICROBIOLOGY		3	2	40	60	100
6	III	PROJECT WORK	21M6UMBPR1	PROJECT WORK		8	4	40	60	100
7	III	ONLINE - COMPETITIVE EXAMINATION	21M6UMBOE1	MICROBIOLOGY FOR COMPETITIVE EXAM			2	100		
8	IV	SEC - IV	21M6UMBS04	SEC - IV	4		2	25	75	100
9	V	EXTENSION ACTIVITY	21M6UEXA01	EXTENSION ACTIVITY			2	100		
				TOTAL	24	11	32	405	495	700
				OVER ALL TOTAL	145	35	140	1560	2940	4100

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Principal
PRINCIPAL
MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
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UG-REGULATION

1. Internal Examination Marks- Theory

Components	Marks
CIA I&II	15
Attendance	5
Assignment	5
Total	25

Attendance Percentage	Marks
96 %to 100%	5
91%to 95%	4
86%to 90%	3
81%to 85%	2
75%to 80%	1
Below 75%	0

2. QUESTION PAPER PATTERN FOR CIA I, II AND ESE (3 HOURS) MAXIMUM: 75 Marks

SECTION-A (10 Marks) (Objective Type)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks (10 x1=10 marks)

SECTION-B (10 Marks) (Short Answer)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks (5 x 2 = 10 marks)

SECTION-C (25 Marks) (Either or Type)

Answer any **FIVE** questions

ALL Questions Carry **EQUAL** Marks

Either or Type. (5 x 5 = 25 marks)

SECTION-D (30 Marks) (Analytical Type)

Answer any **THREE** Questions out of **FIVE** questions

ALL Questions Carry **EQUAL** Marks

(3 x 10 = 30 marks)

(Syllabus for CIA-I 2.5 Unit , Syllabus for CIA-II All 5 Unit)

2a) Components for Practical CIA.

Components	Marks
CIA –I	15
CIA - II	15
Observation Note	5
Attendance	5
Total	40

2. b) Components for Practical ESE.

Components	Mark s
Completion of Experiments	50
Record	5
Viva	5
Total	60

3. Guidelines for Value Education Yoga and Environmental Studies (Part IV)

- The Course Value Education
Yoga is to be treated as 100% CIA course which is offered in I Semester for I year UG students.
- The Course Environmental Studies is to be treated as 100% CIA course which is offered in II Semester for I year UG students.
- Total Marks for the Course=100

Components	Marks
Two Tests (2 x30)	60
Field visit and report (10+10)	20
Two assignments (2 x10)	20
Total	100

The passing minimum for this course is 40%

- In case, the candidate fails to secure 40% passing minimum, he/she may have to reappear for the same in the subsequent odd / even semesters.

4. Guidelines for Extension Activity (Part V)

- At least two activities should be conducted within semester consisting of two days each.
- The activities may be Educating Rural Children, Unemployed Graduates, Self Help Group etc.

The marks may be awarded as follows,

No of Activities	Marks
2 x50 (Each Activity for two days)	100

5. Internship/Industrial Training, Mini Project and Major Project Work

Internship/Industrial Training		Mini Project	Major Project Work	
Components	Marks	Marks	Components	Marks
CIA*²			CIA	
Work Diary	25	-	a) Attendance 10 Marks	40
Report	50	50	b) Review /Work Diary* ¹ 30 Marks	
Viva-voce Examination	25	50		
Total	100	100	ESE*²	
			a)Final Report 40Marks	60
			b)Viva-voce 20Marks	
			Total	100

*¹Review is for Individual Project and Work Diary is for Group Projects (Group consisting of minimum 3 and maximum 5)

*²Evaluation of report and conduct of viva voce will be done jointly by Internal and External Examiners

6. Guidelines for Competitive Exams- Online Mode (PartIII)- Online Exam 3 hours

Components	Marks
100 Objective Type Questions 100*1=100 Marks	100

Objective type Questions from Question Bank.

- The passing minimum for this paper is 40%
- In case, the candidate fails to secure 40% passing minimum, he/she may have to reappear for the same in the subsequent semesters.

B.Sc-Microbiology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards

Course Code	Course Title	Course Type	Sem.	Hours	L	T	P	C
21M1UMBC01	BASICS OF MICROBIOLOGY	DSC THEORY - I	I	4	4	-	-	4
Objective	This subject aims to introduce the history, invention and development of Microbiology for the beginners to progressive advancement							
Unit	Course Content						Knowledge Levels	Sessions
I	Definition and scope of Microbiology – History and recent developments Spontaneous generation – Biogenesis Contributions of Leeuwenhoek, Louis Pasteur, Robert Koch, Elie Metchnikoff and Fleming.						K1-K2	9
II	Microscopy – Simple and compound Microscopy – Dark field – Phase contrast – Fluorescence and Electron Microscopy.						K1-K2	9
III	Microbial Evolution and Diversity – Endo symbiotic theory. Binomial nomenclature of Microbes. Classification - Five kingdoms concept - Eight kingdoms concept (Cavalier Smith).						K1-K2	9
IV	Anatomy of prokaryotes - cell wall, cytoplasmic membrane, cilia, flagella capsule, cytoplasmic inclusions, sporulation. Stain and Staining techniques – Simple, differential and special staining.						K1-K3	9
V	Sterilization - methods of sterilization and Disinfection. Antimicrobial chemotherapy - tests for sensitivity to antimicrobial agents.						K1-K3	9
Course Outcome	CO1: Students will remember and understanding about the history and inventions.						K1	
	CO2: To understand the concepts of microscopy and its applications.						K2	
	CO3: Illustrate the knowledge about microbial evolution and diversity.						K2	
	CO4: Apply the information on anatomy of prokaryotes and its observations.						K3	
	CO5: Apply the previous learning to current applications.						K3	
Learning Resources								
Text Books	1. Pelczar Jr. M.J. Chan. E.C.S and Krelg. N.R (2006). "Microbiology"- 5th Edition McGraw Hill Inc. New York. 2. Hans G. Schlegel. General microbiology. 7'h edition. Cambridge university press (1993).							

Reference Books	1. Prescott L M, J P Harley and D A Klein (2005). Microbiology. Sixth edition, International edition, McGraw Hill. 2. Joanne Willey and Kathleen Sandman and Dorothy Wood, 2020, Prescott's Microbiology, ISBN10: 1260211886 Willey. 3. Sundara Rajan S (2003). College Microbiology. Volume 1 & 2. Revised Edition, Vardhana Publications, Bangalore.					
Website Link	1. https://www.elsevier.com/books/encyclopedia-of-microbiology/schmidt/978-0-12-811736-1 2. https://www.researchgate.net/publication/324037626_Basic_Medical_Microbiology 3. https://www.researchgate.net/publication/264121594_A_textbook_of_Microbiology					
	L-Lecture	T-Tutorial	P-Practical	C-Credit		

B.Sc-Microbiology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards

Course Title	Course Type	Sem.	Hours	L	T	P	C
21M1UMBC01	BASICS OF MICROBIOLOGY	DSC THEORY - I	I	4	4	-	4

CO-PO Mapping

P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
S	S	M	M	S	S	L	S	S	M
S	S	M	M	S	S	L	S	S	L
S	S	M	M	S	S	M	S	S	S
S	S	M	S	S	S	M	S	S	S
S	L	M	S	S	S	M	S	S	M

L-LOW

M-MEDIUM

S-STRONG

Tutorial Schedule

Teaching and Learning Methods

Audio Video lecture, Chalk and Board class, Poster Presentation, PPT, Video presentation

Assessment Methods

Model Practical Test, Group Project, Model Presentation

Designed By

Verified By

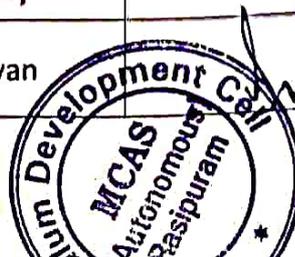
Approved By

Mrs.S.Vahithabanu

Dr.M.Selvan

for R/O

[Signature]



[Signature]

B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards

Course Code	Course Title	Course Type	Sem.	Hours	L	T	P	C
21M1UMBCP01	Practical : Basics of Microbiology	CORE PRACTICAL - I	I	3	-	-	3	2
Objective	To learn about the basic physiological factors and bacterial identification methods							
S.No.	Course Content	Knowledge Levels	Sessions					
1	Laboratory practice & precautions	K1	3					
2	Handling of Instruments & cleaning of glassware's.	K1	3					
3	Handling of microscopes and its operations	K1-K2	3					
4	Handling of laboratory instruments a. Autoclave b. Hot air oven c. Laminar air flow d. pH meter e. Colony counter f. Incubator g. Anaerobic jar.	K1-K3	6					
5	Staining techniques a. Smear preparation: Heat fixation, simple staining procedure b. Differential staining (Gram's and Acid fast staining) c. Special staining (Spore and Capsular staining methods)	K1-K3	9					
6	Media preparation a. Liquid media – Peptone water, Nutrient broth. b. Solid media – Nutrient agar (Agar slant, Agar plate – streaking method c. Enriched Medium – Blood agar d. Differential medium – Mac Conkey agar, SS Agar. e. Selective medium – EMB, MSA.	K1-K4	9					
7	Anaerobic cultivation –Wright's tube method (Demonstration)	K1-K4	3					
Course Outcome	CO1: Remember the laboratory Practices and Precautions in Microbiology Laboratory.	K1						
	CO2: Understand the basic instruments handling and cleaning.	K2						
	CO3: Understand and apply the various staining methods for identifying bacteria.	K3						
	CO4: Apply and analyze the various types of media preparations for bacterial growth.	K4						
	CO5: Apply and survey the anaerobic cultivation of bacteria.	K4						
Learning Resources								

Text Books	1. Aneja KR (2005). Experiments in Microbiology, Plant pathology and Biotechnology. 4th Edition, New Age International Publishers, Chennai. 2. James Cappuccino. Microbiology: A Laboratory Manual (10th Edition). Kannan N (2003). Handbook of Laboratory Culture Media, Reagents, Stains and Buffers. Panima Publishing Corporation, New Delhi.
Reference Books	1. Dubey RC and Maheswari DK (2004). Practical Microbiology 1st Edition, S.Chand & Company Ltd., New Delhi. 2. Prescott, L.M J.P. Harley and C.A. Klein 1995. Microbiology 2nd edition Wm, C. Brown publishers.
Website Link	1. https://www.frontiersin.org/books/Microbial_Physiology_and_Metabolism 2. https://onlinelibrary.wiley.com/doi/book/10.1002/0471223867 3. https://bio.libretexts.org/Learning_Objects/Laboratory_Experiments/Microbiology_Labs/Book%3A_General_Microbiology_Lab_Manual_(Pakpour_and_Horgan)

B.Sc-Microbiology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards											
Course Code	Course Title				Course Type	Sem.	Hours	L	T	P	C
21M1UMBCP01	PRACTICAL: BASICS OF MICROBIOLOGY				DSC PRACTICAL - I	I	3	-	-	3	2
CO-PO Mapping											
CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	S	S	M	M	S	S	L	S	S	M	
CO2	S	S	M	M	S	S	L	S	S	L	
CO3	S	S	M	M	S	S	M	S	S	S	
CO4	S	S	M	S	S	S	M	S	S	S	
CO5	S	L	M	S	S	S	M	S	S	M	
Level of Correlation between CO and PO	L-LOW	M-MEDIUM		S-STRONG							
Tutorial Schedule											
Teaching and Learning Methods						Audio Video lecture, Chalk and Board class, Poster Presentation, PPT, Video presentation					
Assessment Methods						Model Practical Test, Group Project, Model Presentation					
Designed By			Verified By			Approved By					
Mrs.S.Vahithabanu			Dr.M. Ivan			D. Ivan 07/02/23					

for 





Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2UMBC02	MICROBIAL PHYSIOLOGY AND METABOLISM	DSC THEORY - II	II	4	4			4
Objective	To understand the kinetics of microbial growth and influence of varied physio - chemical parameters							
Unit	Course Content						Knowledge Levels	Sessions
I	Nutritional requirements of Microorganisms- Autotrophs, Heterotrophs, Chemotrophs, Copiotrophs and Oligotrophs. Transport Mechanisms - Diffusion- Facilitated Diffusion, Active transport- Group translocation.						K1-K2	9
II	Different phases of growth - Growth curve - Generation time - Factors influencing microbial growth - Temperature, pH, hydrostatic pressure and radiation synchronous growth and continuous cultivation. Diauxic growth, Sporulation – Endospore formation in bacteria.						K1-K3	9
III	Metabolism - EMP, HMP, EDPathway - TCA cycle - Electron transport chain, Phosphorylation, Oxidative Phosphorylation, Substrate level Phosphorylation						K1-K2	9
IV	Anaerobic respiration - sulphur, nitrogenous compounds and CO ₂ as a final electron acceptor- Fermentation: Alcoholic fermentation, mixed acid fermentation, lactic acid fermentation						K1-K3	9
V	Photosynthesis - Characteristics and types of Photosynthetic Prokaryotes. CO ₂ fixation Oxygenic and Anoxygenic - Bio luminescence.						K1-K3	9
Course Outcome	CO1: Remember about the basic nutritional requirements of Microorganisms.						K1	
	CO2: Understand the knowledge on the growth pattern of microorganisms.						K2	
	CO3: Understand the information on energy deriving mechanism.						K2	
	CO4: Interpret the information on synthesis of organic molecules via respiration.						K3	
	CO5: Show the information on synthesis of organic molecules via photosynthesis.						K3	
Learning Resources								
Text Books	1. Prescott L M, J P Harley and D A Klein (2005). Microbiology. Sixth edition, International edition, McGraw Hill. 2. Moat G, John W. Foster and Michael P. Spector (2002). Microbial physiology. Fourth edition, A John Wiley sons, Inc. publication. New Delhi.							



Reference Books	1. Pelczar TR M J Chan ECS and Kreig N R (2006). Microbiology. Tata McGraw-Hill INC., New York. 2. Robert F Boyd (1984). General Microbiology. Times mmor I Mosby college publishers. 3. David white. The physiology and biochemistry of prokaryotes. Oxford university press. 4th edition (2011).				
Website Link	1. https://www.elsevier.com/books/bacterial-physiology-and-metabolism/sokatch/978-1-4832-3137-2 . 2. https://www.frontiersin.org/journals/microbiology/sections/microbial-physiology-and-metabolism . 3. https://www.macmillanlearning.com/college/ca/product/Lehninger-Principles-of-Biochemistry/p/1319228003				
	L-Lecture	T-Tutorial	P-Practical	C-Credit	

B.Sc-Microbiology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards											
Course Code	Course Title				Course Type	Sem	Hours	L	T	P	C
21M2UMBC02	MICROBIAL PHYSIOLOGY AND METABOLISM				DSC THEORY - II	II	4	4			4
CO-PO Mapping											
CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	S	S	M	S	S	S	S	S	S	S	
CO2	S	S	S	S	S	S	S	S	S	S	
CO3	S	S	S	S	S	S	S	S	S	S	
CO4	S	M	M	M	M	S	M	S	S	L	
CO5	S	M	M	M	M	S	M	S	S	L	
Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG								
Tutorial Schedule											
Teaching and Learning Methods					Audio Video lecture, Chalk and Board class, Assignment, Poster Presentation, PPT, Video presentation						
Assesment Methods					Unit Test, Class Test, Assignment, Internal Examination, Model Presentation						
Designed By					Verified By			Approved By			
Mrs.N.Sathyabama					Dr.M.Selvan			A-h. sany			



B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2UMBCP02	PRACTICAL : MICROBIAL PHYSIOLOGY	DSC PRACTICAL - II	II	3	-	-	3	2
Objective	To learn about the basic physiological factors and bacterial identification methods							
S.No.	Course Content	Knowledge Levels	Sessions					
1	Pure culture techniques: streak, spread and pour plate methods	K1-K3	3					
2	Culture characteristics of Microorganisms- colony morphology, shape and margin	K2-K3	3					
3	Motility determination - Hanging drop method and semisolid agar	K2-K3	2					
4	Staining of microorganisms – Grams staining, AFB staining, Capsular staining and spore staining	K2-K4	6					
5	Biochemical test- IMViC test, Oxidase test, Catalase test, Urease test, and Nitrate reduction test	K2-K4	6					
6	Enzymatic Hydrolysis of Starch, Gelatin and Casein	K2-K4	6					
7	Bacterial Growth curve	K2-K4	3					
8	Studying the effect of temperature, pH, carbon and nitrogen sources on bacterial growth	K2-K4	3					
9	Anaerobic cultivation- candle jar, gas pack and Pyrogallol method	K2-K4	3					
Course Outcome	CO1: Remember the methods of isolation of bacteria.	K1						
	CO2: Understand the basic identification methods.	K2						
	CO3: Demonstrate the various biochemical identification of bacteria.	K3						
	CO4: Compare the parameters of bacterial growth.	K4						
	CO5: Assess the anaerobic cultivation of bacteria.	K5						
Learning Resources								
Text Books	1. Aneja KR (2005). Experiments in Microbiology, Plant pathology and Biotechnology. 4th Edition, New Age International Publishers, Chennai. 2. Sundararaj T. Microbiology laboratory manual. Revised and published by Aswathy Sundararaj. No.5 First Cross Street, Thirumalai Nagar, Perungudi, Chennai.							
Reference Books	1. James G Cappuccino and Natalie Sherman (2004). Microbiology: A laboratory manual. Sixth edition, Published by Pearson Education.							

	<p>2. Kannan N (1996). Laboratory Manual in General Microbiology. First edition, Palani Paramount Publications, Palani. Tamil Nadu.</p> <p>3. Harold J Benson (1998). Microbiological Applications Laboratory Manual in General Microbiology. Seventh International edition, Me Grew - Hill, Boston.</p>
Website Link	<p>1. https://www.frontiersin.org/books/Microbial_Physiology_and_Metabolism</p> <p>2. https://onlinelibrary.wiley.com/doi/book/10.1002/0471223867</p> <p>3. https://bio.libretexts.org/Learning_Objects/Laboratory_Experiments/Microbiology_Labs/Book%3A_General_Microbiology_Lab_Manual_(Pakpour_and_Horgan)</p>

B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards											
Course Code		Course Title		Course Type		Sem	Hours	L	T	P	C
21M2UMBCP02		PRACTICAL : MICROBIAL PHYSIOLOGY		DSC PRACTICAL - II		II	3	-	-	3	2
CO-PO Mapping											
CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	S	S	M	M	S	S	L	S	S	L	
CO2	S	S	M	M	S	S	L	S	S	L	
CO3	S	S	M	M	S	S	M	S	S	L	
CO4	S	S	M	M	S	S	M	S	S	L	
CO5	S	S	M	M	S	S	M	S	S	L	
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG		
Tutorial Schedule											
Teaching and Learning Methods						Audio Video lecture, Chalk and Board class, Poster Presentation, Demonstration and Video presentation					
Assessment Methods						Model practical and ESE					
Designed By						Verified By			Approved By		
Mrs.N.Sathyabama						Dr.M.Selvan			A-h-ban		



Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3UMBC03	MICROBIAL GENETICS AND MOLECULAR BIOLOGY	DSC THEORY - III	III	4	4	-	-	4
Objective	To make the students to understand the genetics and molecular biology of microbes. To gather the sound knowledge about gene expressions of target genes.							
Unit	Course Content					Knowledge Levels	Sessions	
I	Historical introduction: DNA as a genetic material: Experiments of Griffith, Avery, Hershey chase experiment, RNA as a genetic material- Singer experiment, DNA and RNA structure, physical and chemical properties and their types. Cell cycle- Mitosis and Meiosis.					K1-K2	9	
II	DNA replication and Mutation: DNA replication in prokaryotes - Meselson-Stahl experiment, Mechanism and enzymology of replication, DNA polymerase III structure. Mutation – types of mutation, spontaneous and induced mutation. DNA repair mechanisms.					K1-K2	9	
III	Transcription and Translation: Transcription in prokaryotes- Initiation, chain elongation and termination of transcription. Translation of proteins - Initiation, elongation and termination of translation. Post translational modification of proteins.					K1-K2	10	
IV	Genetic code and gene expression: Genetic code- salient features, regulation of gene expression in prokaryotes- Lac operon and trp operon.					K1-K2	8	
V	Gene Transfer: An Introduction to Transformation, Conjugation and Transduction (Specialized and Generalized). Transposons. Extra chromosomal DNA- Plasmids and Episomes.					K1-K2	9	
Course Outcome	CO1: Remember about the biomolecules and its mechanisms.					K1		
	CO2: Understand the knowledge about DNA replication process and its complications.					K2		
	CO3: Understand about the biomolecule synthesis.					K2		
	CO4: Produce the knowledge about gene expression.					K3		
	CO5: Apply the knowledge about Gene transfer methods.					K3		
Learning Resources								

Text Books	1. David Frifelder. Microbial Genetics, Narosa publishing house, New Delhi. 1990 2. Daniel L Hartl and Elizabeth W Jones. Genetics-Analysis of Genes and Genomes, Jones and Bartlett publishers, UK. 2001.			
Reference Books	1. Stanly R Maloy, John E Cronan Jr. and David Freifelder. Microbial Genetics, 2nd edition, Narosa publishing house, New Delhi. 2006. 2. David Frifelder. Molecular Biology, Narosa publishing house, New Delhi. 2nd edition. 2008. 3. Lodish H, Baltimore D, Berk A, Zipsury SL, Matsudaira P, Darnell J. Molecular Cell Biology. Scientific American Books. 1995.			
Website Link	1. https://openstax.org/books/concepts-biology/pages/9-2-dna-replication 2. https://en.wikipedia.org/wiki/Transcription_(biology) 3. https://www.goodreads.com/book/show/30631594-freifelder-s-essentials-of-molecular-biology-4th-edition-pb			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc-Microbiology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards											
Course Code	Course Title				Course Type	Sem	Hours	L	T	P	C
21M3UMBC03	MICROBIAL GENETICS AND MOLECULAR BIOLOGY				DSC THEORY - III	III	4	4			4
CO-PO Mapping											
CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	S	S	S	S	S	S	M	S	M	M	
CO2	S	S	S	S	S	M	M	S	M	M	
CO3	S	S	S	S	S	S	M	S	M	M	
CO4	S	S	S	S	S	S	S	S	S	S	
CO5	S	S	S	S	S	M	S	S	S	S	
Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG								
Tutorial Schedule											
Teaching and Learning Methods				Audio Video lecture, Chalk and Board class, Assignment, Poster Presentation, PPT, Video presentation							
Assesment Methods				Unit Test, Class Test, Assignment, Internal Examination, Model Presentation							
Designed By				Verified By				Approved By			
Dr.M.Sankareswaran				Dr.M.Selvan				A. L. Suman			



B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards

Course Code	Course Title	Course Type	Sem.	Hours	L	T	P	C
21M3UMBCP03	Practical : Microbial Genetics	DSC PRACTICAL - III	III	3	-	-	3	2
Objective	To understand molecular techniques used to isolation and identifications of biomolecules							
S.No.	Course Content	Knowledge Levels	Sessions					
1	Observation of mitosis from onion root tip.	K1-K3	3					
2	Isolation of Genomic DNA from Bacteria.	K2-K3	3					
3	Isolation of Plasmid DNA from Bacteria.	K2-K3	3					
4	Separation of DNA by Agarose gel Electrophoresis.	K2-K3	3					
5	Isolation of Auxotrophic mutant by replica plate method.	K2-K3	3					
6	Isolation of drug resistant mutants by gradient plate method.	K2-K3	3					
7	Isolation of phage from Sewage	K2-K3	3					
8	Transformation (Demonstration)	K2	2					
9	Estimation of DNA by DPA method (Demonstration)	K2	2					
Course Outcome	CO1: Remember the cell division in onion root tip.	K1						
	CO2: Understand the method of isolation and separation of DNA	K2						
	CO3: Apply the knowledge about the bacterial mutants.	K3						
	CO4: Apply the knowledge about isolation of bacteriophage.	K3						
	CO5: Apply the molecules transformation.	K3						
Learning Resources								
Text Books	1. Atlas RM and Bartha R. Microbial Ecology: Fundamentals and Applications, 3rd Ed., Benjamin and Cummings Pub. Co. New York. 1993. 2. Rajan S. Manual for Medical Laboratory Technology. Anajanaa Book House, Chennai. 2012. 3. Rajan S and Selvi Christy R. Experimental Procedures in Life Sciences. Anajanaa Book House, Chennai Monica Chees brough. District Laboratory Practice in Tropical Countries - Part I and II, 2nd edition, Cambridge University Press, New Delhi. 2011.							
Reference Books	1. Betty A Forbes, Daniel F Sahm and Alice S Weissfeld. Bailey and Scott's Diagnostic Microbiology, Mosby Elsevier. 12th Edition. 2007. 2. Mackie and McCartney (2006) Practical Medical Microbiology, South Asia Edition. 14th edition. 3. James G Cappuccino and Natalie Sherman. Microbiology - A Laboratory Manual (4th edition).The Benjamin publishing company, New York. 1996.							
Website Link	1. https://www.researchgate.net/publication/280111071_Microbiology_Microbial_Genetics_Molecular_Biology_and_Biochemistry 2. https://www.asmscience.org/content/book/10.1128/9781555817480 3. https://bio.libretexts.org/Learning_Objects/Laboratory_Experiments/Microbiology_Labs/Book%3A_General_Microbiology_Lab_Manual_(Pakpour_and_Horgan)							

B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards

Course Code

Course Code	Course Title		Course Type	Sem.	Hours	L	T	P	C	
21M3UMBCP03	Practical : Microbial Genetics		DSC PRACTICAL - III	III	3	-	-	3	2	
CO-PO Mapping										
CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	S	S	S	L	S	S	M
CO2	S	M	S	S	S	S	L	S	S	M
CO3	S	M	S	M	S	S	L	S	S	S
CO4	S	M	S	M	S	S	L	S	S	S
CO5	S	M	S	M	S	S	L	S	S	S
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG	
Tutorial Schedule				-						
Teaching and Learning Methods				Audio Video lecture, Chalk and Board class, Poster Presentation, Demonstration and Video presentation						
Assessment Methods				Model practical and ESE						
Designed By				Verified By			Approved By			
Mrs.S.Subana				Dr.M.Selvan						







B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	Ç
21M4UMBC04	IMMUNOLOGY AND IMMUNOTECHNOLOGY	DSC THEORY - IV	IV	5	3	2	-	4
Objective	Explain the structural components and functioning of immune systems							
Unit	Course Content					Knowledge Levels	Sessions	
I	Introduction of immune system: History and scope of immunology, Innate immunity and acquired immunity, Phagocytosis. Haematopoeisis- Cells – Lymphocytes, B –cell, T- cell and Ag presenting cells (macrophage, Dendritic cell and Lymphocytes) - organs- primary and secondary lymphoid organs.					K1-K2	12	
II	Antigens and Antibodies: Antigen -Properties of antigen, immunogen, Adjuvant, Hapten. Antibody- structure and types. Complement - classical and alternative pathways. Monoclonal antibodies (Hybridoma technology) and its applications.					K1-K2	12	
III	Auto immune diseases & Hypersensitivity: Auto immune diseases - Types and mechanisms. Hypersensitivity reactions - types, Antibody mediated (Type- I, Type II, Type III) and Cell mediated (Type- IV).					K2	12	
IV	Hematology & Transplantation: Immuno hematology, Blood group, Rh - incompatibilities. Transplantation Immunology - HLA Tissue Typing - mechanism of acceptance and rejection. Vaccines - Types, Immunization schedule.					K1-K3	12	
V	Antigen - Antibody reactions: Definition and Diagnostic Techniques: Agglutination, Precipitation – ODD, IFT, Flocculation. Immuno electrophoresis - RIA- CFT- ELISA.					K3	12	
Course Outcome	CO1: Remember the structural components and mechanisms of immune system.					K1		
	CO2: Understand the knowledge about the role of immune system.					K2		
	CO3: Explain the mechanism of various diseases associated in immune system					K2		
	CO4: Demonstrate the antigen- antibody interaction					K3		
	CO5: Analyze the graft rejection					K4		
Learning Resources								
Text Books	1. Madhavee Latha (2012). A Text book Immunology. First edition, S. Chand & Company Ltd, New Delhi. 2. Annadurai B (2008). Immunology and Immunotechnology. First edition, S. Chand & Company Ltd., New Delhi.							

	3. Kannan I (2007). Immunology. First edition, MJP Publishers, Chennai.			
Reference Books	1. Kuby Immunology - Richard A Goldsby, Thomas J Kindt. Barbara A Osborne, (2000). Fourth edition, W H Freeman and company. New York. 2. Tizard K (1983). Immunology. An Introduction. Saunders college publishing, Philadelphia. 3. Raitt, IM (1988). Essentials of Immunology. ELBS- Blackwell Scientific Publishers, London.			
Website Link	1. https://www.worldcat.org/title/kuby-immunology/oclc/41528664 2. http://www.imgt.org/IMGTEducation/Tutorials/ImmuneSystem/UK/the_immune_system.pdf 3. https://www.goodreads.com/book/show/21203443-textbook-of-immunology			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards											
Course Code											
Course Code	Course Title				Course Type	Sem	Hours	L	T	P	C
21M4UMBC04	IMMUNOLOGY AND IMMUNOTECHNOLOGY				DSC THEORY - IV	IV	5	3	2	-	4
CO-PO Mapping											
CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	S	S	M	M	M	S	S	S	M	M	
CO2	S	S	M	M	M	S	S	S	M	M	
CO3	S	S	M	S	S	S	S	S	S	S	
CO4	S	S	S	S	S	S	S	S	S	S	
CO5	S	S	M	M	S	S	S	S	S	S	
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG		
Tutorial Schedule					Group Discussion, Quiz program, model preparation and Kahoot app						
Teaching and Learning Methods					Audio Video lecture, Chalk and Board class, Assignment, Poster Presentation and Video presentation						
Assessment Methods					Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE						
Designed By					Verified By				Approved By		
Dr.A.K.Saravanan					Dr.M.Selvan				A. h. Saravanan		



B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M4UMBCP04	IMMUNOLOGY-PRACTICAL	DSC PRACTICAL - IV	IV	3	-	-	3	2
Objective	To know about various immunological diagnostic methods							
S.No.	List of Experiments / Programmes						Knowledge Levels	Sessions
1	Blood collection and plasma/serum separation						K1-K3	2
2	Blood grouping - Rh typing -cross matching						K1-K3	3
3	Examinations of Blood Cells (Demonstration) - a. Total Count- WBC b. Differential Count- RBC, Basophil, Lymphocyte, Monocyte, Neutrophil and Platelets						K2-K3	3
4	Agglutination reaction - a. Widal test-slide and tube test b. ASO test c. RA test d. CRP test e. Pregnancy test (Slide and Card test)						K2-K3	6
5	Precipitation reaction - a. Radial Immuno diffusion (RIA) b. Ouchterlony Double immune diffusion test (ODD) c. Counter Immuno electrophoresis (CIE)						K2-K3	6
6	Flocculation - RPR TEST						K2-K3	3
7	HIV - Tri Dot test, Hepatitis – Hepa card						K2-K3	3
8	ELISA-HIV/HBS Ag (Demonstration)						K2-K3	3
Course Outcome	CO1: Remember the blood, serum and antiserum terminology.						K1	
	CO2: Understand the knowledge about the blood grouping identification methods.						K2	
	CO3: Demonstrate the various immune reactions.						K3	
	CO4: Analyze the antigen antibody interaction.						K4	
	CO5: Evaluate the sample reading using instruments						K5	
Learning Resources								
Text Books	1. Aneja KR (2005). Experiments Microbiology, Plant pathology and Biotechnology. Fourth edition, New Age International Publishers, Chennai. 2. Dubey RC and Maheswari DK (2004). Practical Microbiology First edition, S Chand and Company Ltd., New Delhi. 3. Kannan N (2003). Handbook of laboratory culture media, Reagents, Stains and buffers. Panima Publishing Corporation, New Delhi.							

Reference Books	1. Betty A Forbes, Daniel F Sahn and Alice S Weissfeld. Bailey and Scott's Diagnostic Microbiology, Mosby Elsevier. 12th Edition. 2007. 2. Mackie and McCartney (2006) Practical Medical Microbiology, South Asia Edition. 14th edition. 3. Mukherjee, L. (1997). Medical Laboratory Technology. Volume I & II. Tata McGraw- Hill Publishing Company Limited, New Delhi
Website Link	1. https://www.researchgate.net/publication/280733624_A_TEXT_BOOK_OF_IMMUNOLOGY_AND_IMMUNOTECHNOLOGY 2. https://www.academia.edu/14724561/A_TEXT_BOOK_OF_IMMUNOLOGY_AND_IMMUNOTECHNOLOGY 3. https://bio.libretexts.org/Learning_Objects/Laboratory_Experiments/Microbiology_Labs/Book%3AGeneral_Microbiology_Lab_Manual_(Pakpour_and_Horgan)

B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards												
Course Code												
Course Code	Course Title					Course Type	Sem	Hours	L	T	P	C
21M4UMBCP04	IMMUNOLOGY-PRACTICAL					DSC PRACTICAL - IV	IV	3	-	-	3	2
CO-PO Mapping												
CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	S	S	M	S	S	S	M	S	S	L		
CO2	S	S	M	S	S	S	M	S	S	L		
CO3	S	S	M	S	S	S	M	S	S	L		
CO4	S	S	S	S	S	S	M	S	S	L		
CO5	S	S	S	S	S	S	M	S	S	L		
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG			
Tutorial Schedule												
Teaching and Learning Methods						Audio Video lecture, Chalk and Board class, Poster Presentation, and Video presentation						
Assessment Methods						Model practical and ESE						
Designed By						Verified By			Approved By			
Dr.A.K.Saravanan						Dr.M.Selvan			A. h. Saravanan			



Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3UMBS01	BIOINSTRUMENTATION	SEC - I	III	3	L			2
Objective	To gather the general knowledge about technical orientation based on these instruments							
Unit	Course Content						Knowledge Levels	Sessions
I	Definition and calculations of molar & Normality: Preparation of Buffers- Phosphate, TE, TAE. Instrumentations - pH meter, Water Bath, water bath shaker, Autoclave, Hot air oven, Laminar air flow, Incubator and BOD incubator.						K1-K3	6
II	Colorimetry & Spectrometry: Turbidometry, Spectrometry –single and double beam, UV and Visible spectrophotometer, Flame photometry.						K1-K3	6
III	Centrifugation: Basic principles of Sedimentation – types of rotors - types of centrifuges – small bench, micro centrifuge, large capacity refrigerated, high speed and ultra centrifuge. Differential centrifugation – density gradient centrifugation.						K3	6
IV	Chromatography: Paper – ascending and descending. Thin layer, Column, Ion-exchange, Gas, Gel filtration and HPLC. Applications of chromatography.						K2	6
V	Electrophoresis & Blotting Techniques: Agarose gel electrophoresis, Native page, SDS – PAGE and submarine gel electrophoresis. Blotting Techniques – Southern, northern, western, DOT blot.						K2-K3	6
Course Outcome	CO1: Remember the knowledge about buffers and basic instrument operations.						K1	
	CO2: Demonstrate the knowledge about the specific instruments and its mechanisms.						K3	
	CO3: Apply the knowledge about the molecules separation techniques.						K3	
	CO4: Interpret about the molecules purification methods.						K3	
	CO5: Apply the knowledge about biomolecules separations techniques based on electric charge.						K3	
Learning Resources								
Text Books	1. Gedder, A. and L. E. Balsler, John Wiley and Sons, Principles of applied Biomedical instrumentation. 2. Boyer, Rodney, F. Benjamin and Cummins, Modern Experimental Biochemistry 2nd Edition. 3. E.Padmini., Biochemical Calculations and Biostatistics (2007) Books and Allied (P) Ltd., First Edtn.							

Reference Books	1. Palanivelu P (2004). Analytical Biochemistry and Separation techniques. Third edition, MKU Co-op, Press Ltd., Palkalai Nagar, Madurai. 2. Gurumani N (2006). Research Methodology for Biological Sciences. First edition, MJP Publishers, A Unit of Tamil Nadu Book House, Chennai. 3. Upadhyay & Upadhyay. Biophysical Chemistry, (2010). Himalaya Publishing house.						
Website Link	1. https://chromatography.conferenceseries.com/events-list/applications-of-chromatography 2. http://www.biologydiscussion.com/biochemistry/centrifugation/centrifuge-introduction-types-uses-and-other-details-with-diagram/12489 3. https://www.goodreads.com/book/show/52842183-biophysics						
	L-Lecture	T-Tutorial	P-Practical		C-Credit		

B.Sc-Microbiology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards											
Course Code	Course Title				Course Type	Sem	Hours	L	T	P	C
21M3UMBS01	BIOINSTRUMENTATION				SEC - I	III	3	3			2
CO-PO Mapping											
CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	S	S	S	S	S	S	S	S	S	S	
CO2	S	S	S	S	S	S	S	S	S	S	
CO3	S	S	S	S	S	S	S	S	S	S	
CO4	S	S	S	S	S	S	S	S	S	S	
CO5	S	S	S	S	S	S	S	S	S	S	
Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG								
Tutorial Schedule											
Teaching and Learning Methods					Audio Video lecture, Chalk and Board class, Assignment, Poster Presentation, PPT, Video presentation						
Assesment Methods					Unit Test, Class Test, Assignment, Internal Examination, Model Presentation						
Designed By					Verified By			Approved By			
Mrs.N.Sathyabama					Dr.M.Selvan			A. h. 5			

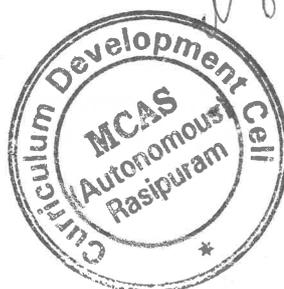


B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M4UMBS02	MUSHROOM TECHNOLOGY	SEC - II	IV	2	2	-	-	2
Objective	To facilitate self-employment							
Unit	Course Content					Knowledge Levels		Sessions
I	Introduction to mushroom cultivation: Introduction – History of mushroom cultivation, Classification and distribution of mushroom - Identification of poisonous mushrooms -life cycle of mushroom.					K1-K2		4
II	Spawn preparation: Spawn preparation - Nutrient media for pure culture, Isolation of pure culture, layout of spawn preparation room, raw material of spawn, sterilization, preparation of mother spawn and multiplication.					K3		4
III	Cultivation of mushroom: layout of mushroom shed - small scale and large scale production unit. Types of raw material – preparation and sterilization, Mushroom bed preparation – maintenance of mushroom shed, harvesting method and preservation of mushrooms. Cultivation of different mushroom: Cultivation of following types of mushroom – milky mushroom, oyster mushroom, button mushroom and any one medically valuable mushroom.					K2-K3		4
IV	Nutritive value of mushroom: Nutrient values of mushroom – protein, carbohydrate, fat, fibre, vitamins and amino acids contents, short and long term storage value addition of mushroom, preparation of various dishes from mushroom.					K2		4
V	Medicinal value of mushroom: cultivation, extraction, isolation and identification of active principle from mushroom. Pharmacological and economic values of mushroom.					K2		4
Course Outcome	CO1: Remember the morphology and types of Mushrooms.					K1		
	CO2: Remember the knowledge about spawn production on their own.					K1		
	CO3: Understand the nutritive value of mushrooms.					K2		
	CO4: Calculate the medicinal value of mushrooms					K3		
	CO5 : Construct the mushroom cultivation techniques in small scale industry					K3		
Learning Resources								
Text Books	1. Tewan and Pankaj Kapoor S.C. 1993. Mushroom cultivation. Mittal Publication. Delhi. 2. Marimuth et al., 1991. Oyster Mushrooms. Dept. of Plant pathology, TNAU, Coimbatore. 3. Nita Bahl. 1988. Hand book of Mushrooms, 2nd Edition, Vol I & II.							
Reference Books	1. Paul Stamets, J.S. and Chilton, J.S. 2004. Mushroom cultivation A practical guide to growing mushrooms at home, Agarikon Press. 2. Shu Fing Chang, Philip G. Miles and Chang, S.T. 2004. Mushrooms Cultivation, nutritional value,							

	medicinal effect and environmental impact. 2nd ed., CRC press.			
Website Link	1. https://www.pdfdrive.com/mushroom-cultivator-a-practical-guide-to-growing-mushrooms-at-home-e158710567.html 2. fungi.com/products/the-mushroom-cultivator 3. https://www.google.co.in/books/edition/Psilocybin_Mushroom_Handbook/HJJmJYCI3HsC?hl=en&bpv=0			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

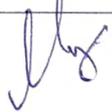
B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards											
Course Code											
Course Code	Course Title				Course Type	Sem	Hours	L	T	P	C
21M4UMBS02	MUSHROOM TECHNOLOGY				SEC - II	IV	2	2	-	-	2
CO-PO Mapping											
CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	S	S	S	S	S	S	S	S	S	S	
CO2	S	S	S	S	S	S	S	S	S	S	
CO3	S	S	S	S	S	S	S	S	S	S	
CO4	S	M	L	M	L	S	M	M	M	L	
CO5	S	L	L	M	L	S	L	M	M	L	
Level of Correlation between CO and PO	L-LOW				M-MEDIUM			S-STRONG			
Tutorial Schedule					Group Discussion, Quiz program, model preparation and Kahoot app						
Teaching and Learning Methods					Audio Video lecture, Chalk and Board class, Assignment, Poster Presentation and Video presentation						
Assessment Methods					Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE						
Designed By					Verified By			Approved By			
Mr.N.Radhakrishnan					Dr.M.Selvan			A-h-bany			



B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem.	Hours	L	T	P	C
	ABILITY AND SKILL ENHANCEMENT	SEC - III		2	2	-	-	2
Objective	This paper intends to build up the four primary skills in students in the academic and public offices							
Unit	Course Content					Knowledge Levels	Sessions	
I	Leadership: What is leadership, traits of leadership, identifying leaders and traits of leadership, Identify leadership qualities.					K1-K2	4	
II	Entrepreneurship: What is Entrepreneurship, traits of successful entrepreneurs, Identify entrepreneurial qualities.					K1-K2	3	
III	Organizational Skills & Employability Skills: What are organizational skills, skills needed to become a successful entrepreneur/administrator. Organizational skills development - discipline making, rules, delegation of power at workplace, etc. How to enhance employability; skills, why do we need them, different workplaces, different skills, how to recognize different work skills.					K1-K2	5	
IV	Decision making: Process of decision making, its steps, basics of organizational decision -making process, entrepreneurial decision making, how to make a right decision at right time, dilemma.					K1-K2	4	
V	Interview Skills: Conducting Interviews with Leaders/ Entrepreneurs, Preparing Questions, Interviewing the fellow person, do's & don'ts while taking interview.					K1-K3	4	
Course Outcome	CO1: Describe about the leadership and its traits.					K1		
	CO2: Understand and apply the concept of entrepreneurship.					K2		
	CO3: Summarize about the employability and organizational skills.					K2		
	CO4: Discuss the knowledge about decision making.					K2		
	CO5: Emphasize and apply the knowledge of interview skills.					K3		
Learning Resources								
Text Books	1. Organisational Behaviour , M.Parikh and R.Gupta , TataMcGraw Hill Education Private Limited 2. Organisational Behavior, D. Nelson, J.C Quick and P. Khandelwal, Cengage Publication.							
Reference Books	1. Understanding Leadership. Avery, G. C. (2005). London: Sage Publications 2. Leadership and performance beyond expectations. Bass, B.M. (1985). New York: Free Press.							
Website Link	1. https://www.skillsyouneed.com/general/life-skills.html 2. https://blog.clrskills.com/the-concept-of-skills-development/ 3. https://www.cbse.gov.in/cbsenew/list-of-manuals/life_skills_cce.pdf							
	L-Lecture	T-Tutorial	P-Practical	C-Credit				

B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards											
Course Code											
Course Code	Course Title				Course Type	Sem.	Hours	L	T	P	C
	ABILITY AND SKILL ENHANCEMENT				SEC - III		2	2	-	-	2
CO-PO Mapping											
CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	S	S	S	S	S	M	S	L	M	M	
CO2	S	S	S	S	S	M	S	L	M	M	
CO3	S	S	S	S	S	M	S	L	M	M	
CO4	S	S	S	S	S	M	S	L	M	M	
CO5	S	S	S	S	S	M	S	L	M	M	
Level of Correlation between CO and PO	L-LOW				M-MEDIUM			S-STRONG			
Tutorial Schedule					Group Discussion, Quiz program, model preparation and Kahoot app						
Teaching and Learning Methods					Audio Video lecture, Chalk and Board class, Assignment, Poster Presentation and Video presentation						
Assessment Methods					Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE						
Designed By					Verified By				Approved By		
Mr.N.Radhakrishnan					Dr.M.Selvan						







B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards

Course Code	Course Title	Course Type	Sem.	Hours	L	T	P	C
	BIOFERTILIZER AND ORGANIC FARMING TECHNOLOGY	SEC - IV		2	2	-	-	2
Objective	To impart the knowledge of herbal medicine, cultivation and marketing strategies							
Unit	Course Content						Knowledge Levels	Sessions
I	Basics of Biofertilizers: Biofertilizers – definition, importance and advantages. Sources of Biofertilizers - Bacteria, Cyanobacteria, Mycorrhiza and PSM. Outlines of production technology of biofertilizers- isolation, selection of strain, preparation of mother culture, starter culture, mass culturing.						K1-K3	4
II	Culture of Bacterial and fungal Biofertilizers: <i>Rhizobium</i> , <i>Azotobacter</i> , <i>Azospirillum</i> - Mass multiplication, inoculum formulations, associative effect and crop response. Anabaena- Characteristics, Azolla-Anabaena association, Azolla production and application. VAM- mass production.						K1-K3	4
III	Biofertilizer Production Technology: Culturing of microorganisms. Inoculum formulations – Carrier properties, Types of formulations: Powders, Granules and Liquids.						K1-K3	4
IV	Concept of organic farming: Introduction of organic farming. Principles of organic farming. Types of organic farming and benefits of organic farming. Scope of organic farming. Conventional farming v/s organic farming. Requirements of organic farming.						K1-K3	4
V	Organic plant nutrient management: Organic farming systems- soil tillage, land preparation and mulching. Propagation of seeds, planting material and seed treatment.						K1-K3	4
Course Outcome	CO1: Remember about the production of biofertilizers.						K1	
	CO2: Understand the production methods in bacteria, fungal and algal biofertilizers.						K2	
	CO3: Apply the production technology of inoculants.						K2	
	CO4: Choose the knowledge about organic farming.						K2	
	CO5: Experiment the knowledge about plant nutrients management.						K3	
Learning Resources								
Text Books	1. Dahama, A. K. 2005. Organic Farming for sustainable agriculture. Agrobios (India) Jodhpur. 2. Gahlot, D. 2005. Organic Farming. Agrobios (India) Jodhpur. 3. Palaniappan, S. P. and Anandurai, K. 1999. Organic Farming. Theory and Practices. Scientific Publication Jodhpur.							

Reference Books	1. Principles of Organic Farming By E. Somasundaram, D. Udhaya Nandhini, M. Meyyappan 2. Whole Farm Planning: Ecological Imperatives, Personal Values and Economics by Elizabeth Henderson and Karl North 3. Basics Of Organic Farming by English, Paperback, Bansal M.			
Website Link	1. https://agritech.tnau.ac.in/org_farm/orgfarm_index.html 2. https://vikaspedia.in/agriculture/crop-production/organic-farming 3. http://omafra.gov.on.ca/english/crops/facts/09-077.htm			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

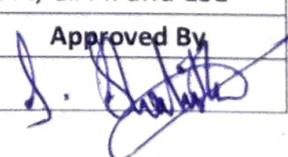
B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards												
Course Code												
Course Code	Course Title					Course Type	Sem.	Hours	L	T	P	C
	BIOFERTILIZER AND ORGANIC FARMING TECHNOLOGY					SEC - IV		2	2	-	-	2
CO-PO Mapping												
CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	S	S	S	S	M	S	S	S	S	S		
CO2	S	S	S	S	M	S	S	S	S	S		
CO3	S	S	S	S	M	S	S	S	S	S		
CO4	S	S	S	S	M	S	S	S	S	S		
CO5	S	S	S	S	M	S	S	S	S	S		
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG			
Tutorial Schedule						Group Discussion, Quiz program, model preparation and Kahoot app						
Teaching and Learning Methods						Audio Video lecture, Chalk and Board class, Assignment, Poster Presentation and Video presentation						
Assessment Methods						Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE						
Designed By						Verified By			Approved By			
Mrs.N.Sathyabama						Dr.M.Selvan						



B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards

Course Code	Course Title	Course Type	Sem.	Hours	L	T	P	C
	HEALTH AND HUMAN DISEASES	NMEC - I		2	2	-	-	2
Objective	To determine the common diseases with their clinical symptoms, mode of transmission, diagnosis and its control measures							
Unit	Course Content					Knowledge Levels		Sessions
I	Introduction - importance of being healthy- nutrition- exercise- causes of disease- environment – age – living conditions – Life style – Role of gut flora in human health, Probiotics & Prebiotics.					K1-K2		4
II	Diseases – causes – symptoms- treatment of – heart diseases- obesity- BMI, jaundice- cancer					K1-K2		4
III	AIDS- Nosocomial diseases- travelling disease- children and old age diseases – TB- leprosy, Dengue- Bird Flu.					K1-K2		4
IV	Diseases prevention – healthy habits, disease prevention awareness- vaccination- immunization schedule					K1-K2		4
V	First aid measures- accident Care- Bleeding and Wound Care – Fractures and dislocations, electric shock burns – breathing emergency – Allergies- Pregnancy care.					K1-K3		4
Course Outcome	CO1: Memorize about importance of health and healthy life style.					K1		
	CO2: Understand the common diseases and their treatment.					K2		
	CO3: Explain about the diseases in child and old age groups.					K2		
	CO4: Discuss the knowledge about healthy habits and diseases prevention methods					K2		
	CO5: Illustrate the knowledge about First aid measures					K3		
Learning Resources								
Text Books	1. Ananthanarayan R. and Paniker C.K.J. (2017) Textbook of Microbiology. 10th edition, Kanungo, Reba (Ed).Orient Blackswan Publication. 2. Brooks G.F., Carroll K.C., Butel J.S., Morse S.A. and Mietzner, T.A. (2016) Jawetz, Melnick and Adelberg's Medical Microbiology. 27th edition. McGraw Hill Publication.							
Reference Books	1. Willey JM, Sherwood LM, and Woolverton CJ. (2017) Prescott, Harley and Klein's Microbiology. 9th edition. McGraw Hill Higher Education. 2. Madigan, Bender, Buckley, Sattley and Stahl. (2018). Brock Biology of Microorganisms. 15th edition. Pearson Global Edition. 3. Tortora GJ, Funke BR, and Case CL. (2016). Microbiology: An Introduction. 11th edition Pearson Education India.							

Website Link	1. https://mechpath.com/2015/12/01/mycobacterium-leprae/			
	2. https://www.slideshare.net/EI_Omda/anthrax-15737452			
	3. https://www.elsevier.com/books/textbook-of-diagnostic-microbiology/mahon/978-0-323-48218-9			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards											
Course Code											
Course Code	Course Title				Course Type	Sem.	Hours	L	T	P	C
	HEALTH AND HUMAN DISEASES				NMEC - I		2	2	-	-	2
CO-PO Mapping											
CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	S	S	S	S	S	S	M	S	M	S	
CO2	S	S	S	S	S	S	S	S	S	S	
CO3	S	S	M	S	S	S	M	S	M	S	
CO4	S	S	S	S	S	S	M	S	S	S	
CO5	S	S	S	S	M	S	S	S	M	S	
Level of Correlation between CO and PO	L-LOW				M-MEDIUM			S-STRONG			
Tutorial Schedule					Group Discussion, Quiz program, model preparation and Kahoot app						
Teaching and Learning Methods					Audio Video lecture, Chalk and Board class, Assignment, Poster Presentation and Video presentation						
Assessment Methods					Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE						
Designed By					Verified By				Approved By		
Dr.S.Anbalagan					Dr.M.Selvan						





B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards

Course Code	Course Title	Course Type	Sem.	Hours	L	T	P	C
	INFECTIOUS DISEASES	NMEC- II		2	2	-	-	2
Objective	To understand the medically important bacteria, fungi, virus and parasites							
Unit	Course Content					Knowledge Levels	Sessions	
I	Distribution of pathogenic microorganisms and ubiquitous nature of pathogens, history of infectious and their invasiveness. Host parasite Interactions.					K1-K2	4	
II	Laboratory identification, epidemiology and control measures of Salmonellosis, Botulism, Mycobacterium, Corynebacterium, leptospirosis and Streptococcal infections					K1-K2	4	
III	Nosocomial infections, History of viral diseases, Smallpox, AIDS, Recent epidemics- Covid-19, Nipha, Monkey pox. Antiviral drugs and prevention.					K1-K2	4	
IV	Pathogenesis, occurrence, epidemiology and treatment of Histoplasmosis, Aspergillosis and Candidiasis.					K1-K3	4	
V	Pathogenesis, distribution and diagnostic measures of Malaria, Amoebiasis and Ascariasis.					K1-K3	4	
Course Outcome	CO1: Remember the knowledge about history of infectious agents.					K1		
	CO2: Remember and understand the knowledge about medically important bacterial agents.					K2		
	CO3: Understand the Pathogenesis of medically important virus.					K2		
	CO4: Illustrate the knowledge about medically important fungi.					K3		
	CO5: Apply the knowledge about medically important parasites.					K3		
Learning Resources								
Text Books	<ol style="list-style-type: none"> 1. Sheehan, C. (1997) Clinical Immunology. Principles and Laboratory diagnosis, second Edn. Lipincott Williams and Wilkins, New York. 2. Dubey RC and Maheswari DK (2012). A text of Microbiology (Revised edition). S. Chand and Company Ltd., New Delhi 3. Geeta Sumbali and Mehrotra RS (2009). Principles of Microbiology. First edition, Tata McGraw Hill P. Ltd., New Delhi. 							
Reference Books	<ol style="list-style-type: none"> 1. Boyd, RF. And Hoer, BG. (1991) Basic Medical Microbiology. 4th Edn. Little Brown and Co. New York. 2. Prescott L M, J P Harley and D A Klein (2005). Microbiology. Sixth edition, International edition, McGraw Hill. 3. Hans G. Schlegel. General microbiology. 7th edition. Cambridge university press (1993). 							

Website Link	1. https://www.amazon.in/Medical-Microbiology-Samuel-Baron/dp/0963117211			
	2. https://www.ncbi.nlm.nih.gov/books/NBK7627/			
	3. https://www.elsevier.com/books/textbook-of-diagnostic-microbiology/mahon/978-0-323-48218-9			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

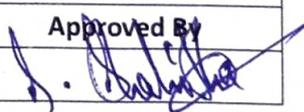
B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards											
Course Code											
Course Code	Course Title				Course Type	Sem.	Hours	L	T	P	C
	INFECTIOUS DISEASES				NMEC- II		2	2	-	-	2
CO-PO Mapping											
CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5	
CO1	S	S	M	S	S	S	M	S	M	M	
CO2	S	S	S	S	S	S	M	S	M	M	
CO3	S	S	M	S	M	S	M	S	S	S	
CO4	S	S	M	S	M	S	M	S	S	S	
CO5	S	S	M	S	M	S	M	S	S	S	
Level of Correlation between CO and PO	L-LOW				M-MEDIUM			S-STRONG			
Tutorial Schedule					Group Discussion, Quiz program, model preparation and Kahoot app						
Teaching and Learning Methods					Audio Video lecture, Chalk and Board class, Assignment, Poster Presentation and Video presentation						
Assessment Methods					Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE						
Designed By					Verified By			Approved By			
Dr.M.Selvan					Dr.M.Selvan						



B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards

Course Code	Course Title	Course Type	Sem.	Hours	L	T	P	C
	FOOD TECHNOLOGY	NMEC- III		2	2	-	-	2
Objective	To understand the medically important bacteria, fungi, virus and parasites							
Unit	Course Content					Knowledge Levels	Sessions	
I	Introduction to food technology: Scope and applications. Nutrition – types of Nutrition, Food used in different ages – infants, children, school age, and adult. Factors determine the quality of food – intrinsic and extrinsic factors.					K1-K2	4	
II	Microbial fermentation of food: Curd, yogurt and sauerkraut, Bread, Beer, Cheese, Pickle, Kefir, Kimchi, Soy sauce, rice wine, malt whisky- process and uses.					K1-K2	4	
III	Common Food borne Bacteria: Molds and yeasts, Role, Significance of Microorganisms in Foods. Food borne pathogens - <i>Campylobacter</i> , <i>Clostridium</i> , <i>Salmonella</i> , <i>Shigella</i> , <i>Vibrio</i> , <i>Staphylococcus</i> , <i>E.coli</i> , Amoebiosis and Mycotoxins.					K1-K2	4	
IV	Food Preservation & Principles: Physical, Chemicals and Antibiotics-Bacteriocins. Applications of Probiotics and prebiotics.					K1-K3	4	
V	Food quality assessment: Standards of food Quality. Pathogens test & Spoilage indicators. Chemical test – pesticides, antibiotics, heavy metals & adulterants. FSSAI, Good Manufacturing Practice (GMP) - Quality Management System & ethics.					K1-K3	4	
Course Outcome	CO1: Remember the knowledge about history of infectious agents.					K1		
	CO2: Remember and understand the knowledge about medically important bacterial agents.					K2		
	CO3: Understand the Pathogenesis of medically important virus.					K2		
	CO4: Remember and understand the knowledge about medically important fungi.					K2		
	CO5: Remember and understand the knowledge about medically important parasites.					K2		
Learning Resources								
Text Books	1. Frazier and Westhoff, DC. 1988. Food Microbiology. TATA McGraw Hill Publishing Company LTD., New Delhi 2. Dubey RC and Maheswari DK (2012). A text of Microbiology (Revised edition). S. Chand and Company Ltd., New Delhi							

	3. Geeta Sumbali and Mehrotra RS (2009). Principles of Microbiology. First edition, Tata McGraw Hill P. Ltd., New Delhi.			
Reference Books	1. Adams, M.R and Moss, MO. 1995. Food Microbiology. The Royal Society of Chemistry, Cambridge 2. Maheshwary. Nutrition and dietetic. New Delhi 3. Khetarpaul Neelam. Food Processing and Preservation, Daya Publishing House, Delhi. 2005.			
Website Link	1. https://www.fda.gov/ 2. https://en.wikipedia.org/wiki/Food_Safety_and_Standards_Authority_of_India 3. https://www.bookdepository.com/Food-Preservation-S-K-Kulshrestha/9780706986600			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards												
Course Code												
Course Code	Course Title					Course Type	Sem.	Hours	L	T	P	C
	FOOD TECHNOLOGY					NMEC- III		2	2	-	-	2
CO-PO Mapping												
CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	S	S	S	M	S	S	M	M	S	S		
CO2	S	S	S	S	S	S	S	S	S	S		
CO3	S	S	M	M	M	S	S	S	S	S		
CO4	S	S	S	S	S	S	S	S	S	S		
CO5	S	S	M	S	S	S	S	S	S	S		
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG			
Tutorial Schedule						Group Discussion, Quiz program, model preparation and Kahoot app						
Teaching and Learning Methods						Audio Video lecture, Chalk and Board class, Assignment, Poster Presentation and Video presentation						
Assessment Methods						Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE						
Designed By						Verified By			Approved By			
Mr.N.Radhakrishnan						Dr.M/Selvan						



B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards

Course Code	Course Title	Course Type	Sem.	Hours	L	T	P	C
	HERBAL MEDICINE	NMEC - IV		2	2	-	-	2
Objective	To impart the knowledge of herbal medicine, cultivation and marketing strategies							
Unit	Course Content						Knowledge Levels	Sessions
I	Introduction: Scope - Alternative systems of medicine – advantages – human system – herbals for human system – definition.						K1	4
II	Secondary metabolites: Source- different types – action – medicinal plants – pharmacological action – toxicity. Role of short chain fatty acids and their significant.						K2	4
III	Herbal cultivation: Plant – types - Methodology – marketing – economic potential – pharmacological companies – manufacture – patency – GATT-TRIPS- WTO.						K2	4
IV	Herbal gardening: Types – methodologies – applications – home gardens – types – methodologies – application – home made remedies – herbal formulations- herbal physiotherapy.						K3	4
V	Biological screening of herbal drugs: introduction and need for phyto pharmacological screening. Antimicrobial screening of herbal drugs, Screening for anticancer activity, Screening for antioxidant activity, Database on pharmaceutical uses of plants.						K3	4
Course Outcome	CO1: Remember the knowledge about importance of herbal medicine.						K1	
	CO2: Understand the medicinal plans metabolites.						K2	
	CO3: Summarize about the herbal medicine cultivation and marketing.						K2	
	CO4: Apply the knowledge about herbal gardening, formulation and treatment.						K3	
	CO5: Make use of screening of herbal compounds.						K3	
Learning Resources								
Text Books	1. Biotechnology of Secondary metabolites K.G.Ramawat, J. M. Muritton. 2. Indian medicinal plants Vol-I to Vol – V: A compendium of 500 Species – Orient Longman 3. The Modern Herbal by Maude Grieve 1931.							
Reference Books	1. Introduction to spices, plantation crops, Medicinal aromatic plants – N.Kumar <i>et. al.</i> , 2. Maheshwary. Nutrition and dietetic. New Delhi 3. The Complete Herbal Tutor: The Ideal Companion for Study and Practice by Anne McIntyre.							

Website Link	1. https://www.elsevier.com/books/herbal-medicines/siddique/978-0-323-90572-5			
	2. hestnutherbs.com/the-best-herbal-medicine-books-for-beginning-herbalists/			
	3. https://www.booktopia.com.au/books-online/non-fiction/mind-body-spirit/complementary-therapies/traditional-medicine-herbal-remedies/cVXHT-p1.html			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc - Microbiology Syllabus LOCF - CBCS with effect from 2021-2022 Onwards												
Course Code												
Course Code	Course Title					Course Type	Sem.	Hours	L	T	P	C
	HERBAL MEDICINE					NMEC - IV		2	2	-	-	2
CO-PO Mapping												
CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5		
CO1	S	S	M	M	M	S	S	S	M	S		
CO2	S	S	M	S	M	S	S	S	M	S		
CO3	S	S	S	M	S	S	S	S	M	S		
CO4	S	S	S	S	S	S	S	S	M	S		
CO5	S	M	S	S	S	S	S	S	M	S		
Level of Correlation between CO and PO	L-LOW					M-MEDIUM			S-STRONG			
Tutorial Schedule						Group Discussion, Quiz program, model preparation and Kahoot app						
Teaching and Learning Methods						Audio Video lecture, Chalk and Board class, Assignment, Poster Presentation and Video presentation						
Assessment Methods						Class Test, Unit Test, Assignment, CIA-I, CIA-II and ESE						
Designed By						Verified By			Approved By			
Dr.S.Anbalagan						Dr.M.Selvan			