

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 MASTER OF SCIENCE

Learning Outcomes - Based Curriculum Framework

- Choice Based Credit System

Syllabus for M.Sc., Biotechnology (Semester Pattern)

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

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 spirit of entrepreneurship and enterprise
- To create a resource pool of socially responsible world citizens

DEPARTMENT OF BIOTECHNOLOGY

VISION

Provide job oriented, value based biotechnological education and to enable them for getting placements

MISSION

- To develop their knowledge to pursue higher education.
- To encourage research activities.
- To promote biotech education in to various application oriented disciplines.
- To make an awareness about of literacy, unity and equality.
- To develop the job oriented curriculum

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

- 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 upholding the human values and environmental sustenance for the betterment of the society.

GRADUATE ATTRIBUTES

The Graduate attributes of B.Sc., Biotechnology are

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

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)

Upon completion of the program,

- PSO1: Graduates understand the basic concepts of Biotechnology and its applications on different living systems like microbes, animals and plants.
- PSO2: Graduates should be able to embark upon research and develop new eco-friendly sustainable technologies in the domain of biotechnology, which can contribute to the hale and healthy environment and society.
- PSO3: Graduates obtain knowledge and skill to get opportunities in industry, research institutions, academics, government organizations and entrepreneurship development.
- PSO4: Develop problem solving ability by utilizing the conceptual knowledge, analytical techniques, computational thinking and statistical approaches
- PSO5: Biotechnology courses to evaluate the real-life problems and develop a sense of social, ethical, environmental and professional responsibility

B.Sc.,-BIOTECHNOLOGY abstract under LOCF-CBCS Pattern with effect from 2021-2022 Onwards
Structure of Credit Distribution as per the TANSICHE / UGC Guidelines

S.No.	Study Components	Part	Sem I		Sem II		Sem III		Sem IV		Sem V		Sem VI		No. of Paper	Total Credit
			No. of Paper	Credit	No. of Paper	Credit	No. of Paper	Credit	No. of Paper	Credit	No. of Paper	Credit	No. of Paper	Credit		
1	LANGUAGE - I	I	1	3	1	3	1	3	1	3					4	12
2	LANGUAGE - II	II	1	3	1	3	1	3	1	3					4	12
3	DISCIPLINE SPECIFIC COURSE(DSC)-THEORY	III	1	4	1	4	1	4	1	4	2	10	2	9	8	35
4	DSC - PRACTICAL	III	1	2	1	2	1	2	1	2	2	4	2	4	8	16
5	GENERIC ELECTIVE COURSES(GEC)- THEORY	III	1	4	1	4	1	4	1	3					4	15
6	GEC PRACTICAL	III			1	3			1	2					2	5
7	DISCIPLINE SPECIFIC ELECTIVE COURSES(DSE)	III									2	8	2	8	4	16
8	PROJECT WORK	III											1	4	1	4
9	INTERNSHIP	III							1	2					1	2
10	ONLINE - COMPETITIVE EXAMINATION	III											1	2	1	2
11	SKILL ENHANCEMENT COURSES(SEC)-SBEC	IV			1	2	1	2	1	2	1	2				8
12	NON MAJOR ELECTIVE COURSES(NMEC)	IV					1	2	1	2					2	4
13	PROFESSIONAL ENGLISH	IV	1	2	1	2									2	4
14	ABILITY ENHANCEMENT COMPULSORY COURSES(AECC)-EVS	IV			1	2									1	2
15	ABILITY ENHANCEMENT COMPULSORY COURSES(AECC)- VALUE EDUCATION - YOGA	IV	1	2											1	2
16	EXTENSION ACTIVITY	V											1	1	1	1
Cumulative Credits			7	20	9	25	7	20	9	23	7	24	9	28	44	140

Total No. of Subjects	44
Marks	4300

PART	No. of Credits
PART - I	12
PART - II	12
PART - III	95
PART - IV	20
PART - V	1
Grand Total	140

Extra Credit	2
	142

P. S. Mahalingam
HEAD

Department of Biotechnology
Muthayammal College of Arts & Science
Rasipuram - 637 408, Namakkal (Dt)
Tamilnadu, India.

[Signature]
PRINCIPAL

**MUTHAYAMMAL COLLEGE OF ARTS AND SCIENCE
(AUTONOMOUS)
RASIPURAM - 637 408,
NAMAKKAL DISTRICT.**



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.BIOTECHNOLOGY

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	5		3	25	75	100
2	II	LANGUAGE-II	21M1UCEN01	COMMUNICATIVE ENGLISH-I	5		3	25	75	100
3	III	DSC THEORY - I	21M1UBTC01	CELL BIOLOGY	5		4	25	75	100
4	III	GEC THEORY - I	21M1UBCA01	ALLIED-BIOCHEMISTRY I	4		4	25	75	100
5	III	DSC PRACTICAL - I	21M1UBTP01	PRACTICAL: CELL BIOLOGY		3	2	40	60	100
6	IV	GEC PRACTICAL - I	21M2UBCAP1	PRACTICAL: ALLIED BIOCHEMISTRY		3				
7	IV	AECC - VALUE EDUCATION	21M1UVED01	YOGA	1		2	100		
8	IV	PROFESSIONAL ENGLISH - I	21M1UPEL01	PROFESSIONAL ENGLISH FOR LIFE SCIENCE - I	4		2	25	75	100
				TOTAL	24	6	20	265	435	600
SEMESTER - II										
1	I	LANGUAGE - I	21M2UFTA02	TAMIL-II	5		3	25	75	100
2	II	LANGUAGE - II	21M2UCEN02	COMMUNICATIVE ENGLISH - II	5		3	25	75	100
3	III	DSC THEORY - II	21M2UBTC02	GENETICS	4		4	25	75	100
4	III	GEC THEORY - II	21M2UBCA02	ALLIED-BIOCHEMISTRY II	4		4	25	75	100
5	III	DSC PRACTICAL - II	21M2UBTP02	PRACTICAL: GENETICS		3	2	40	60	100
6	III	GEC PRACTICAL - I	21M2UBCAP1	PRACTICAL: ALLIED-BIOCHEMISTRY		3	3	40	60	100
7	IV	SEC THEORY- I	21M2UBTS01	BIOINSTRUMENTATION	1		2	25	75	100
8	IV	AECC - ENVIRONMENTAL STUDIES	21M2UEVS01	ENVIRONMENTAL STUDIES	1		2	100		
9	IV	PROFESSIONAL ENGLISH - II	21M2UPEL02	PROFESSIONAL ENGLISH FOR LIFE SCIENCE II	4		2	25	75	100
				TOTAL	24	6	25	330	570	800
SEMESTER - III										
1	I	LANGUAGE - I	21M3UFTA03	TAMIL III	5		3	25	75	100
2	II	LANGUAGE - II	21M3UCEN03	COMMUNICATIVE ENGLISH - III	5		3	25	75	100
3	III	DSC THEORY - III	21M3UBTC03	MICROBIOLOGY	6		4	25	75	100
4	III	GEC THEORY - III	21M3USTA05	ALLIED: BIostatISTICS	5		4	25	75	100
3	III	DSC PRACTICAL - III	21M3UBTP03	PRACTICAL: MICROBIOLOGY		3	2	40	60	100
6	IV	SEC THEORY - II	21M3UBTS02	MUSHROOM TECHNOLOGY	3		2	25	75	100
7	IV	NMEC - I	21M3UBCN01	FUNDAMENTALS OF HUMAN PHYSIOLOGY	3		2	25	75	100
				TOTAL	27	3	20	190	510	700

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Programme : B.Sc.BIOTECHNOLOGY

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	21M4UBTC04	MOLECULAR BIOLOGY	5		4	25	75	100
4	III	GEC THEORY - IV	21M4UCSA05	ALLIED - COMPUTER APPLICATIONS IN BIOLOGY	4		3	25	75	100
5	III	DSC PRACTICAL - IV	21M4UBTP04	PRACTICAL : MOLECULAR BIOLOGY		3	2	40	60	100
6	III	GEC PRACTICAL - II	21M4UCSAP5	PRACTICAL : ALLIED - OFFICE AUTOMATION		3	2	40	60	100
7	IV	SEC THEORY - III	21M4UBTS03	MEDICAL LABORATORY TECHNIQUES	3		2	25	75	100
8	IV	NMEC - II	21M4UBCN02	BIOCHEMISTRY IN DIAGNOSIS	2		2	25	75	100
9	III	INTERNSHIP	21M4UBTIS1	INTERNSHIP			2	100		
				TOTAL	24	6	23	330	570	800
SEMESTER - V										
1	III	DSC THEORY - V	21M5UBTC05	GENETIC ENGINEERING	6		5	25	75	100
2	III	DSC THEORY - VI	21M5UBTC06	PLANT BIOTECHNOLOGY	6		5	25	75	100
3	III	DSC PRACTICAL - V	21M5UBTP05	PRACTICAL GENETIC ENGINEERING AND PLANT BIOTECHNOLOGY			2	40	60	100
4	III	DSC PRACTICAL - VI	21M5UBTP06	PRACTICAL IMMUNOLOGY, NANOBIO TECHNOLOGY AND BIOINFORMATICS		3	2	40	60	100
5	III	DSE - I	21M5UBTE01	ELECTIVE - I	5		4	25	75	100
6	III	DSE - II	21M5UBTE02	ELECTIVE - II	5		4	25	75	100
7	IV	SEC - IV	21M5UBTS03	ALGAL BIOTECHNOLOGY	2		2	25	75	100
				TOTAL	24	6	24	205	495	700
SEMESTER - VI										
1	III	DSC THEORY - VII	21M6UBTC07	ANIMAL BIOTECHNOLOGY	5		5	25	75	100
2	III	DSC THEORY - VIII	21M6UBTC08	ENVIRONMENTAL BIOTECHNOLOGY	5		4	25	75	100
3	III	DSE - III	21M6UBTE03	ELECTIVE - III	5		4	25	75	100
4	III	DSE - IV	21M6UBTE04	ELECTIVE - IV	4		4	25	75	100
5	III	DSC PRACTICAL - VIII	21M6UBCP07	PRACTICAL : ENVIRONMENTAL BIOTECHNOLOGY AND ANIMAL BIOTECHNOLOGY		3	2	40	60	100
6	III	DSC PRACTICAL - IX	21M6UBTP08	PRACTICAL : PROTEOMICS, GENOMICS AND BIOPROCESS TECHNOLOGY		3	2	40	60	100
7	III	PROJECT WORK	21M6UBTPR1	PROJECT WORK	3		4	40	60	100
8	III	ONLINE - COMPETITIVE EXAMINATION	21M6UBTOE1	COMPETITIVE ONLINE EXAMINATION IN OBJECTIVE BIOTECHNOLOGY			2	100		
9	V	EXTENSION ACTIVITY	21M6UEXA01	EXTENSION ACTIVITY			1	100		
				TOTAL	22	6	28	420	480	700
				OVERALL TOTAL	145	33	140	1740	3060	4300
		EXTRA CREDIT COURSE	21M6UBTEC1	MOOC Courses offered in SWAYAM / NPTEL			2			

p.s. Mahalingam

BJR

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. QUESTIONPAPERPATTERNFORCIA I,II AND ESE(3HOURS) **MAXIMUM:75Marks**

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)

2. a) Components for Practical CIA.

Components	Mark s
CIA -I	15
CIA - II	15
Observation Note	5
Attendance	5
Total	40

2. b) Components for Practical ESE.

Components	Marks
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	
Report	50	50	b) Review /Work 30 Marks	40
Viva-voce Examination	25	50	Diary ^{*1}	
Total	100	100	ESE^{*2}	
			a)Final Report 40Marks	
			b)Viva-voce 20Marks	60
			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(Part III)- 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., - Biotechnology LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M1UBT C01	CELL BIOLOGY	DSC THEORY - I	1	5	5			4
Objective	Student will be able to understand the structures and fundamental components of prokaryotic and eukaryotic cells.							
Unit	Course Content						Knowl edge Levels	Sessions
I	Cell as a basic unit, Cell theory, Cell size and Shape, Prokaryotic and Eukaryotic organization, Structural comparison of microbial, plant and animal cells						K1	12
II	Cell wall and Membrane: Plasma membrane-Model of plasma membrane, fluidity of membranes, membrane proteins and their functions; Transport across the membrane Selective permeability of membranes; Cell adhesion; Cell junction.						K2	10
III	Structure and functions of cell organelle; Mitochondria, chloroplast, Endoplasmic reticulum, Golgi Complex, Lysosomes, Ribosomes, Peroxisomes, Glyoxisomes, Vacuoles, Centrioles, cytosols, Microtubules and Microfilaments.						K2	10
IV	Cell cycle and Cell Signaling: Cell division, Cell cycle, Mitosis, Meiosis, Cell signaling, G protein receptors, Cell membrane traffic, Cellular senescence and Apoptosis.						K3	12
V	Specialized cells, Motile cells (Amoeboid, Ciliary, Flagella Movements, Nerve cells and Nerve impulse conduction, Muscle cells and Muscle contraction, Plant cells (Parenchyma cells, Xylem and Phloem Cells)						K3	11
Course Outcome	After completion of the course, students should be able to							
	CO1: Remember the model of a cell and Differentiate the structure of the prokaryotic and eukaryotic cell.						K1	
	CO2: Understand the structure and function of prokaryotic and eukaryotic cell membrane.						K2	
	CO3: Demonstrate the organization of cell organelles.						K2	
	CO4: Compare and contrast the events of cell cycle and its regulation.						K3	
CO5: Distinguish the structure and function of specialized cells.						K3		
Learning Resources								
Text Books	1. Ajoy Paul., (2011) Text Book of Cell and Molecular Biology-Books and Allied (P) Ltd, Kolkata, 3rd Edition. 2. P.S.Verma & V.K. Agarwal, (2004) Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand Publishing Company Pvt Ltd, New Delhi.							
Reference Books	1. Gerald Karp., (2004) Cell and Molecular Biology Concepts and Experiments-4TH Edition, John Wiley & Sons. 2. De Robertis., (2017) Cell Biology, Blaze Publishers and Distributors Pvt .Ltd., New Delhi 3. Sharp., Fundamentals of Cytology, McGraw Hill Company							
Website Link	1. https://mcb.berkeley.edu/courses/mcb110spring/nogales/mcb110_s2008_4signalin g.pdf 2. https://opentextbc.ca/biology/chapter/6-2-the-cell-cycle/							
	L-Lecture	T-Tutorial	P-Practical	C-Credit				

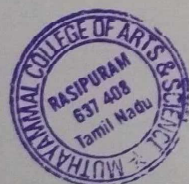
B.Sc.,-Biotechnology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M1UBTC01	CELL BIOLOGY	DSC THEORY - I	I	5	5			4

CO-PO Mapping

CO Number	PO 1	P02	P03	P04	P05	PSO1	PS O2	PSO3	PSO4	PSO5
CO1	S	S	S	M	M	S	S	S	M	M
CO2	S	L	M	M	S	S	S	M	M	S
CO3	M	S	M	M	S	S	S	M	M	S
CO4	M	S	M	S	S	M	M	L	L	M
CO5	S	S	S	M	M	S	S	S	M	M
Level of Correlation between CO and PO	L-LOW W	M-MEDIUM		S-STRONG						

Tutorial Schedule	--
Teaching and Learning Methods	1. Lectures 2. Discussion 3. Interactive sessions 4.ppt Presentation
Assessment Methods	1.Unit test 2.Assignment 3.CIA I & II

Designed By	Verified By	Approved By
<i>D. Kavitha</i>	<i>M. Suresh Kumar</i>	<i>A. Suresh Kumar</i>
(Dr. D. KAVITHA)	(Dr. M. SURESHKUMAR)	



B.Sc-Biotechnology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M1UBTP01	PARACTICAL: CELL BIOLOGY	DSC PRACTICAL - I	1	3			3	2
Objective	To teach students the basic techniques and instrument principles in Cell Biology							
S.No.	List of Experiments / Programmes	Knowledge Levels	Sessions					
1	Microscopes and its parts.	K1	3					
2	Micrometry - Stage and Ocular Micrometer.	K1	3					
3	Cell Counting - Haemocytometer.	K2	3					
4	Mounting epithelium and observing living animal and plant cells using vital staining.	K1	3					
5	Mitosis in Onion root tip squash	K3	3					
6	Meiosis in grasshopper testis / flower buds.	K3	3					
7	Preparation of Permanent Slides - Muscle cells.	K2	3					
8	Observation of Permanent Slides - Cardiac muscle, Sperm cell.	K1	3					
9	Staining of macromolecules - Carbohydrates and Lipids.	K2	3					
10	Microtomy (Demo).	K2	3					
Course Outcome	CO1: Understand the laboratory rules and regulations and its importance.	K1						
	CO2: Recognise the cells by employing different types of microscopes	K2						
	CO3: Interpret the preparation of slides	K2						
	CO4: Interpret the cell division	K3						
	CO5: Examine the cell sectioning	K3						
Learning Resources								
Text Books	1. S. Rajan, R. Selvi Christy. (2015). Experimental Procedures in Life Sciences, Anjanaa Publications.							
Reference Books	1. Jyoti Saxena, Mamta Baunthiyal and Indu Ravi, (2019). Comprehensive Laboratory Manual of Life Sciences, Scientific Publishers. 2. Keith Wilson & John Walker, (2005). Principles and techniques of practical biochemistry and molecular biology, Cambridge Publication							
Website Link	1. https://www.bjcancer.org/Sites_OldFiles/_Library/UserFiles/pdf/Cell_Biology_Laboratory_Manual.pdf 2. https://sjce.ac.in/wp-content/uploads/2018/04/Cell-Biology-Genetics-Laboratory_Manual17-18.pdf							

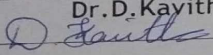
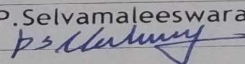
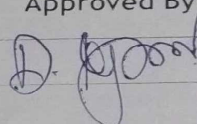
B.Sc-Biotechnology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M1UBTP01	PARACTICAL: CELL BIOLOGY	DSC PRACTICAL - I	I	3			3	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	S	S	S	M	S	M	S
CO2	M	L	L	M	S	S	L	S	M	S
CO3	M	S	L	M	M	S	M	S	S	M
CO4	L	M	M	S	S	S	M	S	M	S
CO5	M	L	M	S	S	S	M	S	M	L
Level of Correlation between CO and PO				L-LOW		M-MEDIUM		S-STRONG		

Tutorial Schedule	1. Interactive Session 2. Discussion
Teaching and Learning Methods	1. Lectures 2. PPT Presentation
Assesment Methods	1. Model Practical 2. Assignment 3. CIA I & II

Designed By	Verified By	Approved By
Dr.D.Kayitha 	Dr.P.Selvamaleeswaran 	

B.Sc-Biotechnology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Se m	Hours	L	T	P	C
21M2UBTCO 2	GENETICS	DSC THEORY-II	II	4	4			4
Objective	**Understanding the concept and principles of genetics exchanges and Its expression in host and to provide an idea about gene regulations and its control							
Unit	Course Content	Knowledge Levels	Sessions					
I	History of Classical and Modern Genetics, Concept and organization of genetic material in bacteria, Plant and Animal, structure ,types, forms and functions of DNA and RNA. Genetic model organisms and significance (E. Coli, Arabidopsis thaliana, Coenorhabditis elegans).	K1-K3	12					
II	Mendelian inheritance, Non-Mendelian inheritance, Linkage, Crossing over, Chromosomal theory of inheritance, Sex linked and Sex limited inheritance. Natural gene transfer methods in bacteria.	K1-K2	11					
III	Fine structure of genes, Genetic code, Structural and numerical alterations of chromosome deletion, Inversion, Duplication, Translocation. Mutations -(Spontaneous and Induced), mutagens Biochemical basis of mutation.	K2	11					
IV	Ploidy -Euploidy and Aneuploidy, Inborn Genetic disorders, Inherited single gene disorders.	K1	10					
V	Cytogenetics, Human Karyotyping, Banding techniques, Human Genetic diseases, Gene therapy, Pedigree analysis.	K2-K3	11					
Course Outcome	After completion of the course, student should be able to							
	C01: Memories an acquaintance on historical overview of microbial genetics and genetic Materials	K1						
	C02: Comprehend the concept of replication of genetic materials	K2						
	C03: Classify the genes and mutation	K2						
	C04: Demonstrate the genetic exchange mechanism in microorganisms	K3						
	C05: Sketch the Cytogenetics	K3						
Learning Resources								

Text Books	1. Ajoy Paul., 2011. Text Book of Genetics -Books and Allied (P)Ltd, Kolkata, 3rd Edition 2. Verma P.S. & Agarwal V.K., Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, S. Chand Publishing.
Reference Books	1. Leland Hartwell, Leroy Hood, Michael Goldberg, Lee Silver, Ruth Veres, Ann E. Reynolds, 1999. Genetics: From Genes to Genomes, McGraw-Hill Education 2. Peter J. Russell, 1997. Genetics (5th Edition), Benjamin-Cummings Pub Co 3. Strickberger, M.W., 1997. 4th Edition. Genetics-Printice hall 4. Alberts ., 2002. Molecular biology of the cell-Garland publications, 4th edition.
Website Link	1. shorturl.at/irsuH 2. https://bit.ly/3cMK03V 3. https://cle.clinic/3wOOD4j
	L-Lecture T-Tutorial P-Practical C-Credit

B.Sc-Biotechnology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Se m	Hours	L	T	P	C
21M2UBTC02	GENETICS	DSC THEORY - II	II	4	4			4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	M	L	L	L	S	S	M	L	M
CO2	S	M	L	M	M	S	S	M	L	M
CO3	S	S	L	M	M	S	S	S	L	M
CO4	S	S	M	M	S	S	S	S	L	M
CO5	S	S	M	M	S	S	S	S	M	M
Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG							
Tutorial Schedule						1. Interactive sessions 2. Quiz				
Teaching and Learning Methods						1. Lectures 2. Discussion 3. PPT Presentation				
Assesment Methods						1. Unit test 2. Assignment 3. CIA I & II				

Designed By	Verified By	Approved By
Dr. D. Kavitha <i>D. Kavitha</i>	Dr. M. Sureshkumar <i>Dr. M. Sureshkumar</i>	<i>A. L. Suresh</i>



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

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2UBTS01	BIOINSTRUMENTATION	SRC-I	II	1	1			2
Objective	To make the students to understand the basic principles of Bioanalytical instruments							
Unit	Course Content						Knowledge Levels	Session
I	Beer Lambert's law - Colorimeter and its applications, Spectrophotometer-Principle and its applications- Types of Spectrophotometer- UV, visible, Infrared Spectrophotometer.						K1	6
II	Principle and working of pH meter. Electrophoresis - Principle and its applications - Types of electrophoresis- Agarose Gel, SDS-PAGE and isoelectric focusing.						K2	5
III	Imaging techniques -EEG, ECG, CT SCAN, MRI SCAN, X-RAY, EMG, NMR, PET.						K3	7
IV	Centrifuge - Principle and its applications - Types of Centrifuge, Chromatography - Principle and its applications, Types- Paper, TLC, Column, Affinity and Ion-exchange.						K2	6
V	Biosensors- Principle and its applications- Electrochemical, Thermometric, Potentiometric-Optical, Piezo-electric and Amperometric Biosensors. GM Counter, Scintillation Counter, Autoradiography, Flow Cytometry. Working principle of Autoclave, Incubator and Hot air oven.						K3	6
Course Outcome	After completion of the course, student should be able to							
	CO1: Memorize the basics of Biological instrumentation.						K1	
	CO2: Describe the working principle and applications of fluorescence and radiation based techniques.						K2	
	CO3: Understand the need and applications of imaging techniques.						K3	
	CO4: Interpret Separating and Purifying the components						K2	
	CO5: Demonstrate the basics of instrumentation by analysis.						K3	
Learning Resources								
Text Books	1. Zubay.G.L., 1993. Biochemistry, 4th Edi. WmC. Brown Publisher 2. A. Upadhyay, K. Upadhyay, and N. Nath, 2003. Biophysical Chemistry Principles . Techniques Handbook, Himalaya Publishing House							
Reference Books	1. H.V. Volkones., 2002. General Biophysics, Vol I& 2. S.Mahesh., 2003. Biophysics New Age International Private Lt 3. Ghatak, K.L., 2003. Techniques and Methods In Biology. PHI Learning Private Ltd. New Delh							
Website Link	1. https://bit.ly/3QfFXea 2. https://bit.ly/3THowGk 3. https://bit.ly/3cHEXBF							

L-Lecture

T- Tutorial
P- Practical

C-Credit

B.Sc-Biotechnology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hou rs	L	T	P	C
21M2UBT S01	BIOINSTRUMENTATI ON	SEC-I	II	1	1			2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	L	S	S	S	M	S	S
CO2	S	M	L	M	M	S	S	M	M	S
CO3	S	M	S	M	M	S	S	M	M	S
CO4	M	L	L	L	S	S	M	S	S	S
CO5	S	M	M	L	M	S	S	M	L	S
Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG							

Tutorial Schedule	
Teaching and Learning Methods	1. Lectures 2. Discussion 3. Interactive Session 4. PPT Presentation
Assesment Methods	1. Unit test 2. Assignment 3. CIA I & II

Designed By	Verified By	Approved By
Dr.D.Kavitha <i>D.Kavitha</i>	Dr.M.Sureshkumar <i>MS</i>	<i>Ar. h. bany</i>

B.Sc-Biotechnology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2UBTP02	PRACTICAL: GENETICS	DSC PRACTICAL - II	II	3			30	2
Objective	To give hands on experience in Mitosis, visualize the sex chromatin under the microscope and quantification of important biological constituents of cell.							
S.No.	List of Experiments / Programmes				Knowledge Levels	Sessions		
1	Mendel's law of genetics - Mono and Dihybrid crosses (Demo).				K1	6		
2	Rearing morphology of Drosophila (Mutant eye identification).				K2	6		
3	Observation of Genetic model organisms (Arabidopsis thaliana and Coenorhabditis elegans)- Permanent slides.				K2	3		
4	Isolation of spontaneous mutant cells.				K3	3		
5	Isolation of petite mutant yeast cell.				K3	3		
6	Identification of Barr body (Buccal epithelium smear).				K2	3		
7	Preparation of polytene chromosomes (Chironomus larvae salivary gland)- squash preparation.				K3	3		
8	Staining of DNA and RNA - Methyl green pyronin				K3	3		
Course Outcome	CO1: Understand the quantify the important biological constituents of cell.				K1			
	CO2: Analyze the sex chromatin present in different cells.				K2			
	CO3: Examine and evaluate the stages of Mitosis				K2			
	CO4: Analyze the sex chromatin present in different cells.				K3			
	CO5: Interpret the mixture of Nucleic Acids				K3			
Learning Resources								
Text Books	1. S. Rajan, R. Selvi Christy. (2015). Experimental Procedures in Life Sciences, Anjanaa Publications.							
Reference Books	1. Jyoti Saxena, Mamta Baunthiyal and Indu Ravi, (2019). Comprehensive Laboratory Manual of Life Sciences, Scientific Publishers. 2. Keith Wilson & John Walker, (2005). Principles and techniques of practical biochemistry and molecular biology, Cambridge Publication							
Website Link	1. https://bit.ly/3Bcnye3 2. https://bit.ly/3QcuY55 3. https://bit.ly/3wOVzHR							



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

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M2UBTP02	PARACTICAL: GENETICS	DSC PRACTICAL - II	II	3			30	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	S	S	S	M	S	M	S
CO2	M	L	L	M	S	S	L	S	M	S
CO3	M	S	L	M	M	S	M	S	S	M
CO4	L	M	M	S	S	S	M	S	M	S
CO5	M	L	M	S	S	S	M	S	M	L

Level of Correlation between CO and PO	L-LOW	M-MEDIUM	S-STRONG
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Tutorial Schedule	1. Interactive Session 2. Discussion
Teaching and Learning Methods	1. Lectures 2. PPT Presentation
Assesment Methods	1. Model Practical 2. Assignment 3. CIA I & II

Designed By	Verified By	Approved By
Dr.D.Kavitha <i>D. Kavitha</i>	Dr.M.Sureshkumar <i>MS</i>	<i>A. L. Suresh</i>



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

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3UBT03	MICROBIOLOGY	DSC THEORY - III	III	6	6	0	0	4
Objective	To understand the early developments of Microorganisms, classification and observation, structure and Diseases.							
Unit	Course Content						Knowledge Levels	Sessions
I	History and scope of Microbiology-Abiogenesis and Biogenesis-Germ theory of diseases. Microscopy-Light Microscopy, Bright field, Dark field, Phase contrast, Differential Interference contrast microscopy, Fluorescence and Electron microscopy.						K1-K3	10
II	Diversity of microbial world - Organizing, classifying and naming of microorganism - Whittaker's five system of classification. Bacterial Taxonomy - Methods in bacterial identification - Bergey's systematic classification of bacteria.						K1-K2	12
III	Cell Structure: Bacteria, Fungi, Algae and Protozoa. Stain and Staining techniques-Simple, Differential (Gram and Acid fast) and Special Staining (Endospore, Capsular, Flagella), Fungal Staining. Permanent Slide Preparation.						K2-K3	12
IV	Survival at extreme environments - Starvation - Adaptive mechanisms in thermophilic, alkalophilic, osmiophilic and barophilic, psychrophilic microorganisms: Hyperthermophilies and halophiles. Pandemic and Epidemic diseases-H1N1 Swine Flu, COVID-19, SARS Tuberculosis, Leprosy, and Malaria.						K2-K4	10
V	Sterilization-Physical and Chemical methods, Culture media and its types, Microbial growth - Growth curve, Measurement and factors affecting growth, Pure culture techniques, Anaerobic culture, Preservation of Cultures.						K2-K3	11
Course Outcome	After completion of the course, students should be able to							
	CO1:To gain knowledge about historical perspective of Microbiology and principle and application of various types of Microscopy						K1	
	CO2:To To Classify and nomenclature explain the structure and general characteristics of Microorganisms						K1	
	CO3: Explain the structure and general characteristics of Microorganisms like bacteria, algae, fungi and protozoan and staining techniques						K2	
	CO4:ToKnow about Survival of microorganism and acquire knowledge on pathogens.						K2	
	CO5:Acquire knowledge on Sterilization, media preparation and maintenance of culture						K3	
Learning Resources								
Text Books	1. R.C. Dubey and D.K. Maheshwari , 2005. A textbook of Microbiology, S. Shand and company limited publication. 2. Michael J Pelczar, Chan ECS and Kreig R, 1998. Microbiology, 5th edition, Tata Mc Graw Hill Education New Delhi.							
Reference Books	1. Prescott LM, Harley JP and Klein DA. (2005). Microbiology, 6th Edition, McGraw Hill. 2. Talero KP and Talero A. (2002). Foundations in Microbiology, 4th Edition, McGraw Hill.							

	3. Peter F. Stanbury, Allan Whitaker, Stephen J. Hall. 2016. Principles of Fermentation Technology. 3rd Edn, Elsevier Science Ltd. Netherlands.					
Website Link	1. https://bit.ly/3AJF9sk					
	2. https://www.agrimoon.com/wp-content/uploads/AGRICULTURAL-MICROBIOLOGY.pdf					
	3. https://microbiologyinfo.com/different-size-shape-and-arrangement-of-bacterial-cells/					
	L-Lecture		T-Tutorial	P-Practical	C-Credit	

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

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3UBTC03	MICROBIOLOGY	DSC THEORY - III	III	6	6			4

CO-PO Mapping										
CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	L	S	L	S	S	M	L	M
CO2	S	M	L	M	M	S	S	M	S	M
CO3	S	S	L	M	M	S	S	S	S	M
CO4	S	S	M	M	S	S	S	S	L	M
CO5	S	S	M	M	S	S	S	S	M	M

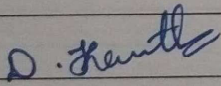

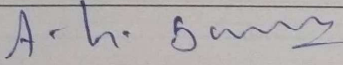
Level of Correlation between CO and PO

L-LOW

M-MEDIUM

S-STRONG

Tutorial Schedule	--
Teaching and Learning Methods	1. Lectures 2. Discussion 3. Interactive sessions 4.ppt Presentation
Assessment Methods	1.Unit test 2.Assignment 3.CIA I & II

Designed By	Verified By	Approved By
 (Dr. D. KAVITHA)	 (Dr. M. SURESHKUMAR)	



B.Sc-Biotechnology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3UBTP03	PRACTICAL: MICROBIOLOGY	DSC PRACTICAL - III	III	3	0	0	3	2
Objective	To provide the students with a basic fundamental knowledge of how microorganisms grow, react with specific types of growth media and their biochemical reactions with media used in identification.							
S.No.	List of Experiments / Programmes						Knowledge Levels	Sessions
1	Sterilization Techniques & sterilization of Media, Glass wares.						K2-K3	3
2	Preparation of different types of Media (solid & liquid).						K2-K1	3
3	Pure culture Isolation and enumeration of microorganism from soil and water						K2-K3	3
4	Staining techniques: Simple staining, Differential staining (Gram's staining, Acid fast Staining)						K2-K3	3
5	Determination of motility: Hanging drop method.						K2-K3	3
6	Bacterial characterization Technique by biochemical tests: IMVIC.						K2-K3	3
7	Measurement of Growth rate of bacteria - Turbidometric method.						K2-K3	3
8	Antibiotic sensitivity Test - Kirby Bauer (Disc and well diffusion method) .						K2-K3	3
9	Isolation of antibiotic resistant mutant.						K2-K3	3
10	Determination of motility: Hanging drop method.						K2-K3	3
Course Outcome	CO1: Develop the basic laboratory techniques of a biotechnology						K1	
	CO2: To analysis and characterization of micro organism						K1	
	CO3: To gain the knowledge of principles of microbial culture and awareness of health and safety issues and handling microbial pathogens						K2	
	CO4: To develop understanding about microbial growth curve, antibiotech sentivity methode.						K2	
	CO5: Analysis of resistant mutant organism						K3	
Learning Resources								
Text Books	1. Benson HJ. (1999). Microbiological Applications: A Laboratory manual in General Microbiology, 7th Edition, McGraw Hill. 2. Bani Baral, Anandita Mandal, (2015). Clinical Microbiology Laboratory Manual And Workbook, CBS Publishers & Distributors							

Reference Books	1. John G. Holt, Noel R. Krie, (1984), <i>Bergey's Manual of Systematic Bacteriology</i> , Springer New York, NY 2. Atlas, R.M. (2010). <i>Handbook of Microbiological Media</i> (4th ed.). CRC Press.
Website Link	1. https://faculty.washington.edu/korshin/Class-486/MicrobiolTechniques.pdf 2. https://www.cnm.edu/programs-of-study/math-science-engineering/microbiology-lab-manual https://bit.ly/3wP8fVZ

B.Sc-Biotechnology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3UBTP03	PRACTICAL: MICROBIOLOGY	DSC PRACTICAL - III	III	3			3	2

CO-PO Mapping										
CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	S	S	S	M	S	M	S
CO2	M	L	L	M	S	S	L	S	M	S
CO3	M	S	L	M	M	S	M	S	S	M
CO4	L	M	M	S	S	S	M	S	M	S
CO5	M	L	M	S	S	S	M	S	M	L
Level of Correlation between CO and PO	L-LOW			M-MEDIUM			S-STRONG			

Tutorial Schedule	
Teaching and Learning Methods	1. Practicals based Learning 2. Discussion 3. Interactive Session
Assesment Methods	1. Unit test 2. Assignment/Observation 3. CIA I & II

Designed By	Verified By	Approved By
Mrs.K.Chitra <i>K.Chitra</i>	Dr.P.Selvamaleeswaran <i>P.S. Selvamaleeswaran</i>	<i>D. Jagan</i>

B.Sc., -Biotechnology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Se m	Hours	L	T	P	C
21M3UB TS02	MUSHROOM TECHNOLOGY	SEC- II	III	3	3			2
Objective	To learn about the concepts of mushroom cultivation and the importance of embarking on self-employment							
Unit	Course Content						Knowle dge Levels	Sessi ons
I	Natural Habitats- Humicolous, Lignicolous and Coprophilous. Differentiation of edible and poisonous mushroom. Description of Edible Types. Nutritional properties; medicinal values, Production of value added products.						K1	6
II	Basic materials required in mushroom cultivation. Methods used for commercial cultivation - mushroom substrate selection, substrate soaking, and pasteurization.						K1-K2	6
III	Preparation of spawn substrate, process of spawn culture, culture maintenance, and mother spawn production and storage of spawn. Harvesting of mushrooms: methods of harvesting; grading, packaging and storing mushroom						K2-K3	6
IV	Design and layout of mushroom farm. Equipment and tools and other infrastructure facilities required, safety measures in the farm. Approximate expenditure for establishing the production unit. Storage of fresh mushrooms and dry mushrooms. Preservation of mushroom.						K3	6
V	Banking - loan facilities; Government sponsored schemes and subsidies, legal processes in company / industry registration and agricultural finance, and patenting.						K3	6
Course Outcome	After completion of the course, students should be able to							
	CO1: Understand the concepts of mushroom cultivation						K1	
	CO2: Selection of important types of Mushroom and its nutritive values						K2	
	CO3: Know the Opportunities to start mushroom farms with the support of schemes						K2	
	CO4: Examine the infrastructure, expenditure, production and preservation of mushrooms						K3	
	CO5: Develop the confidence and personal skills in mushroom cultivation						K3	
Learning Resources								
Text Books	1. Pathak, V. N. and Yadav, N. (1998). Mushroom Production and Processing Technology. Agrobios, Jodhpur. 2. Tewari Pankaj Kapoor, S. C. (1988). Mushroom Cultivation. Mittal Publication, New Delhi							
Referen ce Books	1. Subba Rao, N. S. and Dommergues, Y. R. (1998). Microbial Interactions in Agriculture and Forestry. Vol. I, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi. 2. Verma, A. (1999). Mycorrhiza. Springer Verlag, Berlin							
Website Link	1. https://bit.ly/3elm2gw 2. https://bit.ly/3Tlywiv 3. https://bit.ly/3Qg5zHJ							
	L-Lecture		T-Tutorial		P-Practical			C-Credit

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

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3UBTS02	MUSHROOM TECHNOLOGY	SBEC II	III	3	3			2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	L	S	S	S	M	S	S
CO2	S	M	L	M	M	S	S	M	M	S
CO3	S	M	S	M	M	S	S	M	M	S
CO4	M	L	L	L	S	S	M	S	S	S
CO5	S	M	M	L	M	S	S	M	L	S

Level of Correlation
between CO and PO

L-LOW

M-MEDIUM

S-STRONG

Tutorial Schedule	--
Teaching and Learning Methods	1. Lectures 2. Discussion 3. Interactive sessions 4.ppt Presentation
Assessment Methods	1.Unit test 2.Assignment 3.CIA I & II

Designed By	Verified By	Approved By
		

(Dr. D. RAJASEKARAN)

(Dr. M. SURESH KUMAR)



B. Sc-Biotechnology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M4UBTC04	MOLECULAR BIOLOGY	DSC THEORY - IV	IV	5	5			4
Objective	To gain knowledge about the structure and function of nucleic acids (DNA and RNA) and their mechanism							
Unit	Course Content						Knowledge Levels	Sessions
I	Central dogma of molecular Biology. DNA Replication in Prokaryotic and Eukaryotic organisms, Mechanism of DNA replication, Enzymes and accessory proteins involved in DNA replication. DNA Repair: light and dark mechanisms						K1-K3	12
II	Transcription in Prokaryotic and Eukaryotic organisms, RNA polymerase. Transcriptional and post-transcriptional gene silencing. Modifications in RNA. 5' cap formation, 3'-end processing and polyadenylation, splicing, Editing, Nuclear export of mRNA						K1-K2	12
III	Translation-Prokaryotic and eukaryotic translation, the translation machinery, Mechanisms of initiation, elongation and termination, co- and post-translational modifications of proteins. Import into nucleus, mitochondria and chloroplast. Receptor mediated endocytosis						K3	12
IV	Regulation of gene expression in prokaryotes: Operon concept-lac operon, trp operon. Regulation of gene expression in Eukaryotes. Hormonal control of gene expression						K4	12
V	Oncogenes and Tumor Suppressor Genes-Viral and cellular oncogenes, tumor suppressor genes from humans, Structure, function and mechanisms p53 tumor suppressor proteins. Homologous Recombination-Holliday junction						K4	12
Course Outcome	After completion of the course, student should be able to							
	CO1:Remember basics concepts of molecular biology and their molecular significance						K1	
	CO2: Discuss about transcription in Uni and multicellular organisms						K1	
	CO3:Execute the mechanism of post translational modification of proteins						K2	
	CO4:Differentiate the regulation gene expression prokaryotes and eukaryotes						K3	
	CO5:Evaluate the structure and function of tumor suppressor gene						K3	
Learning Resources								
Text Books	1. Freifelder.D and Malacinski, G.M. 1996. Essentials of molecular biology.2nd Edition Panima Publishing Co. 2. Rorastogi.S.c. 2008. Cell and Molecular Biology, second edition, New Age International Pvt.Ltd. New Delhi							
Reference Books	1. Lewin B, 2000, Genes VII, Oxford University press, Oxford, New York. 2. Weaver, R.F & Hedrick P. W; Genetics. Third Edition, 1997, WCB McGraw-Hill Publishers. 3. Lodish H, Berk A, Zipursky L, Matsudaira P, Baltimore D And Darnell J, 2000. Molecular Cell Biology, 4th Edition, WH Freeman & Co, New York							
Website Link	1.https://bit.ly/3QbmD1C 2.https://bit.ly/3D3PvGh 3.https://bit.ly/3qvk5RH							
	L-Lecture	T-	P-	C-Credit				

Tutorial Practical

B.Sc-Biotechnology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
Z1M4UBTCO 4	MOLECULAR BIOLOGY	DSC THEORY - IV	IV	5	5			4

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	S	S	S	S	M	S
CO2	S	L	M	M	S	S	S	M	M	S
CO3	S	S	S	M	L	M	S	M	S	M
CO4	M	S	M	L	M	S	S	M	M	S
CO5	S	M	M	S	M	S	S	M	M	S
Level of Correlation between CO and PO	L-LOW		M-MEDIUM			S-STRONG				

Tutorial Schedule	1. Interactive sessions 2. Quiz
Teaching and Learning Methods	1. Lectures 2. Discussion 3. PPT Presentation
Assesment Methods	1. Unit test 2. Assignment 3. CIA I & II

Designed By	Verified By	Approved By
Dr.D.Rajasekaran	Dr.M.Sureshkumar	A. h. b m

(Handwritten signature of Dr. D. Rajasekaran)

(Handwritten signature of Dr. M. Sureshkumar)



B.Sc-Biotechnology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M4UBTP 04	PRACTICAL: MOLECULAR BIOLOGY	DSC PRACTICAL - IV	IV	3			30	2
Objective	To imparts practical knowledge on Nucleic acid isolation, digestion and ligation.							
S.No.	List of Experiments / Programmes						Knowle dge Levels	Sessi ons
1	Isolation of DNA from bacterial cells						K1	3
2	Analysis of DNA by agarose gel electrophoresis						K2	3
3	Estimation of DNA by DPA Method						K2	3
4	Isolation of RNA from bacterial cells						K2	3
5	Estimation of RNA by Orcinol Method						K2	3
6	Analysis of DNA & RNA Quality and Quantity.						K2-K3	3
7	Extraction of total protein from dal / lentil samples						K3	3
8	Separation of amino acids by TLC						K3	1
9	Isolation and purification of protein (Dialysis).						K3	2
10	Estimation of Protein by Lowry's method.						K3	3
11	Separation of protein by SDS PAGE.						K3	3
Course Outcome	CO1: Understand the basic laboratory techniques of a biotechnology							
	CO2: Describe the quantity of macromolecules							
	CO3: Apply the techniques for molecule separation							
	CO4: Practice the macromolecules purification technique							
	CO5: Demonstrate the protein separation techniques							
Learning Resources								
Text Books	1.Frederick. M.A., Roger. B.R., David. D. M., Seidman. J. G., John A. S., Kevin. S., (2003). Current Protocols in Molecular Biology, John Wiley and Son,							
Reference Books	1. Watson, J.D., Baker, T.A., Bell, S.P., Gann, A., Levine, M., Losick, R. (2013). Molecular Biology of Gene, 7 th edition, Pearson. 2. Krebs, J. E., Kilpatrick, S.T., Goldstein, E.S. (2013). "Lewin's Genes XI", 11th revised edition, Jones and Bartlett Publishers Inc.							
Website Link	1. https://webstor.srmist.edu.in/web_assets/downloads/2021/20BTC502J-lab-manual.pdf 2. https://www1.villanova.edu/content/dam/villanova/engineering/FacultyResearch/DrugDiscovery/2017LabManual.pdf							

B.Sc-Biotechnology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M4UBTP04	PRACTICAL: MOLECULAR BIOLOGY	DSC PRACTICAL - IV	IV	3			30	2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	S	S	S	M	L	M	S	S
CO2	S	M	M	S	M	S	S	S	M	S
CO3	S	M	M	S	M	S	M	S	M	S
CO4	M	L	M	S	M	S	M	S	L	M
CO5	S	M	M	S	S	S	L	M	M	S
Level of Correlation between CO and PO	L- LOW	M- MEDIUM	S-STRONG							

Tutorial Schedule	1. Interactive sessions 2. Quiz
Teaching and Learning Methods	1. Lectures 2. Discussion 3. PPT Presentation
Assesment Methods	1. Unit test 2. Assignment/Observation 3. CIA I & II

Designed By	Verified By	Approved By
Dr.D.Kavitha <i>D. Kavitha</i>	Dr.M.Sureshkumar <i>Dr. M. Sureshkumar</i>	<i>A. h. Sanyal</i>



B. Sc-Biotechnology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M4UBTS02	MEDICAL LABORATORY TECHNOLOGY	SEC- III	IV	3	3			2
Objective	Demonstrate an understanding of the underlying scientific principles of laboratory testing, including technical, safety, governmental regulations and standards in clinical laboratory science							
Unit	Course Content					Knowledge Levels	Sessions	
I	The use of the laboratory - Basic laboratory principles - Code of conduct of medical laboratory personnel -Organization of clinical laboratory and role of medical laboratory technician - Safety measures					K1	6	
II	Incubator, Hot Air Oven, Water Bath - Anaerobic Jar, Centrifuge, Autoclave -Microscope - Fundamentals of Microscopy, Resolution & Magnification, Light Microscopy, Electron Microscopy- Glassware - Description of Glassware, its use, handling and care					K1-K2	6	
III	Requirement of Blood Collection - Blood collection - Phlebotomy - Sampling errors - Collection and preservation of biological fluids - Anticoagulants - Preservation of samples - Chemical preservatives - Process of analyzing the specimens - The laboratory report.					K3	6	
IV	Buffer and pH- Preparation of reagents : Normal , per cent and Molar solution - normal saline -Methods of measuring liquids- Clinical Laboratory records- Modern Laboratory set up - Quality control: Accuracy, Precision, and Reference values.					K3	6	
V	Types of analyzers - Semi-auto analyzer - Batch analyzer - Random Access auto- analyzers. The use of chemicals and their interactions, danger signs, production techniques, and disposal methods					K3	6	
Course Outcome	After completion of the course, student should be able to							
	CO1: Undersand the basic principles of laboratory					K1		
	CO2: Classify the fundamental knowledge of theory and principles related to laboratory Instruments					K2		
	CO3: Explain the hematology and associate correct laboratory values to the condition					K3		
	CO4: Employ the components that makes up a valid quality assurance program in Clinical Chemistry.					K3		
	CO5: Apply laboratory procedures according to appropriate safety standards.					K3		
Learning Resources								

Text Books	1. Fischbach, 2005. Manual of lab and diagnostic tests, Lippincott Williams Wilkins, New York. 2. Gradwohls, 2000. Clinical laboratory methods and diagnosis. (ed) Ales C. Sonnenwirth and Leonard jarret, M.D.B.I., New Delhi.			
Reference Books	1. J Ochei and Kolhatkar, 2002. Medical laboratory science theory and practice, Tata McGraw- Hill, New Delhi. 2. Kanai L. Mukherjee, 2007, Medical laboratory technology Vol.1.Tata McGraw Hill			
Website Link	1. https://bit.ly/3BgVhD5 2. https://bit.ly/3CV7kam 3. https://bit.ly/3qhav4F			
	L-Lecture	T-Tutorial	P-Practical	C-Credit

B.Sc-Biotechnology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M4UBTS02	MEDICAL LABORATORY TECHNOLOGY	SEC- III	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	S	M	M	S
CO2	S	L	M	M	S	S	M	M	S	S
CO3	M	L	M	L	M	S	M	M	S	S
CO4	S	M	M	M	S	S	S	M	S	M
CO5	M	S	S	M	S	S	S	S	M	M
Level of Correlation between CO and PO		L-LOW		M-MEDIUM	S-STRONG					

Tutorial Schedule	1. Interactive sessions 2. Quiz
Teaching and Learning Methods	1. Lectures 2. Discussion 3. PPT Presentation
Assesment Methods	1. Unit test 2. Assignment 3. CIA I & II

Designed By	Verified By	Approved By
Dr. D. Kavitha <i>D. Kavitha</i>	Dr. M. Sureshkumar <i>M. Sureshkumar</i>	<i>A. H. Banu</i>



B. Sc., Biotechnology Syllabus LOCF-CBCS with effect from 2021-2022 Onwards								
Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3UBTN01	CONCEPTS OF BIOTECHNOLOGY	NMEC- I	III	2	2			2
Objective	To provide an introduction to genetics, molecular biology, tools and applications of biotechnology.							
Unit	Course Content						Knowledge Levels	Sessions
I	Scope of Biotechnology. History of Biotechnology: Conventional and Modern Biotechnology - Biotech industries.						K1	4
II	Tools used in gene cloning - Restriction endonucleases - Types - Features. Ligases - Linkers, adaptors and homopolymer tails. Modifying enzymes.						K1-K2	4
III	Vectors- plasmids- pBR322. Cosmid vector, Animal vector- SV40.						K3	4
IV	Gene transfer methods- Vector mediated and vector less method.						K3	4
V	PCR, RFLP, RAPD and blotting techniques						K3	4
Course Outcome	After completion of the course, students should be able to							
	CO1:Undertsand the basic principles of Biotechnology						K1	
	CO2: Classify the fundamental knowledge of gene cloning tools						K1	
	CO3: Explain the vector system						K2	
	CO4: Employ the components of vector system						K2	
	CO5: Apply the molecular techniques for biotechnology						K3	
Learning Resources								
Text Books	1. Gupta P.K, (2004), Biotechnology and Genomics, Rastogi publication.							
Reference Books	1. Dubey, R. C. (2007), A text book of Biotechnology, S.Chand& Company Ltd. New Delhi. 2. Brown, T.A (1996), Gene cloning and DNA analysis, Blackwell science, Osney Mead, Oxford.							
Website Link	1. https://madhavuniversity.edu.in/biotechnology.html 2. https://bit.ly/3RzN7uG							
	L-Lecture		T-Tutorial		P-Practical			C-Credit

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

Course Code	Course Title	Course Type	Sem	Hours	L	T	P	C
21M3UBTN01	CONCEPTS OF BIOTECHNOLOGY	NMEC I	III	2	2			2

CO-PO Mapping

CO Number	P01	P02	P03	P04	P05	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	L	M	S	S	S	S	M	S
CO2	S	L	M	L	S	S	M	S	S	M
CO3	M	M	L	M	S	S	S	M	S	M
CO4	S	M	M	L	S	S	S	M	M	S
CO5	S	M	L	M	S	S	M	S	M	S

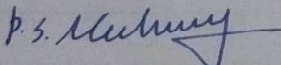
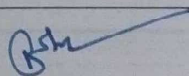
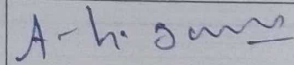
Level of Correlation between CO and PO

L-LOW

M-MEDIUM

S-STRONG

Tutorial Schedule	--
Teaching and Learning Methods	1. Lectures 2. Discussion 3. Interactive sessions 4.ppt Presentation
Assessment Methods	1.Unit test 2.Assignment 3.CIA I & II

Designed By	Verified By	Approved By
		

(Dr. P. SELVAMALEESWARAN)

(Dr. M. SURESHKUMAR)

