ACADEMIC CURRICULA

UNDERGRADUATE DEGREE PROGRAMME

Bachelor of Science
in
Biotechnology
(B.Sc Biotechnology)
Three Years

Learning Outcome Based Education

Choice Based Flexible Credit System

Academic Year
2020 - 2021

SRM
INSTITUTE OF SCIENCE & TECHNOLOGY
(Deemed to be University u/s 3 of UGC Act, 1956)

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY

(Deemed to be University u/s 3 of UGC Act, 1956)

Kattankulathur, Kancheepuram District 603203, Tamil Nadu, India

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Department of Biotechnology

1. Department Vision Statement	
Stmt - 1	*Creating the most conducive environment for imparting quality education in Biotechnology*
Stmt - 2	*Contributing effectively to produce globally competent quality professionals in the field of life science*
Stmt - 3	*Contributing towards preparing young minds to serve community*

2. Department Mission Statement	
Stmt - 1	*Impart student's essential knowledge and skills required for a successful career in life science*
Stmt - 2	*Instill confidence in the students to take up new challenges by grooming them appropriately*
Stmt - 3	*Inculcate in the students a sense of commitment to professional ethics, moral values with emphasis on team work and leadership qualities*
Stmt - 4	*Instill the students with a clear awareness of environmental issues and their relevance to their profession*
Stmt - 5	*Impress upon the students the impact of their work on the nation's economic and social progress*

3. Program Education Objectives (PEO)	
PEO - 1	*Offer the students those skill sets and domain knowledge based on needs of current trends in biotechnology*
PEO - 2	*Provide the students with the capabilities in the areas of analysis, design, development and testing*
PEO - 3	*Kindle the minds of students to take up research and development in life science with missionary zeal*
PEO - 4	*Train the students to become effective communicators in professional as well as general aspects of life*
PEO - 5	*Prepare the students into balanced individuals who are keen to leave a mark by excelling in their profession*

4. Program Specific Outcomes (PSO)	
PSO - 1	*Graduates will acquire a comprehensive knowledge and sound understanding of fundamentals of biotechnology*
PSO - 2	*Graduates will develop practical, analytical and critical thinking.*
PSO - 3	*Graduates will be prepared to acquire a range of general skills, to work and establish newer concepts in the field of biotechnology.*

5. Consistency of PEO's with Mission of the Department

	Mission Stmt. - 1	Mission Stmt. - 2	Mission Stmt. - 3	Mission Stmt. - 4	Mission Stmt. - 5
PEO - 1	H	H	M	H	M
PEO - 2	H	M	H	H	H
PEO - 3	M	H	M	H	H
PEO - 4	H	H	H	L	M
PEO - 5	L	H	M	H	H

H – High Correlation, M – Medium Correlation, L – Low Correlation

6. Consistency of PEO's with Program Learning Outcomes (PLO)															
	Program Learning Outcomes (PLO)														
	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
PEO - 1	H	H	H	H	H	L	H	L	H	H	H	H	H	H	H
PEO - 2	H	H	H	H	H	L	H	L	H	H	H	H	H	H	H
PEO - 3	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
PEO - 4	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
PEO - 5	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H

H – High Correlation, M – Medium Correlation, L – Low Correlation

7. Programme Structure- B.Sc Biotechnology

1. Professional Core Courses (C)
(12 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
UBT20101J	Cell Biology	4	0	4	6
UBT20102J	Microbiology	4	0	4	6
UBT20201J	Biochemistry	4	0	4	6
UBT20202J	Genetics and Molecular Biology	4	0	4	6
UBT20301J	Enzymology	4	0	4	6
UBT20302J	Biophysics and Bioinstrumentation	4	0	4	6
UBT20401J	Bioprocess Technology	4	0	4	6
UBT20402J	Food Biotechnology	4	0	4	6
UBT20501J	Plant and Animal Biotechnology	4	0	4	6
UBT20502J	Genomics and Proteomics	4	0	4	6
UBT20601J	Immunotechnology	4	0	4	6
UBT20602J	rDNA Technology	4	0	4	6
Total Learning Credits					**72**

2. Discipline Specific Elective Courses (D)
(5 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
UBT20D01T	Mathematical Calculations in Biology	4	0	0	4
UBT20D02T	Human Physiology	4	0	0	4
UBT20D03T	Medical Biotechnology	4	0	0	
UBT20D04T	Environmental Biotechnology	4	0	0	4
UBT20D05T	Bioethics, IPR & Biosafety	4	0	0	
UBT20D06T	Nanobiotechnology	4	0	0	4
UBT20D07T	Cancer Biology				
UBT20D08L	Mini Project and Dissertation	0	0	16	8
Total Learning Credits					**24**

3. Generic Elective Courses (G)
(5 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
ULT20G01J	Tamil-I	2	0	2	3
ULH20G01J	Hindi-I				
ULF20G01J	French-I				
ULT20G02J	Tamil-II	2	0	2	3
ULH20G02J	Hindi-II				
ULF20G02J	French –II				
UCY20G01T	Chemistry	4	0	0	4
UMS20G01T	Biostatistics	4	0	0	4
UBT20G01T	Microbial Physiology	4	0	0	4
Total Learning Credits					**18**

4. Ability Enhancement Courses (AE)
(3 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
ULE20AE1T	English	4	0	0	4
UES20AE1T	Environmental Studies	3	0	0	3
Total Learning Credits					**7**

5. Skill Enhancement Courses(S)
(Any 5 Courses+ My India Project)

Course Code	Course Title	Hours/ Week L	T	P	C
UBT20S01T	Diagnostic tools	2	0	0	2
UBT20S02T	Entrepreneurship in Biotechnology				
UBT20S03T	Biofertilizer technology	2	0	0	2
UBT20S04T	Agricultural biotechnology				
UBT20S05T	Pharmaceutical Biotechnology	2	0	0	2
UBT20S06T	Advanced bioinformnatics				
UMI20S01L	My India Project	0	0	0	1
UCD20S01L	Soft Skills	0	0	2	1
UCD20S02L	Quantitative Techniques	0	0	2	1
Total Learning Credits					**9**

6. Extension Activity (NS/NC/NO/YG)
(Any 1 Course)

Course Code	Course Title	Hours/ Week L	T	P	C
UNS20201L	NSS	0	0	0	0
UNC20201L	NCC				
UNO20201L	NSO				
UYG20201L	YOGA				
Total Learning Credits					**0**

7. Life Skill Courses (JK)
(4 Courses)

Course Code	Course Title	Hours/ Week L	T	P	C
UJK20201L	Communication Skills	0	0	4	2
UJK20301T	Universal Human Values	2	0	0	2
UJK20401T	Professional Skills	2	0	0	2
UJK20501T	Leadership and Management Skills	2	0	0	2
Total Learning Credits					**8**

Total Learning Credits : 138

8. Implementation Plan

Semester – I

Code	Course Title	Hours/ Week L	T	P	C
UBT20101J	Cell Biology	4	0	4	6
UBT20102J	Microbiology	4	0	4	6
ULT20G01J	Tamil-I	2	0	2	3
ULH20G01J	Hindi-I				
ULF20G01J	French-I				
UCY20G01T	Chemistry	4	0	0	4
UCD20S01L	Soft Skills	0	0	2	1
ULE20AE1T	English	4	0	0	4
	Total Learning Credits	18	0	12	24
	Total number of hours /week				30

Semester – II

Code	Course Title	Hours/ Week L	T	P	C
UBT20201J	Biochemistry	4	0	4	6
UBT20202J	Genetics and Molecular Biology	4	0	4	6
ULT20G02J	Tamil-II	2	0	2	3
ULH20G02J	Hindi-II				
ULF20G02J	French-II				
UMS20G01T	Biostatistics	4	0	0	4
UJK20201L	Communication Skills	0	0	4	2
UCD20S02L	Quantitative Techniques	0	0	2	1
UNS20201L	NSS	0	0	0	0
UNC20201L	NCC				
UNO20201L	NSO				
UYG20201L	YOGA				
	Total Learning Credits	14	0	16	22
	Total number of hours /week				30

Semester – III

Code	Course Title	Hours/ Week L	T	P	C
UBT20301J	Enzymology	4	0	4	6
UBT20302J	Biophysics and Bioinstrumentation	4	0	4	6
UBT20G01T	Microbial Physiology	4	0	0	4
UMI20S01L	My India Project	0	0	0	1
UBT20D01T	Mathematical Calculations in Biology	4	0	0	4
UBT20S01T	Diagnostic tools	2	0	0	2
UBT20S02T	Entrepreneurship in biotechnology				
UJK20301T	Universal Human Values	2	0	0	2
	Total Learning Credits				25
	Total number of hours /week				28

Semester - IV

Code	Course Title	Hours/ Week L	T	P	C
UBT20401J	Bioprocess Technology	4	0	4	6
UBT20402J	Food Biotechnology	4	0	4	6
UBT20D02T	Human Physiology	4	0	0	4
UBT20D03T	Medical Biotechnology				
UBT20D04T	Environmental Biotechnology	4	0	0	4
UBT20D05T	Bioethics, IPR & Biosafety				
UBT20S03T	Biofertilizer technology	2	0	0	2
UBT20S04T	Agricultural biotechnology				
UJK20401T	Professional Skills	2	0	0	2
	Total Learning Credits				24
	Total number of hours /week				28

Semester –V

Code	Course Title	Hours/ Week L	T	P	C
UBT20501J	Plant and Animal Biotechnology	4	0	4	6
UBT20502J	Genomics and Proteomics	4	0	4	6
UBT20D06T	Nanobiotechnology	4	0	0	4
UBT20D07T	Cancer Biology				
UBT20S05T	Pharmaceutical Biotechnology	2	0	0	2
UBT20S06T	Advanced bioinformnatics				
UES20AE1T	Environmental Studies	3	0	0	3
UJK20501T	Leadership and Management Skills	2	0	0	2
	Total Learning Credits				23
	Total number of hours /week				28

Semester - VI

Code	Course Title	Hours/ Week L	T	P	C
UBT20601J	Immunotechnology	4	0	4	6
UBT20602J	rDNA Technology	4	0	4	6
UBT20D08L	Mini Project and Dissertation	0	0	16	8
	Total Learning Credits				20
	Total number of hours /week				32

Total Learning Credits: 138

9. Program Articulation Matrix

Course Code	Course Name	Programme Learning Outcomes														
		Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
UBT20101J	Cell Biology	H	H	H	H	H	H	M	H	H	M	-	H	-	H	H
UBT20102J	Microbiology	H	H	M	M	M	H	L	M	H	M	-	H	-	H	H
UBT20201J	Biochemistry	H	H	M	M	M	H	M	M	L	M	-	H	-	H	H
UBT20202J	Genetics and Molecular Biology	H	M	M	M	M	H	M	H	M	M	-	H	-	H	H
UBT20301J	Enzymology	H	M	M	M	M	H	H	M	M	M	-	H	-	H	H
UBT20302J	Biophysics and Bioinstrumentation	H	H	M	M	M	H	H	M	M	M	-	H	-	H	H
UBT20401J	Bioprocess Technology	H	H	H	H	M	H	H	M	M	H	-	H	-	H	H
UBT20402J	Food Biotechnology	H	H	M	H	M	H	M	M	H	H	-	H	-	H	M
UBT20501J	Plant and Animal Biotechnology	H	H	H	H	M	H	M	H	M	M	-	H	-	H	H
UBT20502J	Genomics and Proteomics	H	H	H	H	M	H	H	H	H	H	-	H	-	H	H
UBT20601J	Immunotechnology	H	H	M	H	M	H	M	H	H	H	-	H	-	H	H
UBT20602J	rDNA Technology	H	H	M	M	M	H	M	H	H	H	-	H	-	H	H
UBT20D01T	Mathematical Calculations in Biology	H	H	H	H	M	H	L	H	M	H	-	H	-	H	H
UBT20D02T	Human Physiology	H	H	M	H	M	H	L	L	M	M	-	H	-	H	H
UBT20D03T	Medical Biotechnology	H	H	M	H	M	L	L	L	M	M	-	H	-	H	H
UBT20D04T	Environmental Biotechnology	H	H	M	M	H	H	H	M	M	M	-	H	-	H	H
UBT20D05T	Bioethics, IPR & Biosafety	H	H	M	M	M	L	L	L	M	M	-	H	-	H	H
UBT20D06T	Nanobiotechnology	H	H	M	M	M	L	L	L	M	M	-	H	-	H	H
UBT20D07T	Cancer Biology	H	H	M	H	M	L	L	L	M	M	-	H	-	H	H
UBT20D08L	Mini Project and Dissertation	H	H	H	M	H	H	M	H	H	H	-	H	-	H	H
ULT20G01J	Tamil-I	H	H	H	M	H	H	M	H	M	H	H	H	H-	H	H
ULH20G01J	Hindi-I	H	H	H	H	H	H	M	H	H	H	H	H	H	H	H
ULF20G01J	French-I	H	H	H	M	H	H	M	H	H	H	H	H	M	H	H
ULT20G02J	Tamil-II	H	H	M	H	H	H	H	H	M	H	H	H	M	H	H
ULH20G02J	Hindi-II	H	H	M	H	H	H	H	H	M	H	H	H	M	H	H
ULF20G02J	French –II	H	H	M	H	M	L	M	M	L	L	M	H	M	H	H
UCY20G01T	Chemistry	H	H	M	H	M	L	L	L	M	M	M	H	M	H	H
UMS20G01T	Biostatistics	H	H	M	M	H	H	H	M	M	M	L	H	H	H	H
UBT20G01T	Microbial Physiology	H	H	H	H	H	H	M	H	H	H	H	H	H	H	H
ULE20AE1T	English	H	H	M	M	M	L	M	M	L	M	L	H	M	H	H
UES20AE1T	Environmental Studies	H	M	M	M	M	H	M	M	M	M	H	H	H	H	H
UBT20S01T	Diagnostic tools	H	M	M	M	M	L	M	L	M	M	M	H	H	H	H
UBT20S02T	Entrepreneurship in biotechnology	H	H	M	M	M	L	L	L	M	M	M	M	-	H	H
UBT20S03T	Biofertilizer technology	H	M	M	M	M	H	M	M	M	M	H	H	-	H	H
UBT20S04T	Agricultural biotechnology	H	M	M	M	M	H	M	M	M	M	H	H	-	H	H
UBT20S05T	Pharmaceutical Biotechnology	H	H	H	H	M	L	L	L	M	L	M	H	-	H	H
UBT20S06T	Advanced bioinformnatics	H	H	M	H	M	L	M	M	L	L	M	H	M	H	H
UMI20S01L	My India Project	H	H	M	H	M	L	L	L	M	M	M	H	M	H	H
UCD20S01L	Soft Skills	H	H	M	M	H	H	H	M	M	M	L	H	H	H	H
UCD20S02L	Quantitative Techniques	H	H	M	M	L	L	L	L	L	L	L	H	M	H	H
UNS20201L	NSS	H	H	M	M	M	L	L	L	L	L	L	H	M	H	H
UNC20201L	NCC	H	M	M	M	M	L	M	L	M	M	M	H	H	H	H
UNO20201L	NSO	H	H	M	M	M	L	L	L	M	M	M	M	M	H	H
UYG20201L	YOGA	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H
UJK20201L	Communication Skills	H	H	M	H	H	H	H	H	M	H	H	H	H	H	H
UJK20301T	Universal Human Values	H	H	M	H	H	H	H	H	M	H	H	H	H	H	H
UJK20401T	Professional Skills	H	H	H	H	M	L	L	L	M	M	M	M	H	H	H
UJK20501T	Leadership and Management Skills	H	H	H	H	M	L	L	L	H	L	M	H	H	H	H
	Program Average	H	H	M	H	M	L	L	L	M	M	M	H	M	H	H

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY
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SEMESTER – I

Course Code	UBT20101J	Course Name	CELL BIOLOGY	Course Category	C	Professional Core Course	L	T	P	C
							4	0	4	6

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to,
CLR-1 :	Understanding the organization of cells
CLR-2 :	Understanding the function of cells
CLR-3 :	Knowledge on division of cells and proloiferation of cells
CLR-4 :	Knowledge on cell signaling
CLR-5 :	Learning different cell types and their functions
CLR-6 :	Candidates understanding on cell organisation and their organelle morphology

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)															
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	To learn about classification of cells and their transport mechanism	2	85	80	H	H	H	H	H	H	M	M	M	L	-	H	-	-	-
CLO-2 :	Gathering knowledge on cell organelles	3	85	80	L	H	H	H	H	H	M	M	M	L	-	H	-	-	-
CLO-3 :	Applying knowledge on cell division and cell proliferation process	3	85	80	L	H	H	H	H	H	M	M	M	L	-	H	-	-	-
CLO-4 :	Applying knowledge on cell signaling process	3	85	80	L	H	H	H	H	H	M	M	M	L	-	H	-	-	-
CLO-5 :	Having knowledge on specilaised types of cells and their functions	3	85	80	L	H	H	H	H	H	M	M	M	L	-	H	-	-	-
CLO-6 :	Overall understanding of cell type functions and organisation	3	85	80	L	H	H	H	H	H	M	M	M	L	-	H	-	-	-

Duration (hour)		24	24	24	24	24
S-1	SLO-1	Introduction to cell biology	Voltage gated channel	vacuoles, peroxysomes	Akt/PKB signalling	Introduction to Specialized cells
S-2	SLO-1	Overview of cell biology	Membrane potential	Nuclear compartment. centrioles	Akt/PKB signalling	Nerve cells
S-3	SLO-1	Classification of cell	Introduction to cell organelles	Introduction Cell cycle	AMPK signalling	Microtubules- motile appendages
S-4	SLO-1	Cell types	Golgi apparatus	Cell cycle	AMPK signalling	Microfilament-based movement-intracellular transport
S 5-8	SLO-1 SLO-2	Introduction to the cell biology laboratory- Lab safety discussion	Identification of giant chromosome in chironomous larvae	Observation of Barr bodies	Isolation of erythrocyte membrane Proteins	Estimation of hemoglobin by Sahli's method
S-9	SLO-1	Development of cell theory	Mitochondria	Regulation of cell cycle	cAMP dependent pathway	Muscle cells
S-10	SLO-1	Different theories on cells	Micro bodies	Mitosis-I	cAMP dependent pathway	Functioning of muscle cells
S-11	SLO-1	Prokaryotic cell organization,	endoplasmic reticulum	Mitosis-II	JAK-STAT signalling	Importance of calcium in muscle

						movemnt
S-12	SLO-1	Eukaryotic cell organization	Cytoskeleton structures	Meiosis-I	JAK-STAT signalling	Cells of vision
S 13-16	SLO-1 SLO-2	Estimation of hemoglobin by Sahli's method	Cell Counting and viability	Cell Counting and viability	Enzyme Kinetics	Blood Smear Preparation
S-17	SLO-1	active transport	Microtubules, microfilament	Meiosis-II	PI3K signalling	Cells of vision
S-18	SLO-1	passive transport,	Intermediate filament	Checkpoints in cell cycle	PI3K signalling	Pancreatic cells
S-19	SLO-1	Diffusion, reverse osmosis, osmotic potential	ribosomes	Introduction to apoptosis	Introduction to Kegg's pathway	Pancreatic cells
S-20	SLO-1	membrane architecture	Lysozymes, basal bodies	Discussion	Cell- ECM interaction	Overall revision
S 21-24	SLO-1 SLO-2	Isolation of Erythrocyte Membrane Proteins	Isolation of Erythrocyte Membrane Proteins	Protoplast Isolation	Staining for Cell Viability and Apoptosis	Staining for Cell Viability and Apoptosis

Learning Resources	1. *Alberts, Bruce, "Molecular Biology of Cell", 5th Edition, Garland Science, 2008* 2. *Veer Bala Rastogi, "Fundamentals of Molecular Biology"Ane Books Pvt.Ltd, 2008.*	1. *Robert Weaver. "Molecular Biology" 5th edition, 2011.* 2. *Cooper,G.M. "The Cell: A Molecular Approach, 4th Edition, ASM Press, 2007.*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	Dr. T.G. NITHYA, SRMIST

Course Code	UBT20102J	Course Name	MICROBIOLOGY	Course Category	C	Professional Core Course	L	T	P	C
							4	0	4	6

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning		
		1	2	3
CLR-1 :	*Understanding the taxonomic classification of microorganisms based on convention*	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-2 :	*understanding the techniques used for visualizing and identifying microorganism*			
CLR-3 :	*Knowledge on structure and organization of bacteria*			
CLR-4 :	*Knowledge on structure and organization of viruses and fungi*			
CLR-5 :	*Learning techniques on preparation and sterilization of media*			
CLR-6 :	*Candidates understanding on fundamentals of microbiology useful for industry and academia*			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Program Learning Outcomes (PLO)														
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	*To identify the microorganism based on taxonomical rules*	*3*	*80*	*70*	*H*	*-*	*-*	*H*	*-*	*-*	*-*	*-*	*H*	*H*	*-*	*-*	*M*	*H*	*H*
CLO-2 :	*Application of techniques for identifying microorganism using technologies*	*3*	*85*	*75*	*H*	*H*	*H*	*H*	*H*	*-*	*M*	*-*	*H*	*H*	*-*	*-*	*M*	*H*	*H*
CLO-3 :	*Applying knowledge to identify bacteria based on structure and functional organelles*	*3*	*75*	*70*	*H*	*-*	*-*	*H*	*-*	*-*	*M*	*-*	*H*	*H*	*-*	*-*	*M*	*H*	*H*
CLO-4 :	*Applying knowledge to identify viruses and fungi based on structure and functional organelles*	*3*	*85*	*80*	*H*	*-*	*-*	*H*	*-*	*-*	*-*	*-*	*H*	*M*	*-*	*-*	*M*	*H*	*H*
CLO-5 :	*Having knowledge on media preparation and sterilization in microbiology for maintaining GLP*	*3*	*85*	*75*	*H*	*H*	*H*	*H*	*H*	*M*	*M*	*-*	*H*	*H*	*-*	*M*	*M*	*H*	*H*
CLO-6 :	*Overall understanding and application of microbiological concepts in the progress of industry and academics*	*3*	*80*	*70*	*H*	*H*	*H*	*H*	*H*	*-*	*-*	*-*	*H*	*H*	*-*	*-*	*M*	*H*	*H*

Duration (hour)		24	24	24	24	24
S-1	SLO-1	*Microbiology- Introduction*	*Nomenclatural rules and identification*	*Introduction into morphology of bacteria*	*Mycoplasma*	*Fungal cell wall synthesis*
S-2	SLO-1	*Biogenesis vs Abiogenesis*	*Principles of Microscopy*	*Cell wall of Gram negative bacteria*	*Endospore-Structure & Function*	*Sterilization and disinfection*
S-3	SLO-1	*Contribution of Louis Pasteur and Anton von Leeuwenhoe*	*Applications of Microscopy*	*Cell wall of Gram positive bacteria*	*Structure and organization of viruses*	*Physical sterilization*
S-4	SLO-1	*Koch Postulation*	*Types of Microscopy- Bright field & Dark Field*	*Archaebacterial Cell wall*	*General property of viruses*	*chemical sterilization*
S 5-8	SLO-1	*Lab1 : Cleaning of Glassware and laboratory rules*	*Lab 4: Smear preparation and simple staining*	*Lab 7: capsular staining technique*	*Lab 10: Enumeration of Bacteria- Serial dilution, Pour plate and Spread plate method*	*Lab 13: Biochemical tests- TSI*
	SLO-2					
S-9	SLO-1	*Scope of microbiology*	*Types of Microscopy- Phase Contrast*	*Cell wall synthesis*	*Viral Replication*	*Chemotherapeutical agents- mode of action*
S-10	SLO-1	*Classification – Five kingdoms and Three kingdoms.*	*Fluorescence Microscopy*	*Capsule types, composition, function*	*Ultra structure–Bacteriophages*	*Nutrients and types - Micro, Macro and growth factor*
S-11	SLO-1	*Woese domain system*	*Smear preparation and simple*	*Cell membranes and*	*Life cycle of Bacteriophages*	*Growth curve*

			staining	*periplamicspace -function*		
S-12	SLO-1	*Microbial Taxonomy: Definition and systematics*	*Staining: Gram staining*	*Structure and function and typesof flagella*	*Sub-viral particles: Virusoids*	*Microbiological media and its types*
S 13-16	SLO-1 SLO-2	Lab2: Principles and method of sterilization– Heat, Filtration and Radiation	Lab 5- Gram's staining technique	Lab 8: Staining of Fungi – LPCB	Lab 11: Pure culture technique- Streak plate method and study of colony morphology.	Lab 14: Antibiotics sensitivity test- Disk diffusion-Kirby Bauer method
S-17	SLO-1	*Numerical taxonomy*	*Spore and flagellar staining,*	*Structure and function cilia and pili*	*Sub-viral particles: Virusoids*	*Nutritional types of microorganisms*
S-18	SLO-1	*Chemical taxonomy*	*Staining: Capsule staining- Negative*	*Internal membrane systems*	*Sub-viral particles: Prions*	*Nutritional types of microorganisms*
S-19	SLO-1	*Serological taxonomy*	*Acid-fast staining.*	*Functions of cytoplasmic matrix and nucleoid*	*Structure and organization of fungi-*	*Physical factors influencing the growth*
S-20	SLO-1	*Genetic taxonomy*	*Discussion on staining*	*Inclusion bodies and Ribosomes*	*cell wall structure and composition*	*Chemical factors influencing the growth*
S 21-24	SLO-1 SLO-2	*Lab 3- Preparation of media (Solid, Semi solid and Liquid).*	*Lab 6: Spore staining technique*	*Lab 9: Demonstration of motility by hanging drop method*	*Lab 12: Biochemical tests- IMViC*	*Lab 15: Antibiotics sensitivity test- Disk diffusion-Kirby Bauer method*

Learning Resources	***Text Books:*** 1. *M.J. Pelezar, E.C.S. Chan and N.R. Krieg "Microbiology"– Krieg Tata McGraw Hill Publication 2007.* 2. *Prescott, Harley and Klein, "Microbiology", McGraw Hill publications, Fifth edition, 2003.*	***Reference:*** 1. *Jacquelyn G.Black, "Microbiology -Principles and Explorations" Wiley publications 2008.*

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	DR.D.THIRUMURUGAN, SRM IST
		DR.N.PRASANTH BHATT, SRM IST

Course Code	ULE20AE1T	Course Name	English	Course Category	A	Ability Enhancement Course	L	T	P	C
							4	0	0	4

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*English*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*
CLR-1 :	*Extend and expand the integrity in an individual which shall never allow him/her to compromise upon a noble way of living*
CLR-2 :	Enable the students to overcome the fear of speaking a foreign language and enable them to think through a foreign language.
CLR-3 :	Make them communicate an unbiassed way of thinking in a better manner
CLR-4 :	Develop strategies of comprehension of texts based on different culture and life styles
CLR-5 :	Strengthen spoken and written skills of the student in English
CLR-6 :	Help them express their sentiments, emotions and opinions, and reactions to information and situations in a civilized, cultured and humane manner.

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Learning: Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	*To acquire knowledge of becoming better beings through the tools of Language and Literature*	2	75	60
CLO-2 :	*To acquire a strong knowledge on concept, culture, civilization through English Literature*	2	80	70
CLO-3 :	*To develop own content and to be able to translate using the features in English Language*	2	70	65
CLO-4 :	*To interpret the contents in the texts presented in English Language*	2	70	70
CLO-5 :	*To present an improved and healthier communication and intercultural elements acquired through English Literature*	2	80	70
CLO-6 :	*To participate in any level of conversation and discussion presented in English with both proficiency in the language and positive caliber in the content of speech*	2	75	70

	Program Learning Outcomes (PLO)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO -1	PSO -2	PSO-3
CLO-1 :	*To acquire knowledge of becoming better beings through the tools of Language and Literature*	*H*	*H*	*H*	-	-	*H*	-	*H*	-	*H*	*H*	*H*	-	-	-
CLO-2 :	*To acquire a strong knowledge on concept, culture, civilization through English Literature*	-	*H*	-	*H*	-	*H*	-	*H*	-	-	*H*	*H*	-	-	-
CLO-3 :	*To develop own content and to be able to translate using the features in English Language*	*H*	-	-	*H*	-	*H*	-	*H*	-	-	*H*	*H*	-	-	-
CLO-4 :	*To interpret the contents in the texts presented in English Language*	*H*	-	*H*	*H*	*H*	*H*	-	*H*	-	-	*H*	-	-	-	-
CLO-5 :	*To present an improved and healthier communication and intercultural elements acquired through English Literature*	-	*H*	-	*H*	-	*H*	-	*H*	-	-	*H*	-	-	-	-
CLO-6 :	*To participate in any level of conversation and discussion presented in English with both proficiency in the language and positive caliber in the content of speech*	*H*	*H*	-	*H*	*M*	*H*	*M*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*

Duration (hour)		12	12	12	12	12
S-1	SLO-1	*Introduction to the art of poetry writing will be done*	*Post-colonial impacts in India as observed in their language and culture will be discussed.*	*Story through images is explained to the students*	*The definition and purpose of monologue is explained*	Homophones and Homonyms are to be explained in the class along with examples of usage.
	SLO-2	*The rationale behind this unit will be discussed.*	*The students will be encouraged to impart their views*	*The students are asked to create their own stories from those images*	*the sample monologues are to be provided to the learners*	How where and when these as vocabulary can be used is to be explained
S-2	SLO-1	*Feminism through Kamaladas' poem' In Kindergarten' is explained*	*Mathraboothan and the mother tongue influence in English – a discussion*	*Every day the students are made to bring their own cartoons to tell stories related to social issues and political issues.*	*The learners are made to create their own monologue contents.*	*Cross word puzzles are to be given to the students to make them understand the differences and usage of*

						homophones and homonyms
	SLO-2	*feminist critique's stand through poets like Meena Kandasamy is discussed*	*Students from different regions are asked to talk. The peculiarity in their pronunciation is to be identified by them*	*How to identify irony and sarcasm is taught*	*The contents are assessed and the lacuna is informed*	*The students are evaluated by making them use homophones and homonyms on their own*
S-3	**SLO-1**	*The writer Meena Kandasamy is invited to read her poems on women.*	*Enjoywithinlimits, says Mr Mathruboothamistaught and discussed*	*International Political memes to be created in the class*	*Discuss the contents created by the students and reiterate the idea that a monologue should mimic a story and has to have a proper beginning middle and an end.*	*How exactly to decide a proper word at a given situation is to be practically explained in the class.*
	SLO-2	*Questions on her perspectives are to be posed by the students*	*Everymistakefound in the textisanalysed*	*Memes on popular issues to be created in the class*	*The created monologues are to be assessed by the students themselves*	*Mundane situations are to be given to the students to check their ability to use those words*
S-4	**SLO-1**	*Gender inequality is discussed through A K Ramanujam and his poetry*	*The structure of sentence in English and the distorsion of the sentence isverified*	*Autobiography and biography differences are explained*	*To ask the students to bringnewspaper to class and makethem select a column and readitloudly.*	*To give all the parts of speech not according to the grammar book order but according to a method which would easily make one understand correlation of one with the other. For instance – Noun, Pronoun, Adjective, Verb, Adverb… will have to be the order*
	SLO-2	*Different legal situations where both the genders suffer is explained in the class*	*Diffèrent sentences are given and tested*	*Certain Classic autobiographies and biographies are presented*	*No meaningis to beexplained. Just the flow is to bechecked.*	*The students are made to use as many adjectives as possible for describing their friends*
S-5	**SLO-1**	*Kalki the poetisinvited to conduct a guets lecture on herownpoem.*	*Nobel? What Nobel, asks MrMathrubootham is discussed*	*How to give voice to an inanimate object.*	*Another reading loud session of the same passages are to be conducted along with dictionary checking for meanings are to be done.*	*The parts of speech must beused in different sentences*
	SLO-2	*Questions on her perspectives are to be posed by the students*	*The attitudes of people in a ludicrous manner is discussed*	*Different objects are given to the students and they are asked to give autobiographical notes to them*	*The new meanings that the students get must be compared with the given word and the distance between the meanings are to be explained*	*the teacherought to use the board to draw a situation to make one understandeachpart's usage.*
S-6	**SLO-1**	*Seminar to generate discussion to enhance gender sensitivity is conducted*	*The Text is analyzed in detail*	*Practically test the students in class by giving them different concrete objects.*	*To make them compare and realize how they had overcome their fear for English*	*Along with parts of speech particularly when Verb is being taught Tenses ought to be taught with same methodology mentioned above.*
	SLO-2	*Case studies are to be incorporated by the students in their seminar*	*More insights into Indian English is given*	*Ask the students to evaluate each other's autobiography on concrete objects*	*The comprehensive techniques are taught*	*The students are asked to create a lighter vein situation and asked to use all the tenses*

S-7	**SLO-1**	Human interest columns in news papers - tragedies on women men and transgender documented is read aloud and discussed in the class room.	*Neutral accent is taught along with right pronunciation*	*Caption writing is taught*	*To develop the ability to pick up a conversation istaugh*	*The rules of Tenses are taught with live examples in the classes.*
	SLO-2	. how much are the students able to relate with or able to feel emotionally for those situations is to be checked and analysed	*Test is to be conducted to check how far a student is able to understand neutral accent*	*The purpose of the caption writing is to be instilled*	*to engage in conversations and be able to interupt and end conversation appropriatelywilllbetaught*	*Ability to use all the rules in tenses is taught.*
S-8	**SLO-1**	*Case studies to be given to the students to document their reactions*	*Mr Mathruboothamisfullysupporting all new technologies – discussion*	*Different examples for captions are given*	*Different situations to be given to the students to engage in a conversation.*	*The basic way to pick an error is by already knowing the rules of grammar thoroughly.*
	SLO-2	*Find out if there is any student finding it hard to emote or is insensitive toward the moment*	*Humor and sarcasmisskimmedfrom the text*	*The studenst are asked to create captions similar to the ones shown in the class*	*The students are asked to find errors in each others' monologue*	*Hence all the rules are to be brushed up*
S-9	**SLO-1**	*Students are to made to createtheirownenactable content on the prevailinggenderinequalities*	*How to write a statement and question is to be taught with reference to the text.*	*The students are made to give captions different news articles, products and situations*	*To test how much one is able to use ironyhumor and sarcasm in one's conversation*	*Excercises on all sorts of possible errors are given to the students and asked to rectify.*
	SLO-2	*The students are asked to improvise on dialogue on theirown*	*The way sentences are constructed according to the regional impact is discussed*	*The best is appreciated for its qualities of being best*	*Natural usage of punisexplained*	*Mathrabootham's passages are given to the studentsagain to check the errors.*
S-10	**SLO-1**	*Feminism vs Gender inequality a test for the students to chart out the existing gulf*	*Pizza maavu : Welcome to Mr Mathruboothamfoodrecipiewebsiteisdi scussed*	*Public Speakingexamplessince Julius Caesar to Martin Luther isgiven*	*To teachdifferentkinds of reading. - skimming scanning and intensive reading extensive reading is taught*	*Definesynonym and antonym. Ask the sudents to identifysynonyms and antonyms in text.*
	SLO-2	*False allegations and Legal situations sometimes created by women to corner men only degrades the freedom struggle of women – discuss*	*The students are made to explain the textthemselves*	*The techniques used by different leaders sinceagesisdiscussed*	*Teh students are practicallyasked to use thosemethodology to understand a text*	*Demonstartetheriunderstanding of synonyms and antonyms in active learning. Introduce thesaurus reference.*
S-11	**SLO-1**	*A detailed discussion on the 4 poets is done in the class through comparative method*	*Identify the errors and make students to rewrite first two texts*	*The Ted X talks are played in the class, different political leader's canvasing is presented*	*The students are made to read the passages loudly*	*Demeonstrateunderstanding of words by relatingthem to their opposites (antonyms)*
	SLO-2	*While comparison the students are able to get a deeper analytical way of thinking and are able to present an all encompassed points*	*Check if they are able to retain the humor in the text after correcting the sentences*	*What makes a talk impressive is identified and discussed*	*The students are asked questions from the passages to check their retention capacity*	*Demonstrateunderstanding of wordswithsimilar but not identicalmeanings (synonyms)*
S-12	**SLO-1**	*The comprehension and retention and application of all the acquired knowledge of the student is checked by initiating an informal discussion in the class.*	*Identify the errors and make the students to rewrite the last two texts*	*The students are givendifferent topics to give impromptu*	*The learner is made to select phrases and words from the given passages and is asked to use it in own sentences*	*With the studentsbrainstormshortlist of commonlyusedwords*
	SLO-2	*The overall development in the student's EQ pertaining to gender oriented issues will be sensible and objective.*	*Check if they are able to retain the humor in the text after correcting the sentences. Explain the result to them*	*The best talk isrecorded and made available for other'srefferences*	*The ability to converse with humor sarcasm or deep thoughts and with the capacity to emote the desired emotion in the other is checked*	*Askthem to rapidlygivesynonyms and antonyms to thosewords*

Learning Resources	***Theory:*** ***1.*** Horizon- English Text Book – Compiled and Edited by the Faculty of English Department, FSH, SRMIST, 2020 ***2. English Gramar in Use by Raymond Murphy***

Learning Assessment												
	Bloom's Level of Thinking	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (10%)**		**CLA – 3 (20%)**		**CLA – 4 (10%)#**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	30%	-	30%	-	30%	-	30%	-	30%	-
	Analyze										
Level 3	Evaluate	40%	-	40%	-	40%	-	40%	-	40%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
	1. Prof. Daniel David, Prof & Head, Department of English, MCC, Chennai	*1. Dr. Shanthichitra, Associate Professor, & Head, Department of English, FSH,SRMIST*
		2. Dr K B Geetha, Assistant Professor, Department of English, FSH, SRMIST

Course Code	ULT20G01J	Course Name	Tamil-I	Course Category	G	Generic Elective Course	L	T	P	C
							2	0	2	3

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*Tamil*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*To enable them to learn the nuances of modern poetry in Tamil*			
CLR-2 :	To explore New historicism through the works of art written in Tamil to enlighten the students to understand the changes in the modern society			
CLR-3 :	Inculcate Ways of life, moralities and ethical factors as an essential part of learning Tamil literature			
CLR-4 :	Develop strategies of comprehension of texts of different origin			
CLR-5 :	Strengthen the language of the students both in oral and written			
CLR-6 :	Express their sentiments, emotions and opinions, reacting to information, situations			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	*Extend and expand their savoir-faire through the acquisition of skills to cater the needs of the modern era.*	*2*	*75*	*60*
CLO-2 :	Enable the students to appreciate their mother tongue and to Enhance their thinking capacity	*2*	*80*	*70*
CLO-3 :	Make them learn the basic rules of Language and make them communicate better	*2*	*70*	*65*
CLO-4 :	Develop strategies of comprehension of texts based on different culture and life styles	*2*	*70*	*70*
CLO-5 :	Strengthen spoken and written skills of the student	*2*	*80*	*70*
CLO-6 :	*Will be able to clear government examinations*	*2*	*75*	*70*

Program Learning Outcomes (PLO)															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO -1	PSO -2	PSO-3
H	*H*	*H*	-	*H*	*H*	*M*	*H*	*H*	-	*H*	*H*	*H*	*H*	*H*
H	*H*	-	*H*	-	-	*H*	-	-	*H*	*H*	-	*H*	*H*	*H*
H	*H*	*H*	*M*	-	-	*H*	-	-	*H*	*H*	-	*H*	*H*	*H*
H	-	*H*	*H*	*H*	-	*M*	-	-	*H*	*H*	-	*H*	*H*	*H*
-	*H*	-	*M*	-	*H*	*H*	-	*H*	*H*	*H*	-	*H*	*H*	*H*
H	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*

Duration (hour)		12	12	12	12	12
S-1	SLO-1	தமிழ் இலக்கியப் போக்குகள்	நவீன கவிதை தோற்றம்	தமிழரின் வீரமரபு	சிற்றிலக்கியத் தோற்றம்	மொழி வரலாறு
	SLO-2	இலக்கிய நுட்பங்கள்	நவீன கவிதை வரலாறு	போர் விழுமியங்கள்	சிற்றிலக்கிய வகைமை	மொழிப் பயிற்சி
S-2	SLO-1	தமிழ்க் கவிதை மரபு	நவீன கவிதை செல்நெறிகள்	பரணி அறிமுகம்	சிற்றிலக்கியங்கள்	தமிழும் அகராதியியலும்
	SLO-2	காலந்தோறும் கவிதை உள்ளடக்கம்	செல்நெறிகளில் கோட்பாடுகள்	பரணி இலக்கியங்கள்	முதன்மைச் சிற்றிலக்கியங்கள்	அகரவரிசைப்படுத்தல்
S-3	SLO-1	காலந்தோறும் கவிதை வடிவம் –	கவிதை மொழி	கலிங்கத்துப்பரணி (484)	புதுக்கவிதையும் இதழ்களும்	கலைச்சொல் அறிமுகம்
	SLO-2	தற்கால இலக்கியம்	நவீன கவி மொழியின் நுட்பங்கள்	தலைவனின் வீரம்	மணிக்கொடி இதழ்	கலைச்சொல் உருவாக்க நுட்பங்கள்
S-4	SLO-1	புதுக்கவிதை உருவாக்கம்	நவீன கவி ஆளுமைகள்	தமிழ் இலக்கிய மரபில் தூது	எழுத்து இதழ்	தமிழில் கலைச்சொற்கள்
	SLO-2	புதுக்கவிதை	நவீன கவி ஆளுமைகளின்	தூது இலக்கியங்கள்	வானம்பாடி இதழ்	நிலைபெற்ற

		செல்நெறிகள்	கவித்துவம்			கலைச்சொற்கள்
S-5	SLO-1	பாரதியார் – காலத்தின் அடையாளம்	விளிம்புநிலை மனிதர்கள்	அழகர் கிள்ளைவிடு தூது (கண்ணிகள்)	சிறுகதை தோற்றம்	மரபுத்தொடர்
	SLO-2	பாரதியார் -பன்முக ஆளுமை	விளிம்புநிலை இலக்கியம்	தூது மரபில் கிளியும் பாராட்டும்	சிறுகதை வளர்ச்சி	தமிழில் மரபுத்தொடர்கள்
S-6	SLO-1	பாரதியார் - கண்ணன் என் சேவகன்	ராஜா சந்திரசேகரரின் கைவிடப்பட்ட குழந்தை	செய்யுள் மரபில் கலம்பகம்	சிறுகதை – வரலாறு	நாட்டார் வழக்காறுகள்
	SLO-2	கண்ணன் என் சேவகன் கவிதை சொல்லும் வாழ்வியல்	புறக்கணிப்பும் வாழ்வியலும்	கலம்பக இலக்கியங்கள்	சிறுகதை ஆசிரியர்கள்	பழமொழி அறிமுகம்
S-7	SLO-1	20 ஆம் நூற்றாண்டுக் கவிதை மரபில் பாரதிதாசன்	புலம்பெயர்தல்	நந்திக் கலம்பகம் (77)	புதினம் தோற்றம்	தமிழில் பழமொழிகள்
	SLO-2	பாரதிதாசனும் தமிழும்	புலம்பெயர் வாழ்வியல்	மகள் மறுத்தலில் வீரம்	புதினம் வளர்ச்சி	பழமொழியும் பயன்பாடும்
S-8	SLO-1	பாரதிதாசன் – தமிழினி இனிமை,	அனார் - மேலும் சில இரத்தக் குறிப்புகள்	குறவஞ்சி அறிமுகம்	புதினத்தின் வகைமை	தமிழ் இலக்கண நுட்பங்கள்
	SLO-2	தமிழின் பெருமையும் வளமையும்	உள்நாட்டுப் போர்ச்சூழலும் பெண் உளவியலும்	குறவஞ்சி இலக்கியங்கள்	புதின ஆசிரியர்கள்	இலக்கணமும் பயன்பாடும்
S-9	SLO-1	வானம்பாடியில் அப்துல்ரகுமான்	காலந்தோறும் பெண்	குற்றாலக் குறவஞ்சி (9)	அச்சு ஊடக வரலாறு	தமிழில் சொல் வகைகள்
	SLO-2	அப்துல்ரகுமான் கவிதையின் தனித்தன்மைகள்	பெண் இலக்கியம்	மலையும் வாழ்வும்	அச்சு ஊடகமும் தமிழும்	சொல்லும் பயன்பாடும்
S-10	SLO-1	அப்துல்ரகுமான் - அவதாரம்	சுகிர்தராணியின் அம்மா	காப்பிய இலக்கணம்	அச்சு ஊடகமும் உரைநடை வளர்ச்சியும்	பெயர்ச்சொற்கள்
	SLO-2	அவதாரம் - நம்பிக்கையும் வெற்றியின் பாதைகளும்	பெண்மையும் தாய்மையும்	காப்பிய வகைமைகள்	தமிழில் உரைநடை	பெயர்ச்சொற்கள் அறிதல்
S-11	SLO-1	சுற்றுச்சூழலியல்	சமத்துவம்	தமிழில் பௌத்த இலக்கியங்கள்	சுவடிகள்	வினைச்சொற்கள்
	SLO-2	தமிழ்க் கவிதையில் சுற்றுச்சூழலியல்	பாலியல் சமத்துவம்	மணிமேகலை	சிவதருமோத்திரச் சுவடி பெற்ற வரலாறு	வினைச்சொற்கள் அறிதல்
S-12	SLO-1	நரசிம்மன் – மகனே என்னை மன்னித்து விடு	நா. முத்துக்குமாரின் தூர் கவிதை	பெண் சாபமும் காயசண்டிகையும்	புழங்குபொருள் பண்பாடும் தமிழர் வாழ்வியலும்	தமிழில் பெயரடை, வினையடை
	SLO-2	நவீன வாழ்வும் சுற்றுச்சூழலியல் அறிதலும்	தூர் கவிதை முன்வைக்கும் பெண் சமத்துவம்	பெண் வரலாற்றில் சாபங்களின் கதைகள்	கூஜாவின் கோபம்	பெயரடை, வினையடை அறிதல்

Learning Resources	1. குறிஞ்சித்தேன், தொகுப்பும் பதிப்பும் - தமிழ்த்துறை ஆசிரியர்கள், எஸ்.ஆர்.எம். அறிவியல் மற்றும் தொழில்நுட்பக் கல்விநிறுவனம், காட்டாங்குளத்தூர், 603203, 2020 2. வல்லிக்கண்ணன், புதுக்கவிதை தோற்றமும் வளர்ச்சியும், ஆழி பதிப்பகம், சென்னை, 2018 3. கா. சிவத்தம்பி, தமிழில் சிறுகதை தோற்றமும் வளர்ச்சியும், என்.சி.பி.எச்., சென்னை, 2013 4. தமிழ் இணையக் கல்விக்கழகம் - http://www.tamilvu.org/ 5. மதுரை தமிழ் இலக்கிய மின் தொகுப்புத் திட்டம் - https://www.projectmadurai.org/

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	30%	30%	30%	30%	30%	30%	30%	30%	-
	Understand										
Level 2	Apply	40%	40%	50%	50%	50%	50%	50%	50%	50%	-
	Analyze										
Level 3	Evaluate	30%	30%	20%	20%	20%	20%	20%	20%	20%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Expert from Higher Technical Institutions	Internal Experts
	1. Dr. R..Srinivasan Associate Professor, Department of Tamil, Presidency College, Chennai,	*1. B.Jaiganesh, Assistant Professor & Head, FSH, SRMIST*
		2. T.R.Hebzibah Beulah Suganthi, Assistant Professor, FSH, SRMIST
		3.S.Saraswathy, Assistant Professor, FSH, SRMIST

Course Code	ULH20G01J	Course Name	HINDI-I	Course Category	G	Generic Elective Course	L	T	P	C
							2	0	2	3

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*HINDI*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning	Program Learning Outcomes (PLO)

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*To be able to converse well in the Hindi Language*			
CLR-2 :	*To read and write and clarity*			
CLR-3 :	*To be willing listeners and translators –where need be*			
CLR-4 :	*To acquire the values/thought contents of the writers and practice in it in life.*			
CLR-5 :	*To find motivation through the various forms of literature and learn to overcome any challenges of life.*			
CLR-6 :	*To discover the importance of the language in making education as a means of growth in life and not mere literacy.*			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	1	2	3
CLO-1 :	*To appreciate the Hindi language in its various forms.*	2	75	60
CLO-2 :	*To understand the philosophy of life and living through stories.*	2	80	70
CLO-3 :	*To help the students learn and develop the fundamentals of life, through One-Act plays.*	2	70	65
CLO-4 :	*To share the richness of thought and content presented in the Hindi language, into other languages so that the readers would stand to gain.*	2	70	70
CLO-5 :	*To guide the students in the learning of the technical aspect of the Hindi language, this would help them in the field of administration.*	2	80	70
CLO-6 :	*To encourage the students to communicate with the public, on a large scale with the medium of Main stream and Documentary films.*	2	75	70

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO -1	PSO -2	PSO-3
CLO-1 :	*H*	*H*	*H*	-	-	-	-	-	-	-	-	-	-	-	-
CLO-2 :	-	*H*	-	*H*	-	-	-	-	-	-	-	-	-	-	-
CLO-3 :	*H*	-	-	*H*	-	-	-	-	-	-	-	-	-	-	-
CLO-4 :	*H*	-	*H*	*H*	*H*	-	-	-	-	-	*H*	-	-	-	-
CLO-5 :	-	*H*	-	*H*	-	-	-	-	-	-	-	-	-	-	-
CLO-6 :	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	Kahani kya Hai	Ekanki aur Natak kya hai	Patrkarita ka arambh	Film Samiksha	Takniki Shabdavali
	SLO-2	Jivan ka anubhav	Vidhyarthiyon dono ke antar ko smajhkar apne dwara use prastut kar sakta hai	Vidhyarthiyon ka apne samaj ke prti jagrukta	Film ka prabhav ko smajhna	Vaignik tarike se bhashaon ka avishkaar karna
S-2	SLO-1	Kahani ke Tatva	EKANKI KA ARTH	Aazdi aur Patrkarita ka daiytava	SAMIKSHA KYA HAI	ARTH
	SLO-2	Vishleshan karne ki Kshmta	Vidhyarthi ke bhitar ishkleshan ki kshamta jagrit	Vidhyarthiyon ko patrkarita ka itihas smajkar samaj nirman ke liye sahyog dena	Tarkik vishleshan kshmta paida karta hai	Vidhyarthi uske arth dwara hi uske mahtav smjhenge
S-3	SLO-1	Vo Tera Ghar Ye Mera Ghar Parivar me Buzargon ke Mahtav ko Samjhana	PARIBHASHA	PATRKARITA KA MAHTAVA	SAMIKSHA KE PRAKAR	PARIBHASHA

	SLO-2	Bhartiya Sanskriti Se Vidhyarthiyon ko Jodna	Vidvano ke mat se parichay	Patrkarita se bhut se sawal ka smadhan ho jata hai	Vidhyarthiyon ka un prkaro ka adhyaan karna jisse vidhyarthi us samiksha ko tayaar kar payenge	Vibhinn vidwano dwara di gai paribhasha se us baat ko smjhenge vidhyathi
S-4	SLO-1	Mithaiwala Pyar Bantne se dukh kam hota hai	SWAROOP	PTRAKARITA KA ARTH	SAMIKSHA KA UDDESHYA	SHABDAVALI KI AVSHYAKTA
	SLO-2	Manavata ka Path	Vidhyarthiyon me iski samajh se lekhan kshmata badegi	Vibhinn vidhvono ko padhne se vidhyarthiyon ki tarkik kshmta badhti hai ,	Vidhyarthi ke andar smaj ke prati Kartavya bodh paida hoga	Vaignikon ka awiskar kitna mahtavpurn
S-5	SLO-1	Bechadri Pal Chatro me Utsah Vardhan Karna	PATHYA VACHAN	PTRAKARITA KI PARIBHASHA	FILM KA SAMAJIK MAHTAVA	BHASHA VAIGYANIK
	SLO-2	Beta-beti ek saman ke mahtav ko smjhana.	Vidhyarthiyon ka path kaushal bdhega	K vidhvaono ki ukti ek smadhan bhi hota hai	Samajik uttar daiytav ko smjhana	Bhasha vaignikon ki jankari
S-6	SLO-1	Nadi aur Jeevan Paryavaran ke mahtav se awagat karana.	PRASTUTI	PRAMUKH SAMACHAR PATR	FILM KA VISHLESHAN	KARYALYIN SHABD
	SLO-2	Manav Jeevan me nadi ki upyogita aur Mahtav.	Natak khelne par bahut si takniki bate samajhenge	Vidhyarthiyon ki jankari badhegi	Vidhyarthi tarkik vishleshan sikhega	Shabd kaise tayar kiye jate hain vidhyorthiyon ko jankari
S-7	SLO-1	Pachees chauka Ded Sau Jamindari Pratha se awagat karana	MAHTVA	TV.PATRKARITA	DRISTIKON NIRMAN	ANGREZI SE HINDI ANUVAD
	SLO-2	Asprishya Vicharao ke Prati Sakaratamak Bnana.	Natak ka mahtav ko smajhkr samaj ke hito ke sath judna.	TV patrkar ke daiytav ko smajkar vidhyarthi ise apne rozgar se jod sakta hai	Vidhyarthi ka drishtikon nirmit hoga	Hindi adhikarai aur anuvadak ke pad ke liye tayaar karna
S-8	SLO-1	Kahani ka Uddeshya	PRASHAN-ABHYAS	PHOTO PATRKARITA	DOCUMENTRY FILM	HINDI SE ANGREZI ANUVAD
	SLO-2	Vidhyarthiyon ko Samaj se Jode rakhna	Vidhyarthiyon ka lekhan kshmata Badhna	Vidhyarthiyon me photo patrkarita ke mahtav ka smajh paida hona	Vidhyarthi samajik dharatal ki kathinai ko smajhkar desh se judega	Hindi adhikari aur anuvadak ke pad ke liye tayaar karna.
S-9	SLO-1	Kahani Lekhan	UDDESHYA	PRASTUTIKARAN	MAIN STREAM FILM	EK DIN EK SHABD
	SLO-2	Vidhyarthi Ko likhne ki aur Prerit karna	Vidhyarthi ko smaj upyog hito ki jankari dena	Vifhyarthi apni baat rakhne ki kshmta vikstit karta hai	Vidhyarthion ko jivan ke anchue pahluon se bhi sakshaktkar	Vidhyarthiyon ko rozgaar se jodna
S-10	SLO-1	Seminar	PARICHARCHA	BHASHA-SHAILI	FILM KE DARSHAK	ATI MAHTVAPURN SHABD
	SLO-2	Vidhyarthiyon dwara Prastuti karan	Vidhyarthi me vak-kaushal bdhana	Vidhyarthi ko apni report me bhasha-shaili ko sikh kar ek badhiya reporter ban sakta hai	Vidhyarthiyon ka samajik gyan	Shabdon ke mahtav ko smajhkar use yaad karna
S-11	SLO-1	Prashan Abhyas	BHASHA SHAILI	PATRKARITA KE NIYAM	FILM AUR BAZAAR	SAMANYA SHABD AUR PARIBHASHIK SHABDAVALI ME ANTAR
	SLO-2	Vidhyarthiyon me Lekhn Kaushal ki kshmata Viksit karna.	Vidhyarthiyon ko bhasha ka mahtav smjhna	Vidhyarthi ise sikh kar ek nyay priya patrkar ban sakta hai	Vidhyarthiyon ko rozgaar se jodna	Vidhyarthiyon ko vaighniko dwara tayaar ki gai bhasha ki samaj
S-12	SLO-1	Path-Punravarti	EKANKI AUR RANGMANCH	PATRKAR KA DAIYTVA	FILM DARSHAK KA MAHTAVA	PARIBHASHIK SHABDAVALI KA MAHTAV
	SLO-2	Pariksha ke liye Saksham	Vidhyarthi isse rangmanch ke mahtav ko smajhenge	Vidhyarthiyon ko patrkar ka daityva sikhkar smaj ke uttar daityva ko nibhana hai	Vidhyarthiyon ko darshak ki ruchiyon se awagat karvana	Rozgaar se vidhyarthiyon ko jodnaw

Learning Resources	***The Prescribe Text Book Compiled and Edited by Department of Hindi*** www.gadyakosh.com www.shabdkosh.com

Learning Assessment											
	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	30%	30%	30%	30%	30%	30%	30%	30%	-
	Understand										
Level 2	Apply	40%	40%	50%	50%	50%	50%	50%	50%	50%	-
	Analyze										
Level 3	Evaluate	30%	30%	20%	20%	20%	20%	20%	20%	20%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Expert from Higher Technical Institutions	Internal Experts
	1. Prof.(Dr.) S.Narayan Raju, Head, Department of Hindi,CUTN, Tamilnadu	*1. Dr.S Preeti. Associate Professor & Head, SRMIST*
		2. Dr. Md.S. Islam Assistant Professor, SRMIST
		3 Dr. S. Razia Begum, Assistant Professor, SRM IST

Course Code	ULF20G01J	Course Name	French-I	Course Category	G	Generic Elective Course	L	T	P	C
							2	0	2	3

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*French*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Extend and expand their savoir-faire through the acquisition of current scenario*			
CLR-2 :	Enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French			
CLR-3 :	Make them learn the basic rules of French Grammar.			
CLR-4 :	Develop strategies of comprehension of texts of different origin			
CLR-5 :	Strengthen the language of the students both in oral and written			
CLR-6 :	Express their sentiments, emotions and opinions, reacting to information, situations			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*			
CLO-1 :	*To acquire knowledge about French language*	*2*	*75*	*60*
CLO-2 :	*To strengthen the knowledge on concept, culture, civilization and translation of French*	*2*	*80*	*70*
CLO-3 :	*To develop content using the features in French language*	*2*	*85*	*75*
CLO-4 :	*To interpret the French language into other language*	*2*	*70*	*80*
CLO-5 :	*To improve the communication, intercultural elements in French language*	*2*	*80*	*70*
CLO-6 :				

Program Learning Outcomes (PLO)														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO -1	PSO -2	PSO-3
H	*H*	*H*	-	-	-	-	-	-	-	-	-	-	-	-
-	*H*	-	*H*	-	*H*	-	-	-	-	*M*	-	-	-	-
H	-	-	*H*	-	*H*	-	-	-	-	*M*	-	-	-	-
H	-	*H*	*H*	*H*	-	-	-	-	-	*H*	-	-	-	-
-	*H*	-	*H*	-	-	-	-	-	-	*H*	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	**Bonjour, ça va ?**	**Salut ! Je m'appelle Agnès**	**Qui est –ce ?**	**Dans mon sac, j'ai…**	**Il est comment ?**
	SLO-2	**Salut**	**Paul, Valérie, Manish**	**Les exemples**	**Da ns ton sac**	**Les objectifs**
S-2	SLO-1	Les pays	Les pronoms personnels sujets	Les professions	La formation du féminin (3)	L'aspect physique
	SLO-2	Les nationalités	Je, Tu, Il/Elle Nous, vous, Ils/Elles	Les exemples	Les féminins	Le corps
S-3	SLO-1	Les animaux domestiques	Les verbes être et avoir	Quelques objets	La phrase interrogative	Le caractère
	SLO-2	Les animaux	Les verbes auxiliaires	Objets	Les interrogatives	Les exemples
S-4	SLO-1	Les jours de la semaine	Les articles définis et indéfinis	La fiche d'identité	*qu'est – ce que.. ?*	Les prépositions de lieu (1)
	SLO-2	Les mois de l'année	Les exemples	La carte d'identité	*Les exemples*	Dans, sur, sous etc..,
S-5	SLO-1	Les nombres de 0 à 69	La formation du féminine (1)	La liaison	*Qu'est – ce que C'est*	Les nombre à partir de 70
	SLO-2	Les nombres	Les féminins	Les activités	*Les objets*	Les exemples
S-6	SLO-1	La famille (1)	La formation du pluriel (1)	L'élision	*Qui est – ce ?*	**Allo ?**
	SLO-2	Ses parents	Les exemples	Les activités	*Les personnes*	**Portable**

S-7	**SLO-1**	L'accent	Les adjectifs possessifs	Intonation descendre	*la phrase négative*	La formation du féminin(3)
	SLO-2	L'accent tonique	Les exemples	Les descendre	*La négation*	Les exemples
S-8	**SLO-1**	Les articles définis	Entrer en contact : salut	Intonation montante	*C'est*	Les articles contractés
	SLO-2	Les articles indéfinis	Entrer en contact : demander	Les montantes	*Il est*	Les articles partitifs
S-9	**SLO-1**	Bonjour, - Salut !	Dire comment ça va	Dans mon sac	*Les verbes du premier group*	Les pronoms personnels toniques
	SLO-2	Ca va	Comment allez-vous ?	Des objets	*Les exemples*	Les pronoms
S-10	**SLO-1**	Je m'appelle Agnès	Se présenter	Les Mots	Les verbes *aller*	Les adverbes interrogatifs
	SLO-2	Quel est votre nom	Présenter quelqu'un	Les expressions	Le verbe venir	Les interrogatifs
S-11	**SLO-1**	Les Mots	*Demander*	Demander poliment	Demander et répondre poliment	Les verbes du deuxième group
	SLO-2	Les Expressions	*Demander le temps*	Répondre poliment	Les exemples	Les exemples
S-12	**SLO-1**	Entrer en contact	Demander la date	Demander des informations personnelles	Demander des informations personnelles	Décrire l'aspect physique
	SLO-2	Se présenter.	Dire la date	Les exemples	Les activités	Décrire le caractère

Learning Resources	***Theory:*** ***3.*** "**Génération-AI"** Méthode de français, Marie-Noëlle COCTON, P.DAUDA, L.GIACHINO, C.BARACCO, Les éditions Didier, Paris, 2018. ***4. Cahier d'activités avec deux discs compacts.***

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	30%	30%	30%	20%	20%	20%	20%	30%	-
	Understand										
Level 2	Apply	40%	40%	50%	50%	50%	50%	50%	50%	50%	-
	Analyze										
Level 3	Evaluate	30%	30%	20%	20%	30%	30%	30%	30%	20%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Expert from Higher Technical Institutions	Internal Experts
	1. Dr. C.Thirumurugan Associate Professor, Department of French, Pondicherry University	*1. Kumaravel K. Assistant Professor & Head, SRMIST*
		2. Ponrajadurai M Assistant Professor, SRMIST

Course Code	UCY20G01T	Course Name	CHEMISTRY	Course Category	G	Generic Elective Course	L	T	P	C
							3	1	0	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	CHEMISTRY	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Understanding bonding and periodic properties
CLR-2 :	Understanding the acid-base titrations
CLR-3 :	Knowledge on properties of organic molecules
CLR-4 :	Knowledge on differential rate law equations
CLR-5 :	Learning about electrode potential and redox reactions
CLR-6 :	Candidates understanding on fundamentals of physical, organic and inorganic chemistry

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)															
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO – 1	PSO - 2	PSO – 3
CLO-1 :	To learn about chemical bonding	3	85	80	H	-	-	H	-	-	-	-	L	M	-	M	-	-	-
CLO-2 :	Gathering knowledge on the concepts of chemical equilibrium	3	80	75	H	H	-	H	H	-	-	-	M	M	-	M	-	-	-
CLO-3 :	Applying knowledge about the use of organic chemistry in biology	3	85	80	H	H	-	H	H	-	-	-	M	M	-	H	-	-	-
CLO-4 :	Applying knowledge on chemical kinetics and its applications	3	85	80	H	H	-	H	-	-	-	-	M	M	-	H	-	-	-
CLO-5 :	Having knowledge on electrochemistry and its reactions	3	85	80	H	H	H	H	H	-	-	-	M	M	-	M	-	-	-
CLO-6 :	Overall understanding of the use of chemistry in biology	3	75	80	H	H	H	H	H	-	-	-	M	M	-	M	-	-	-

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		12	12	12	12	12
S-1	SLO-1	Introduction to bonding	Equilibrium constant	Introduction to functional groups	Rate of reaction	Electrode potential
S-2	SLO-1	Introduction to bonding	Equilibrium constant	Chemical & physical properties	Rate of reaction	Electrode potential, related problems
S-3	SLO-1	Classification of elements in the periodic table	Le-Chatelier principle	Chemical & physical properties	Differential rate law expressions	Nernst equation & its applications
S 4	SLO-1	Classification of elements in the periodic table	Le-Chatelier principle	SN1 & SN2 mechanism	Order & molecularity	Nernst equation & its applications
S-5	SLO-1	Periodic properties,	Acid & bases	E1 & E2 reactions in alcohols	Rate constant	EMF of the cell
S 6	SLO-1	Types of bonds	Strength of acid & bases	Heterocyclic compounds	Integrated equations (Ist,2nd & 3rd order)	EMF of the cell
S-7	SLO-1	Types of bonds	pH of aqueous solutions	Configuration & projection formula	Integrated equations (Ist,2nd & 3rd order)	Redox reactions in cells
S -8	SLO-1	Factors affecting the bond formation	Acid –base titrations	Nucleophilic addition	nth life of a reaction	Redox reactions in cells

S -9	SLO-1	Factors affecting the bond formation	Acid –base titrations	Substitution reactions at carbonyl group	Arrhenius equations	free energy change
S-10	SLO-1	Bond parameters	Indicators in titrations	Optical isomerism	temperature dependence of rate constant	standard emf of the cell
S-11	SLO-1	Polarity of bonds	Solubility product & applications	Geometrical isomerism	Reaction intermediates,	Redox titrations applications with two examples
S-12	SLO-1	semipolar bonds	ionic product, Condition for precipitation, Hydrolytic reactions & expression for hydrolytic constant.	Tautomerism	Different theories on reaction rate	Redox titrations applications with two examples

Learning Resources	*Theory:*

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Academic		Internal Experts
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	Dr. SANKARI, SRMIST

Course Code	UCD20S01L	Course Name	Soft Skills	Course Category	S	Skill Enhancement Course	L	T	P	C
							0	0	2	1

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Career Development Centre	Data Book / Codes/Standards		-	

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Expose students to right attitudinal and behavioral aspects and to build the same through activities			
CLR-2 :	Develop and nurture interpersonal skills of the students through individual and group activities.			
CLR-3 :	Increase efficiency and leadership skills and to improve team results.			
CLR-4 :	Acquire time management skills and develop creative skills			
CLR-5 :	Understand intercultural communication and etiquettes required in a professional environment			
CLR-6 :	Instill confidence in students and develop skills necessary to face the challenges of competitive exams and placements			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	Re-engineer their attitude and understand its influence on behavior	3	80	70	M	M	M	-	M	H	M	-	-	H	H	H	M	H	H
CLO-2 :	Acquire inter personal skills and be an effective goal oriented team player	3	80	70	M	M	M	-	M	H	M	-	-	H	H	H	M	H	H
CLO-3 :	Understand the importance of time management and creativity	3	85	75	M	M	M	-	M	H	M	-	-	H	H	H	M	H	H
CLO-4 :	Build confidence during any presentation	3	85	75	M	M	M	-	M	H	M	-	-	H	H	H	M	H	H
CLO-5 :	Develop interpretation skills and intercultural communication	3	85	75	M	M	M	-	M	H	M	-	-	H	H	H	M	H	H
CLO-6 :	Help the students succeed in competitive exams and placements	3	80	70	M	M	M	-	M	H	M	-	-	H	H	H	M	H	H

Duration (hour)		6	6	6	6	6
S-1	SLO-1	***IKIGAI***	***Interpersonal Skills***	*Creating brands – activity (posters, flyers, business cards)*	***Value of Time***	***Intercultural communication - beliefs, customs and attitude of people in different countries (US, UK, Japan, West Asia, China, Russia)***
	SLO-2	***IKIGAI***	*Emotional Intelligence*	*Creating brands – activity (posters, flyers, business cards)*	***Diagnosing Time Management***	***Social and cultural etiquettes***
S-2	SLO-1	***Attitude***	*Importance of Team Work*	*Causes of Stress and Its Impact*	***Weekly Planner, To do list, Prioritizing work***	***Communication etiquettes***
	SLO-2	***Factors influencing Attitude***	*Team Building Activity*	*How to Manage Stress and Distress?*	***Time management activity***	***Telephone etiquettes***
S-3	SLO-1	***SWOT Analysis***	*Leadership skills*	*Understanding the Circle of Control*	***Creativity - think out of the box***	***Dinning etiquettes***
	SLO-2	***Individual SWOT Analysis - activity***	*Leadership skills based Activity*	*Stress Busters*	***Creativity Activity***	***Grooming etiquettes***

S-4	SLO-1	*Extempore Practice Session*	*Networking skills*	*Conflicts in Human Relations – reasons*	*Creativity Assessment Activity*	*Ice breaking*
	SLO-2	*Extempore Practice Session*	*Networking skills based Activity*	*Approaches to conflict resolution*	*Creativity Assessment Activity*	*Designing ice breaker games*
S-5	SLO-1	*Extempore Practice Session*	*Negotiation skills*	*Conflict resolution – case studies*	*Brainstorming, use of groups and individual brainstorming techniques to promote idea generation*	*Ice breaker activity*
	SLO-2	*Extempore Practice Session*	*Negotiation skills based Activity*	*Conflict resolution – case studies*	*Brainstorming session activities*	*Ice breaker activity*
S-6	SLO-1	*Extempore Practice Session*	*Entrepreneurial Skills*	*Importance and necessity of Decision Making*	*Brainstorming session*	*Introduction to resume building*
	SLO-2	*Extempore Practice Session*	*Entrepreneurial knowledge, Focus, Investment, Risk tolerance, Resilience, Negotiation, Ethics, Networking*	*Process of Decision Making, Practical Way of Decision Making, Weighing Positives and Negatives*	*Brainstorming session*	*Introduction to resume building*

Learning Resources	1. *Jeff Butterfield, Soft Skills for Everyone, CENGAGE, India, 2015* 2. *Dr. K. Alex, Soft Skills, S.Chand Publishing & Company, India, 2014* 3. *Covey Sean, Seven habits of highly effective teens, Simon & Schuster, New York, 2014*	***4. Carnegie Dale, How to win friends and influence people, Simon and Schuster, New York, 2016*** ***5. Thomas A Harris, I am ok, you are ok, Arrow, London, 2012*** ***6. Daniel Coleman , Emotional Intelligence , Bloomsbury, India, 2016***

Learning Assessment					
Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (100% weightage)**			
		CLA-1 (20%)	**CLA-2 (20%)**	**CLA-3 (30%)**	**CLA-4 (30%)##**
		Practice	**Practice**	**Practice**	**Practice**
Level 1	Remember	10%	10%	30%	15%
	Understand				
Level 2	Apply	50%	50%	40%	50%
	Analyze				
Level 3	Evaluate	40%	40%	30%	35%
	Create				
	Total	100 %	100 %	100 %	100 %

CLA-1, CLA-2 and CLA-3 can be from any combination of these: Online Aptitude Tests, Classroom Activities, Case Studies, Poster Presentations, Power-point Presentations, Mini Talks, Group Discussions, Mock interviews, etc.

CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
1. Ajay Zener, Director, Career Launcher	-	*1. Mr Priyanand, Assistant Professor, CDC, E&T, SRMIST*
		2. Ms Sindhu Thomas, Head in charge, CDC, FSH, SRMIST
		3. Ms Mahalakshmi, Assistant Professor, CDC, FSH, SRMIST

SEMESTER II

Course Code	UBT20201J	Course Name	BIOCHEMISTRY	Course Category	C	Professional Core Course	L	T	P	C
							4	0	4	6

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	*BIOTECHNOLOGY*	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-1 :	*Understanding the classification of carbohydrates*	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO – 2	PSO – 3
CLR-2 :	*Understanding the importance of lipids*																		
CLR-3 :	*Understanding the importance of bonds in structure integrity*																		
CLR-4 :	*Knowledge on structure of nucleic acid*																		
CLR-5 :	*Knowledge on importance of vitamins and minerals*																		
CLR-6 :	*Understanding fundamentals and importance of biomolecules*																		
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:																		
CLO-1 :	*To analyze the importance of carbohydrates, requirement for living organism*	3	80	70	*H*	*H*	-	*H*	*M*	-	-	-	H	H	-	-	M	H	H
CLO-2 :	*To analyze the importance of lipids for living organism*	3	85	75	*H*	*H*	*H*	*H*	*H*	-	-	-	H	H	-	-	M	H	H
CLO-3 :	*Strong basis for understanding protein structure*	3	75	70	*H*	*H*	-	*H*	*H*	-	-	-	H	H	-	-	M	H	H
CLO-4 :	*Better knowledge gained in the structure of DNA and RNA*	3	85	80	*H*	*H*	-	*H*	*H*	-	-	-	H	M	-	-	M	H	H
CLO-5 :	*Analyzing ability against the vitamins importance and deficiency disease*	3	85	75	*H*	*H*	*H*	*H*	*H*	-	-	-	H	H	-	-	M	H	H
CLO-6 :	*Overall understanding and application of microbiological concepts in the progress of industry and academics*	3	80	70	*H*	*H*	*H*	*H*	*H*	-	-	-	H	H	-	-	M	H	H

Duration (hour)		24	24	24	24	24
S-1	SLO-1	*Introduction and classification of carbohydrates*	*TCA cycle regulation , energetics*	*Desaturation*	*Urea cycle*	*Nucleic acid sequencing.*
S-2	SLO-1	*Structure of carbohydrates- monosacharides (straight chain)*	*Introduction and classification of lipids*	*Introduction of amino acids*	*Regulation*	*Nucleic acid sequencing.*
S-3	SLO-1	*Structure of carbohydrates- monosaccharides (Ring structure)*	*simple lipids*	*Classification of amino acids*	*Introduction- nucleic acid*	*Vitamins- Classification*
S-4	SLO-1	*Structure of carbohydrates- Disaccharides*	*simple lipids*	*Classification of amino acids*	*Structure of Purines and Pyrmidines*	*Fat soluble vitamins- A, D*
S 5-8	SLO-1 SLO-2	*Intrduction to Biochemistry lab-Lab safety guidelines*	*Sugar analysis-Fructose, Galactose, Mannose*	*Sugar analysis- starch & dextrin*	*Amino acid analysis- tryptophan, methionine*	*TLC –amino acid result discusion*
S-9	SLO-1	*Structure of carbohydrates- homoploysaccharides*	*Compounds lipids*	*Properties of amino acids*	*Structure of Purines and Pyrmidines*	*Fat soluble vitamins- E, K*
S-10	SLO-1	*Structure of carbohydrates- heteroploysaccharides*	*Compounds lipids*	*Properties of amino acids*	*Unusual bases*	*Water soluble vitamins- B1, B2, B3*

S-11	SLO-1	*Properties of carbohydrates*	*Derived lipids*	*Protein- classification*	*Nucleotides and Nucleosides*	*Water soluble vitamins- B5, B6, B12.*
S-12	SLO-1	*Properties of carbohydrates*	*Derived lipids*	*Protein- classification*	*DNA double helical structure*	*Minerals- macro minerals*
S 13-16	SLO-1 SLO-2	*Regeant preparation for carbohydrate analysis*	*Sugar analysis- Sucrose*	*Sugar analysis- starch & dextrin*	*Amino acid analysis- cysteine, arginine*	*Paper chromatography*
S-17	SLO-1	*Metabolism introduction*	*Physical and chemical properties of fats.*	*Structure of proteins- primary*	*Forms of DNA*	*Minerals- macro minerals*
S-18	SLO-1	*Glycolysis pathway*	*Physical and chemical properties of fats.*	*Structure of proteins-secondary*	*Forms of DNA*	*Minerals- macro minerals*
S-19	SLO-1	*Glycolysis regulation , energetics*	*Biosynthesis of fatty acid-Palmitic acid*	*Structure of proteins-tertiary*	*Types of RNA*	*Minerals- micro minerals*
S-20	SLO-1	*TCA cycle*	*Elongation*	*Structure of proteins-quarternary*	*Types of RNA*	*Minerals- micro minerals*
S 21-24	SLO-1 SLO-2	*Sugar analysis-Glucose*	*Sugar analysis- lactose, Malatose*	*Amino acid analysis-Histidine, tyrosine*	*TLC –amino acid*	*Model exam*

Learning Resources	1. Robert K. Murray, David Bender, Kathleen M. Botham and Peter J. Kennelly,Harpers"Illustrated Biochemistry" 29th Edition, Mc Graw HilL 2012. 2. Lehninger, Nelson and Cox, "Principles of Biochemistry", 6th edition, W.H. Freeman & Company, 2013.	1. Voet&Voet, "Fundamentals of Biochemistry", John Willey & Sons, 2010. Jeremy M. Berg, John L. Tymoczko and LubertStryer, Biochemistry, 4th Edition , Freeman and Company, 2011

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
MR. RAVISHANKAR	*DR. SUMATHI, MGR UNIVERSITY CHENNAI*	MRS. S. VIJAYABHARATHI, SRMIST

Course Code	UBT20202J	Course Name	GENETICS AND MOLECULAR BIOLOGY	Course Category	C	Professional Core Course	L	T	P	C
							4	0	2	5

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning	Program Learning Outcomes (PLO)

		Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLR-1 :	*Understanding the structure genome, chromosome and DNA*	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLR-2 :	*Understanding the concepts of central dogma*																		
CLR-3 :	*Knowledge on repairs and mutagens*																		
CLR-4 :	*Knowledge on gene regulation*																		
CLR-5 :	*Learning recent advances on techniques employed in molecular biology*																		
CLR-6 :	*Candidates understanding on fundamentals of microbiology useful for industry and academia*																		
Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:																		
CLO-1 :	*Learning about structure of DNA, chromosome and genome*	2	80	70	*H*	-	-	*M*	-	-	-	-	L	L	-	H	-	-	-
CLO-2 :	*Knowledge on central dogma useful for basic understanding of molecular biology*	2	85	75	*H*	*H*	*H*	*H*	*H*	-	-	-	M	L	-	H	-	-	-
CLO-3 :	*Knowledge on repairs and mutations necessary for applying during studies on DNA*	2	75	70	*H*	-	-	*H*	-	-	-	-	M	L	-	H	-	-	-
CLO-4 :	*Applying knowledge regulation during protein expression studies*	2	85	80	*H*	-	-	*H*	-	-	-	-	M	L	-	H	-	-	-
CLO-5 :	*Having updation on newer aspects of research in molecular biology*	2	85	75	*H*	*H*	*H*	*H*	*H*	-	-	-	M	L	-	H	-	-	-
CLO-6 :	*Overall understanding and application of molecular biological concepts in the progress of industry and academics*	2	80	70	*H*	*H*	*H*	*H*	*H*	-	-	-	L	L	-	H	-	-	-

Duration (hour)		24	24	24	24	24
S-1	SLO-1	*Introduction to Mendelism*	*Concept of Linkage*	*Recombination repair*	*Termination in eukaryotes*	*Termination of translation*
S-2	SLO-1	*Mendel's experiment*	*crossing over*	*SOS repair*	*End replication problem*	*Post translational modification*
S-3	SLO-1	*monohybrid cross*	*recombination*	*Hardy –Weinberg equilibrium*	*Introduction Prokaryotic transcription*	*Post translational modification*
S-4	SLO-1	*dihybrid cross*	*cytological basis of crossing over*	*Random genetic drift*	*Transcription- Initiation*	*General aspects of gene regulation*
S 5-8	SLO-1 SLO-2	*Introduction to Molecular biology lab*	*Isolation of bacterial genomic DNA*	*Purification of DNA*	*Polymerase chain reaction*	*Southern Blotting*
S-9	SLO-1	*principles of segregation*	*types of crossing over*	*Hershey & chase experiment*	*Elongation, termination*	*Enhancers*
S-10	SLO-1	*Law of independent assortment*	*Sex-Linked Inheritance*	*Messelson-Stahl experiment for semi-conservative*	*RNA processing- 5' end and 3' end*	*silencers*
S-11	SLO-1	*epistasis*	*Sex-Linked Inheritance*	*Replication- prokaryotic*	*Splicing mechanism*	*Insulators*

S-12	SLO-1	*epistasis*	*Chromosome mapping*	*Replication fork*	*Splicing mechanism*	*Introduction to operon models*
S 13-16	SLO-1 SLO-2	*Estimation of DNA by Diphenyl amine method*	*Isolation of plasmid DNA*	*Purification of DNA*	*Polymerase chain reaction- Discussion*	*Southern Blotting*
S-17	SLO-1	*multiple alleles*	*Introduction to mutation*	*Progression of replication fork*	*Eukaryotic transcription- GTFs*	*Lactose operon- positive regulation*
S-18	SLO-1	*karyotyping*	*agents of mutation*	*Termination of replication in prokaryotes*	*Termination, RNA processing*	*Lactose operon- positive regulation*
S-19	SLO-1	*genome organization*	*DNA damage*	*Types of replication models- rolling circle*	*Introduction to translation*	*tryptophan operon- negative regulation*
S-20	SLO-1	*Chromosomal abnormalities*	*repair mechanisms- excision*	*Theta replication, D- loop*	*Prokaryotic and eukaryotic translation*	*tryptophan operon- negative regulation*
S 21-24	SLO-1 SLO-2	***Estimation of RNA by Orcinol Method***	***Isolation of plasmid DNA***	***Purity checking of DNA and RNA***	***Gel elution of amplified DNA***	***Model Exam***

Learning Resources	***Theory:*** 1. *David Friefelder. Physical Biochemistry: Applications to Biochemistry and Molecular Biology (Life Sciences/Biochemistry).* 2. *James D. Watson. Molecular Biology of the Gene. Cold spring Harbor Laboratory Press, 2017.*	***Reference:*** The Cell: A Molecular Approach. Geoffrey M. Cooper, Robert E. Hausman

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	DR.N. PRASANTH BHATT, SRMIST

Course Code	ULT20G02J	Course Name	Tamil-II	Course Category	G	Generic Elective Course	L	T	P	C
							2	0	2	3

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*Tamil*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*To generate in students a sensitivity to gender marginalization and Eco sensitivity.*			
CLR-2 :	*An evolved consciousness in the minds to accommodate all is developed*			
CLR-3 :	*The ability to accept all and to co- exist is initiated*			
CLR-4 :	*To create community connectivity and interdependence is initiated*			
CLR-5 :	*To instill language skills*			
CLR-6 :	*To give them all the historical insights*			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					Fundamental Knowledge	Application of Concepts Link with Related Disciplines		Procedural Knowledge	Skills in Specialization Ability to Utilize Knowledge		Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO -1	PSO -2	PSO-3
CLO-1 :	*To acquire knowledge about Tamil Language*	*2*	*75*	*60*	*H*	*H*	*H*	*-*	*-*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*
CLO-2 :	*To strengthen the knowledge on concept, culture, civilization and translation of Tamil*	*2*	*80*	*70*	*-*	*H*	*-*	*H*	*H*	*H*	*H*	*-*	*-*	*H*	*H*	*H*	*H*	*H*	*H*
CLO-3 :	*To develop content using the features in Tamil language*	*2*	*70*	*65*	*H*	*-*	*-*	*H*	*-*	*H*	*H*	*H*	*-*	*H*	*H*	*H*	*H*	*H*	*H*
CLO-4 :	*To use Tamil Language and Literature to enhance their creativity*	*2*	*70*	*70*	*H*	*-*	*H*	*M*	*H*	*-*	*-*	*-*	*H*	*H*	*H*	*H*	*H*	*H*	*H*
CLO-5 :	*To improve communication and creative expression in Tamil language*	*2*	*80*	*70*	*-*	*H*	*-*	*H*	*-*	*H*	*H*	*-*	*-*	*H*	*H*	*H*	*H*	*H*	*H*
CLO-6 :	To enable the students to speak and write in chaste Tamil	*2*	*75*	*70*	*H*	*H*	*H*	*H-*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*

Duration (hour)		12	12	12	12	12
S-1	SLO-1	தமிழில் காலந்தோறும் அகமரபு	களப்பிரர் காலம்	பல்லவர் காலம்	சங்ககால வரலாறு	தமிழ்ச் சிறுகதைப் போக்குகள்
	SLO-2	அக இலக்கியப் போக்குகள்	அறமும் வாழ்வியலும்	பல்லவர் கால இலக்கியம்	சங்ககால மக்களின் வாழ்வியல்	தமிழ்ச் சிறுகதையும் தமிழ்ச் சமூக வாழ்வியலும்
S-2	SLO-1	எட்டுத்தொகை நூல்களும் பெயர்களும்	திருக்குறள் - உலகப்பொதுமறை	பக்தியும் தமிழும்	முச்சங்கம் – அறிமுகம்	புதுமைப்பித்தன் - அகல்யை
	SLO-2	எட்டுத்தொகையில் அக நூல்கள்	திருக்குறள் கட்டமைப்பு	பக்தி இலக்கியங்கள்	முச்சங்க வரலாறு	தொன்மம் – கட்டுடைப்பு
S-3	SLO-1	ஐங்குறுநூறு (203)	தமிழில் வினை	சைவ சமய இலக்கியங்கள்	செம்மொழி இலக்கியங்கள்	அகிலன் - ஒருவேளைச் சோறு
	SLO-2	தலைவனின் நாட்டுப் பெருமை	திருக்குறள் - வினைத்திட்பம் (67)	தேவார மூவர்	பாட்டும் தொகையும்	தொழிற்புரட்சியும் விவசாயமும்
S-4	SLO-1	குறுந்தொகை (130)	உழவும் தமிழர் வாழ்வும்	தேவாரம் – திருஞான சம்பந்தர் பாடல்	எட்டுத்தொகை உருவாக்கப் பின்புலம்	ஆண்டாள் பிரியதர்ஷினி – மாத்திரை

	SLO-2	அகவாழ்வில் நம்பிக்கை வேர்கள்	திருக்குறள் - உழவு (104)	தேவாரம் – திருநாவுக்கரசர் பாடல்	எட்டுத்தொகையும் தமிழர் வாழ்வியலும்	குடும்பம் – கட்டமைப்பு
S-5	SLO-1	பண்டைத் தமிழரின் வாழ்வியல்	சமண சமய இலக்கியங்கள்	திருவாசகம் அறிமுகம்	பத்துப்பாட்டு உருவாக்கப் பின்புலம்	பாரததேவி - மாப்பிள்ளை விருந்து
	SLO-2	பண்டைத் தமிழர் உணர்வியல்	நாலடியார்	மாணிக்கவாசகர் பாடல்	பத்துப்பாட்டும் தமிழர் வாழ்வியலும்	எளிய மனிதர்களின் கதை
S-6	SLO-1	அகநானூறு (44)	இலக்கியங்களில் நட்பு	வைணவ சமய வளர்ச்சிப் போக்கு	பதினெண் கீழ்க்கணக்கு நூல்கள்	சிங்கார வடிவேலு – தவிப்பு
	SLO-2	புறவாழ்வோடு கூடிய அகம்	நட்பில் பிழை பொறுத்தல் (221)	வைணவ சமய இலக்கியங்கள்	பதினெண் கீழ்க்கணக்கும் தமிழர் அற மரபும்	புறக்கணிப்பின் வலி
S-7	SLO-1	கற்றறிந்தார் ஏத்தும் கலி	தமிழர் மருத்துவம்	நாலாயிரத் திவ்யப் பிரபந்தம்	நீதி இலக்கியங்கள்	செய்தி அறிக்கை அறிமுகம்
	SLO-2	கலித்தொகை கட்டமைப்பு	நீதி இலக்கியத்தில் மருத்துவ நூல்கள்	பெரியாழ்வார் பாடல்	நீதி இலக்கியங்களின் பன்முகத் தன்மைகள்	செய்தி அறிக்கை தயாரித்தல்
S-8	SLO-1	கலித்தொகை (149)	திரிகடுகம்	ஆண்டாள் பாடல்	காப்பிய இலக்கணம்	விமர்சனம்
	SLO-2	வாழ்வியல் அறமும் அகமும்	செங்கோல் அரசு	தொண்டரடிப்பொடி ஆழ்வார் பாடல்	காப்பியப் போக்குகள்	இலக்கியம், கலை விமர்சனம்
S-9	SLO-1	தமிழர் புறமரபு	இனியவை நாற்பது அறிமுகம்	தமிழில் இஸ்லாமிய இலக்கியங்கள்	ஐம்பெருங்காப்பியங்கள்	நேர்காணல் அறிமுகம்
	SLO-2	புற இலக்கியங்கள்	இனியவை நாற்பதின் தனித்தன்மைகள்	இஸ்லாமிய இலக்கியங்களின் கொடை	ஐம்பெருங்காப்பியங்களின் சிறப்புகள்	நேர்காணல் – நுட்பங்கள்
S-10	SLO-1	புறநானூறு (235)	இனியவை நாற்பது (14)	சீறாப்புராணம்	தமிழ்ச் சமூகமும் சமயத் தத்துவங்களும்	நேர்காணல் கேள்வி தயாரிப்பு
	SLO-2	கையறுநிலை	இனிமையும் அழகும்	மானுக்குப் பிணைநின்ற படலம் (5 பாடல்கள்)	சமயத் தத்துவங்களும் வாழ்வியல் விழுமியங்களும்	நேர்காணல் பதிவும் எழுது முறையும்
S-11	SLO-1	ஆற்றுப்படை அறிமுகம்	பண்டைக்காலப் போரும் வாழ்வும்	கிறித்தவ சமய இலக்கியங்கள்	பன்னிரு திருமுறை – அறிமுகம்	பேச்சுக்கலை அறிமுகம்
	SLO-2	ஆற்றுப்படை மரபுகள்	போர் இலக்கியங்கள்	கிறித்தவ இலக்கியங்களின் கொடை	பன்னிரு திருமுறை – வரலாறு	தமிழரின் பேச்சுக்கலை
S-12	SLO-1	சிறுபாணாற்றுப்படை	களவழி நாற்பது (14)	ஆதிநந்தாவனப் பிரளயம்	நாலாயிரத் திவ்யப் பிரபந்தம் – அறிமுகம்	பேச்சுக்கலையின் வகைகள்
	SLO-2	நல்லியக்கோடனும்பாணர் வாழ்வியலும்	தமிழர் வீரம்	ஏதேன் தோட்ட வருணனை	பன்னிரு ஆழ்வார்கள் வரலாறு	பேச்சுப் பயிற்சி

Learning Resources	1. மௌவல், தொகுப்பும் பதிப்பும் - தமிழ்த்துறை ஆசிரியர்கள், தமிழ்த்துறை, எஸ்.ஆர்.எம். அறிவியல் மற்றும் தொழில்நுட்பக் கல்விநிறுவனம், காட்டாங்குளத்தூர், **603203, 2020.** 2. தமிழண்ணல், புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு, மீனாட்சி புத்தக நிலையம், மதுரை, 2017 3. மு. அருணாசலம், தமிழ் இலக்கிய வரலாறு, நூற்றாண்டு முறை (9ஆம் நூ. முதல் 16 வரை), தி பார்க்கர், சென்னை, 2005 **4.** தமிழ் இணையக் கல்விக்கழகம் - **http://www.tamilvu.org/** 5. மதுரை தமிழ் இலக்கிய மின் தொகுப்புத் திட்டம் - **https://www.projectmadurai.org/**

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	30%	30%	30%	30%	30%	30%	30%	30%	-
	Understand										
Level 2	Apply	40%	40%	50%	50%	50%	50%	50%	50%	50%	-
	Analyze										
Level 3	Evaluate	30%	30%	20%	20%	20%	20%	20%	20%	20%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Expert from Higher Technical Institutions	Internal Experts
	1. Dr. R..Srinivasan, Associate Professor, Department of Tamil, Presidency College, Chennai.	*1. B.Jaiganesh, Assistant Professor & Head, FSH, SRMIST*
		2. T.R.Hebzibah Beulah Suganthi, Assistant Professor, FSH, SRMIST
		3.S.Saraswathy, Assistant Professor, FSH, SRMIST

Course Code	ULH20G02J	Course Name	HINDI-II	Course Category	G	Generic Elective Course	L	T	P	C
							2	0	2	3

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*HINDI*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*To be able to converse well in the Hindi Language*			
CLR-2 :	*To read and write and clarity*			
CLR-3 :	*To be willing listeners and translators –where need be*			
CLR-4 :	*To acquire the values/thought contents of the writers and practice in it in life.*			
CLR-5 :	*To find motivation through the various forms of literature and learn to overcome any challenges of life.*			
CLR-6 :	*To discover the importance of the language in making education as a means of growth in life and not mere literacy.*			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*			
CLO-1 :	*To acquire knowledge about Medieval and Modern Poetry.*	*2*	*75*	*60*
CLO-2 :	*To consider the relevance of the present trends in Hindi and their contemporary relevance.*	*2*	*80*	*70*
CLO-3 :	*To help develop better understanding of the Hindi language by studying the stories with reference to current reality.*	*2*	*70*	*65*
CLO-4 :	*To understand the usage of the present Advertising trends and its creative angles with the varied skills of Hindi Language.*	*2*	*70*	*70*
CLO-5 :	*To make translation of good literature and any relevant document from the Hindi Language to English and Vice-versa.*	*2*	*80*	*70*
CLO-6 :	*To help the learner to tackle Administrative terminologies, help them use Idioms and Phrases in their daily life, with ease.*	*2*	*75*	*70*

Program Learning Outcomes (PLO)														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO -1	PSO -2	PSO-3
H	*H*	*H*	-	-	-	-	-	-	-	-	-	-	-	-
-	*H*	-	*H*	-	-	-	-	-	-	-	-	-	-	-
H	-	-	*H*	-	-	-	-	-	-	-	-	-	-	-
H	-	*H*	*H*	*H*	-	-	-	-	-	*H*	-	-	-	-
-	*H*	-	*H*	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	Kavye ke guno se awagat karana - Jaysi	Kahani Idkiyan	VIGYAPAN	ANUVAD	Takniki Shabdavali
	SLO-2	Ishk hakiki evam moksh bhava se awagat karana	Nari Shakti ki sarthakata	Srijnatamak kshmata jagrit karna	Vidhyarthiyon ko sikhaya jayega anuvad kitna upyogi hai	Vaignik tarike se bhashaon ka avishkaar karna
S-2	SLO-1	Surdas – Vatsalya ras se awagat karana	Kahani gunda Prem ki prakashtha se awagat karvana	VIGYAPAN KYA HAI	ARTH	ARTH
	SLO-2	Bhakti Bhavna se vidhyarthiyon ko jodna	Prtantr bharat ki samajik vyavstha se awagat karvana	Shabdavali evam chitratamakta se awagat karvana	Vidhyarthiyon dwara arth smajkar samaj ke liye mahtavpurn karya kar payenge	Vidhyarthi uske arth dwara hi uske mahtav smjhenge
S-3	SLO-1	Tulsidas-Manav mulyon ki prabal bhavna jagrit karna	KAHANI KE TATVA	VIGYAPAN KI BHASHA	PARIBHASHA	PARIBHASHA

	SLO-2	Dharmik Parvarti se awagat karana	Kahani ke tatva ki mahatta se awagat karvana	Bhasha ki abhivyakti ke pryog ko smjhana	Vibhinn vidwano dwara di gai paribhasha se us baat ko smjhenge vidhyathi	Vibhinn vidwano dwara di gai paribhasha se us baat ko smjhenge vidhyathi
S-4	**SLO-1**	Tiruvaluvaar – naitik mulyon ko jagrit karna	KAHANI KE AAYAM	VIGYAPAN KA PRBHAV	MAHATVA	SHABDAVALI KI AVSHYAKTA
	SLO-2	Vidhyarthiyon ko nitivaan bnana	Vidhyarthiyon ko kahani ke vidhinn ayam se awagat karvana	Shravaya-drishya samgri ke prbhav ki upyogita	Samijik jan-jeevan ke liye anuvad ke mahtav ko smjhana.	Vaignikon ka awiskar kitna mahtavpurn
S-5	**SLO-1**	Desh prem ki bhavna bharna	LEKHAK PARICHAY	VIGYAPAN AUR BAZAR	UDDESHYA	BHASHA VAIGYANIK
	SLO-2	Krantikari vicharon se Awagat karana	Lekhako ke jivan se awagat karvana	Vidhyarthioyon ko vigyapan se bazar me kaise sthapit kiya ja skata hai batana	Vidhyarthi anuvad ke uddeshya ko smajhkar samaj upyogi karya krne me apni sarthak bhumika nibhayenge	Bhasha vaignikon ki jankari
S-6	**SLO-1**	Badal Raag- Desh prem ki bhavna bhrna	KAHANI PATH	VIGYAPAN AUR ROZGAR	HINDI-ENGLISH	KARYALYIN SHABD
	SLO-2	Krantikari vicharo se awagat karana	Vidhyarthiyon ko kahani path ke dwara unka vak kausal majbut karna	Vidhyarthi savam ka ad-ajency bhi bna paye	Hindi adhikarai aur anuvadak ke pad ke liye tayaar karna	Shabd kaise tayar kiye jate hain vidhyorthiyon ko jankari
S-7	**SLO-1**	Pret ka Byaan -Bhukhmari evam akaal se awagat karana	KAHANI KA SARANSH	VIGYAPAN KI NIYAM	ENGLISH-HINDI	ANGREZI SE HINDI ANUVAD
	SLO-2	Samajik samanta banaye rkhne ki pravarti jagana	Lekhan kshmata ka vikas hona	Vigyapan ka ek hi niyam bhasha ka kashav jo vidhyarthiyon me viksit kiya jayega	Hindi adhikarai aur anuvadak ke pad ke liye tayaar karna	Hindi adhikarai aur anuvadak ke pad ke liye tayaar karna
S-8	**SLO-1**	Lahro se dark a nauka paar nhi hoti –chatro ko sahashi bnana	KAHANI KA UDDESHYA	VIGYAPAN KA MAHTVA	ANUVAD KI UPYOGITA	HINDI SE ANGREZI ANUVAD
	SLO-2	Karmaththa purn bhavna ko jagrit karna	Kahani ke uddeshy unke jiwan ke mahtav ko smjhne me sahayk banna	Vartman me uski prasangikta vidhyarthiyon ko smjhana	Vidhyarthiyon ko vibhin karyalayon me hindi adhikari pad ki jankari prapt	Hindi adhikari aur anuvadak ke pad ke liye tayaar karna.
S-9	**SLO-1**	Javani –rashtr prem ki bhavna jagrit karna	KAHANI KA VISHELESHAN	PRINT VIGYAPAN	ANUVADk KI BHUMIKA	EK DIN EK SHABD
	SLO-2	Vir ras evam virta ki pravati se awagat karana	Vishleshan kshmata viksit hota	Vidhyarthi iski bhasha sikhenge	Vidhyarthiyon ko anuvadak ki bhumika ka mahtav smajh aayega jiske adhar par vo kaam karenge	Vidhyarthiyon ko rozgaar se jodna
S-10	**SLO-1**	Dhool- saman vyavhar ki pravarti jagana	KAHANI PARICHARCHA	RADIO, TV.VIGYAPAN	SAHITYIK ANUVAD	PRYOJANMULAK SHABD KA MAHTAVA
	SLO-2	Satah se jude rahne ke prerna dena.	Vaad-vivad se vidhyarthiyon me apni baat ko rkhne ki yogyata banna	Vidhyarthiyon ko abhyas karvaya jayega	Vibhinn bhashaon ke sahitya ka anuvad kaise kiya jane ki chunouti ko samjajh payenge	Vidhyarthiyon ko vaighniko dwara tayaar ki gai bhasha ki samaj
S-11	**SLO-1**	KAVYA BIBM	KAHANI ANDOLAN	Ad agency	ANUVAD KE NIYAM	VIBHINN KSHETRO ME PRYOJANMULAK SHABDO KA MAHATAV
	SLO-2	Vidhyarthiyon ko naye-naye bibm ki jankari prapt hona	Vibhinn kahani andolan se bhi awagat karana	Ad agency aur swarozgaar se jodna	Anuvad ke niyamo ko vidhyarthi smajh payenge	Hindi adhikari pad par karyarat
S-12	**SLO-1**	SAMUHIK PARICHARCHA	KAHANI KA BADLTA SWAROOP	VIGYAPAN KA SWARUP	SHABDO KA MAHATAV	VAIGYANIK SHABDAVALI KI AVSHYAKATA
	SLO-2	Vidhyarthiyon ki bolne ki kaushal kshamta ko bdhana	Smay ke sath unke swarup ke bdlav ka bhi vidyarthi me samajh paida hona	Vidhyarthiyon ko vigyapan lekha ki barikayon ki samajh utpann hona	Shabda anuvad ke mahtva ko vidhyarthi smajhenge	Vidhyarthiyon ko shabdo ki vaignikta se jodna

Learning Resources	***The Prescribe Text Book Compiled and Edited by Department of Hindi*** www.kavitakosh.org www.shabdkosh.com

Learning Assessment											
	Bloom's Level of Thinking	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (10%)**		**CLA – 3 (20%)**		**CLA – 4 (10%)#**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	Remember	30%	30%	30%	30%	20%	20%	20%	20%	30%	-
	Understand										
Level 2	Apply	40%	40%	50%	50%	50%	50%	50%	50%	50%	-
	Analyze										
Level 3	Evaluate	30%	30%	20%	20%	30%	30%	30%	30%	20%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Expert from Higher Technical Institutions**	**Internal Experts**
	1. Prof.(Dr.) S.Narayan Raju, Head, Department of Hindi,CUTN, Tamilnadu	*1. Dr.S Preeti. Associate Professor & Head, SRMIST*
		2. Dr. Md.S. Islam Assistant Professor, SRMIST
		3 Dr. S. Razia Begum, Assistant Professor, SRM IST

Course Code	ULF20G02J	Course Name	French-II	Course Category	G	Generic Elective Course	L	T	P	C
							2	0	2	3

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*French*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*
CLR-1 :	Strengthen the language of the students both in oral and written
CLR-2 :	Express their sentiments, emotions and opinions, reacting to information, situations
CLR-3 :	Make them learn the basic rules of French Grammar.
CLR-4 :	Develop strategies of comprehension of texts of different origin
CLR-5 :	Enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French
CLR-6 :	*Extend and expand their savoir-faire through the acquisition of current scenario*

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	*To acquire knowledge about French language*	2	75	60
CLO-2 :	*To strengthen the knowledge on concept, culture, civilization and translation of French*	2	80	70
CLO-3 :	*To develop content using the features in French language*	2	70	65
CLO-4 :	*To interpret the French language into other language*	2	70	70
CLO-5 :	*To improve the communication, intercultural elements in French language*	2	80	70
CLO-6 :	To enable the students to overcome the fear of speaking a foreign language and take position as a foreigner speaking French	2	75	70

Program Learning Outcomes (PLO)														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO -1	PSO -2	PSO-3
H	*H*	*H*	-	-	-	-	-	-	-	-	-	-	-	-
-	*H*	-	*H*	-	-	-	-	-	-	*M*	-	-	-	-
H	-	-	*H*	-	-	-	-	-	-	*H*	-	-	-	-
H	-	*H*	*H*	*H*	-	-	-	-	-	*H*	-	-	-	-
-	*H*	-	*H*	-	-	-	-	-	-	*H*	-	-	-	-
H	-	*M-*	*H*	*H*	-	-	-	-	-	-	-	-	-	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	**Les loisirs**	**La routine**	**Où faire ses courses ?**	**Découvrez et dégustez**	**Tout le monde s'amuse**
	SLO-2	**Les activités**	**Les exemples**	**Les courses**	**Dégustez**	**Le monde**
S-2	SLO-1	Les activités quotidiennes	Les adjectifs interrogatifs	Les aliments	Les articles partitifs	Les sorties
	SLO-2	Les quotidiennes	Les trois formes	Les exemples	Du, De la, De l', Des	Les exemples
S-3	SLO-1	Les matières	Les nombres ordinaux	Les quantités	Le pronom en (la quantité)	Situer dans le temps
	SLO-2	Les exemples	Les nombres	Les exemples	Le bon quantité	Les activités
S-4	SLO-1	Le temps	L'heure	Les commerces	Très ?	Les vêtements
	SLO-2	L'heure	Quelle heure est-il ?	Les activités	Beaucoup ?	Les accessoires
S-5	SLO-1	Les fréquences	Le pronom personnel COD	Les commerçants	La phrase négative (2)	**Les ados au quotidien**
	SLO-2	Les activités	Les exemples	Les exemples	Les négations	**La vie quotidienne**
S-6	SLO-1	Les sons [u]	Les pronominaux	Demander le prix	C'est /Il est	Les adjectifs démonstratifs

	SLO-2	Les sons [y]	Se promener, se coucher etc…,	Dire le prix	Les activités	Ce, Cet, Cette, Ces
S-7	**SLO-1**	Les loisirs	Les verbes du premier groupe	Les services	L'impératif	La formation du féminin
	SLO-2	Les exemples	Parler, Demander, Poser	Les exemples	Les exemples	Les exemples
S-8	**SLO-1**	La routine	groupe en –e_er,é_er,-eler,-eter	Les moyens de paiement	Les verbes devoir, pouvoir	Le pronom indéfini on
	SLO-2	Les activités	Appeler, Jeter etc..,	La carte de crédits	Les verbes savoir, vouloir	Les activités
S-9	**SLO-1**	Les Mots	Le verbe prendre	les sons [ã]	Il faut	Le futur proche
	SLO-2	Les expressions	Les exemples	Les sons [an]	Le verbe impersonnel	S+Aller+Infinitif du verbe
S-10	**SLO-1**	Exprimer ses gouts	Parler de ses gouts	Découvrez !	Au restaurant : Commander et commenter	Le passe composé
	SLO-2	Les exemples	Des gouter	Dégustez !	Les restaurant	Les exemples
S-11	**SLO-1**	Exprimer ses préférences	Parler de ses préférences	Au restaurant : commander	Inviter à une invitation	Les verbes voir et sortir
	SLO-2	Les activités	Les exemples	Au restaurant : commenter	Répondre à une invitation	Décrire une tenue
S-12	**SLO-1**	Décrire sa journée	Décrire sa journée	Inviter à une invitation	Les Mots	écrire un message amical
	SLO-2	Les exemples	Les activités	Répondre à une invitation	Les expressions	Lire un message

Learning Resources	***Theory:*** 1. **''Génération-AI''** Méthode de français, Marie-Noëlle COCTON, P.DAUDA, L.GIACHINO, C.BARACCO, Les éditions Didier, Paris, 2018. ***2.Cahier d'activités avec deux discs compacts.***

Learning Assesment

	Bloom's Level of Thinking	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (10%)**		**CLA – 3 (20%)**		**CLA – 4 (10%)#**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	Remember	30%	30%	30%	30%	20%	20%	20%	20%	30%	-
	Understand										
Level 2	Apply	40%	40%	50%	50%	50%	50%	50%	50%	50%	-
	Analyze										
Level 3	Evaluate	30%	30%	20%	20%	30%	30%	30%	30%	20%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	**Expert from Higher Technical Institutions**	**Internal Experts**
	1. Dr. C.Thirumurugan Associate Professor, Department of French, Pondicherry University	*1. Kumaravel K. Assistant Professor & Head, SRMIST*
		2. Ponrajadurai M Assistant Professor, SRMIST

Course Code	UMS20G01T	Course Name	BIOSTATISTICS	Course Category	G	Generic Elective Course	L	T	P	C
							4	0	0	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Mathematics and Statistics	Data Book / Codes/Standards	Graph sheets and statistical table		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	To provide foundations in Bio Statistics			
CLR-2 :	To provide a strong foundations of organizing the data, diagrammatic and graphical presentation.			
CLR-3 :	To apply Statistical techniques for biological problems.			
CLR-4 :	To understand the characteristics of biological problems.			
CLR-5 :	To provide the application of correlation and regression in biological sciences.			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3	Program Learning Outcomes (PLO)														
					1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					Scientific Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	To understand the statistical modeling and its limitations, and have skill in description, interpretation and exploratory analysis of data by graphical and other means;	3	85	80	L	L	L	M	L	-	-	-	L	M	H	M	-	-	-
CLO-2 :	To calculate and apply measures of central tendency - grouped and ungrouped data cases.	3	80	75	M	M	M	M	M	-	-	-	M	M	H	M	-	-	-
CLO-3 :	To understand and apply measures of dispersion - grouped and ungrouped data cases.	3	85	80	H	H	M	H	M	-	-	-	M	M	H	H	-	-	-
CLO-4 :	Find the relationship between two or more variables using correlation and regression.	3	85	80	M	H	M	H	M	-	-	-	M	M	H	H	-	-	-
CLO-5 :	Perform Test of Hypothesis for small sample. Learn non-parametric test such as the Chi-Square test for Independence and Goodness of Fit.	3	85	80	H	H	M	H	H	-	-	-	M	M	H	M	-	-	-
CLO-6 :	Perform the Analysis of Variance - One way Classifications.	3	75	80	H	H	M	H	M	-	-	-	M	M	H	M	-	-	-

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		12	12	12	12	12
S-1	SLO-1	Nature and scope of statistical methods Definition of statistics Numerical Data	Measures of Central tendency i. Definition ii. Functions of average iii. Characteristics of a typical average	Measures of Dispersion,	Correlation Analysis: Correlation - Definition and uses Types of correlation	Testing of Hypotheses -Testing Procedures
	SLO-2	Nature of statistics	Arithmetic mean Individual series	Range –Individual, Discrete series and Continuous series	Methods for Finding Correlation Coefficient, Properties of correlation coefficient	Definition of test statistic t and its uses
S-2	SLO-1	Importance of statistics	Arithmetic mean Discrete series	Quartile Deviation - Individual and Discrete series	Karl Pearson's Correlation Co-efficient	t-test Small Sample tests
	SLO-2	Functions of statistics	Arithmetic mean Continuous series	Quartile Deviation - Individual and Discrete series	Karl Pearson's Correlation Co-efficient	Testing Procedure
S-3	SLO-1	Limitations and Distrust of Statistics	Arithmetic mean Continuous series	Quartile Deviation - Continuous series	Spearman's Rank Correlation Coefficientwith non-repeated Ranks	t-test - Test for Single Mean
	SLO-2	Collection of data	Arithmetic mean Meritsand Demerits	Quartile Deviation - Continuous series	Spearman's Rank Correlation Coefficientwith non-repeated Ranks	t-test - Test for Single Mean

S 4	SLO-1	Classification i. Meanings ii. Objects iii. Rules of classification	Median i. Individual series ii. Discrete series	Mean Deviation about Mean – Individual Series	Spearman's Rank Correlation Coefficientwith repeated Ranks	t-test -Test for two Sample Means
	SLO-2	Classification i. Types of classification ii. Characteristics of good classification	Median Continuous series	Mean Deviation about Mean – Discrete series	Spearman's Rank Correlation Coefficientwith repeated Ranks	t-test -Test for two Sample Means
S-5	SLO-1	Tabulation: i. Parts of Tabulation ii. Rules of Tabulation	Median Meritsand Demerits	Mean Deviation about Mean – Continuous series	Spearman's Rank Correlation Co-efficient	t-test - t Test Statistic, when sample standard deviations are not known, but Population Standard Deviations are known
	SLO-2	Types of tables Objective of Tabulation	Median Graphical solution	Mean Deviation about Median – Individual series	Problems on finding the best pair of judgements	t-test - t Test Statistic, when sample standard deviations are not known, but Population Standard Deviations are known
S-6	SLO-1	Components of Good Table Rules of construction of the table.	Mode Individual series	Mean Deviation about Median – Discrete series	Bivariate Distribution	Chi-Square distribution - Definition and its Uses
	SLO-2	Difference between classification and tabulation.	Mode Discrete series	Mean Deviation about Median– Continuous series	Bivariate Distribution	Chi-Square test - Testing Procedure
S -7	SLO-1	Diagrammatic representation of various types of statistical data : Bar Diagram	Mode Continuous series	Standard Deviation – Individual and Discrete Series	Regression Analysis: Regression - Definition and Uses	Test based on Goodness of fit
	SLO-2	Types of Bar diagram	Mode Meritsand Demerits	Standard Deviation – Individual and Discrete Series	Regression Coefficients	Test based on Goodness of fit
S -8	SLO-1	One dimensional Diagrams	Mode Graphical solution	Standard Deviation-Continuous Series	Regression Equations	Testing the Independence of Attributes using Chi-Square
	SLO-2	Two dimensional Diagrams	Mode Graphical solution	Standard Deviation-Continuous Series	Types of Regression Equations	Testing the Independence of Attributes using Chi-Square
S-9	SLO-1	Pie chart	Geometric Mean Individual Series	Coefficient of Variation	Regression Equation of X on Y and Regression Equation of Y on X	F-test - Test Statistic of F-test
	SLO-2	Histogram	Geometric Mean Discrete Series	Coefficient of Variation	Regression Equation of X on Y and Regression Equation of Y on X	Uses and testing Procedures
S-10	SLO-1	Frequency Polygon	Geometric Mean Continuous Series	Graphical solution of Dispersion Lorenz curve	Regression Equation of X on Y and Regression Equation of Y on X	Testing the equality of variance using F distribution
	SLO-2	Frequency Curve	Geometric mean Meritsand Demerits	Graphical solution of Dispersion Lorenz curve	Regression Equation of X on Y and Regression Equation of Y on X	Testing the equality of variance using F distribution
S-11	SLO-1	Less than O gives	Harmonic Mean Individual Series	Skewness Bowley's coefficient of Skewness	Relationship between Correlation and Regression Coefficients	Analysis of Variance – Definition and Uses

	SLO-2	*More than O gives*	*Harmonic Mean Discrete Series*	*Skewness Bowley's coefficient of Skewness*	*Problems on the Relationship between the Coefficients*	*Analysis of Variance – testing procedure*
S-12	*SLO-1*	*Lorenz Curve*	*Harmonic Mean Continuous series*	*Concept of Kurtosis*	*Finding the corrected Correlation Coefficient values by correcting the wrongly entered inputs*	*ANOVA - One Way Classification*
	SLO-2	*Lorenz Curve*	*Harmonic Mean Merits and Demerits*	*Concept of Kurtosis*	*Finding the corrected Correlation Coefficient values by correcting the wrongly entered inputs*	*ANOVA - One Way Classification*

Learning Resources	*Theory:* **1.** Pillai, R.S.N, Bagavathi, V. (2009),Statistics,Theory and Practice,7thEdition,S.ChandLtd,NewDelhi. **2.** Gupta, S.P. (2012), Statistical Methods, 4th Edition, Sultan Chand & Sons, New Delhi. **3.** Khan and Khanum, (2008), Fundamentals of Bio Statistics, 3rd Edition, Ukaaz Publications, Hyderabad. **4.** Ken Black, (2013), Business Statistics for Contemporary Decision Making, 7th Edition, John Wiley Publications

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.

Course Designers	
Experts from Academic	**Internal Experts**
Dr.M.A.Baskar, Professor & Head, Dept. Of Mathematics, Loyola college, Chennai	S. Suruthi, Assistant Professor, Dept. Mathematics and Statistics, FSH, SRMIST
Dr.P.Dhanavanthan, Professor & Head, Dept. Of statistics, Pondicherry University	

Course Code	UJK20201L	Course Name	Communication Skills	Course Category	JK	Life Skill Course	L	T	P	C
							0	0	4	2

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	English	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*To make the students learn the native speakers' accent.*			
CLR-2 :	*To educate them about word stress of English*			
CLR-3 :	*The enable them to participate in group discussion and debates*			
CLR-4 :	To improve their participation and participation skills			
CLR-5 :	To improve the listening and speaking abilities in English			
CLR-6 :	*LSRW skills all together is developed in every student*			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO -1	PSO -2	PSO-3
CLO-1 :	*Understand the native speakers' exact pronunciation*	*2*	*75*	*60*	*H*	*H*	*H*	*H*	-	-	-	*H*	*H*	*H*	*H*	*H*	-	-	-
CLO-2 :	*Master the sound systems of English*	*2*	*80*	*70*	*H*	*H*	*H*	-	-	-	-	*H*	*H*	*H*	*H*	*H*	-	-	-
CLO-3 :	*Have a better Word stress, Rhythm and Intonation*	*2*	*70*	*65*	*H*	*H*	*H*	-	*H*	*H*	-	-	*H*	*H*	*H*	*H*	-	-	-
CLO-4 :	*Develop Neutral Accent*	*2*	*70*	*70*	*H*	*H*	*H*	-	*H*	-	-	-	-	-	*H*	*H*	-	-	-
CLO-5 :	*Participate in any conversation with any native speaker*	*2*	*80*	*70*	*H*	*H*	-	*H*	-	*H*	-	*H*	*H*	*H*	*H*	*H*	-	-	-
CLO-6 :	*Clear any standardized tests conducted to measure the English language ability like IELTS and TOEFL*	*2*	*75*	*70*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	*H*	-

Duration (hour)		12	12	12	12	12
S-1	SLO-1	Introduction to Digital language lab - helps in the listening skills by providing an interactive environment to the students	*Learners are enabled to record their speech and listen to it in order to correct their lacuna*	*Reading software is used to facilitate reading exercises for the students*	*To enable the students to familiarize with word processor blogging*	Students are enabled to learn and pronounce stressed and unstressed words
	SLO- 2	The students will be able to converse fluently	*One will know himself where he/ she has gone wrong*	*Flow in reading will be improved*	*online publishing. Will be learnt by the students*	The practice will lead them to acquire neutral accent and understand foreign accent
S-2	SLO-1	*Students are exposed to functional language*	*Fluency and Pronunciation to be evaluated*	*The usage of phonetics will be mandated.*	Enable the students in learning situational language	Common topics in IELTS speaking test and TOFEL will be provided to assess the students.
	SLO- 2	*This exposure will help them pick up fluency*	*Their standard will measured*	*reading will be done in the class*	Create imaginary situations and students are allowed to engage in conversations	Assessments will be provided for self scrutiny
S-3 – S-4	SLO-1	*Lab 1 In the wall of Pink Floyed to be played for the students*	*Lab 4 Students are given a situation, they need to write a respond for it by writing a letter requesting information or explaining*	*Lab 7 Introduction to the conversation of a native speaker/ interview of a native speaker*	*Lab 10* learners are asked to describe some visual information(table/charts/nature) in their own word	*Lab 13students will listen to a passage and they need to give a suitable title*

			the situation			
	SLO- 2	*The students will be able to understand the isolation of a wall. It helps them to enhance their pronunciation*	*This will lead to understand the English letter conventions*	*Learners will prove the fluency by listening*	*They need to have a well organized thought of it using language accurately in a academic style.*	Assessment on their language competency and vocabulary
S-5	**SLO-1**	*They get familiarized with pronunciation styles*	*Learners to record and repeat new wordsagain and again*	*New words are to be referred in the reading passages and checked with the help of dictionaries*	*Familiarize the students with e-journals , e-guidance, e-magazines, e-Books, e-Library*	Listening topics in the IELTS listening test and TOFEL will be provided
	SLO- 2	*American and British styles are differentiated*	*Untill right prononciation isaquiredis not allowed to go to the Next session*	*Those new words are to be used in different contexts and sentences*	*Help students to access them as much as possible*	Assessment on their listening capacity is to be provided
S-6	**SLO-1**	*Listening to news bulletins and songswillbeenabled to help them to understand use of vocabulary*	*Learnerscanspeak English and compare the notes and exchange ideas*	*Comprehensive skills are enhanced and checked the level*	Enable the students to versatile writing	Reading topics in the IELTS reading test and TOFEL will be provided to assess the students.
	SLO- 2	*Will beenabled ti imitae the exact accent and prononciation*	*From the exchangedideascomprehensive questions willbeasked by the otherstudents*	*The levels are informed to the students and Icuna is explained*	Diffrerence in writing and readingisexplained	Assesment on their capacity is explained
S-7 – S-8	**SLO-1**	*Lab 2TedX will be played for the student*	*Lab 5 introduction to semi-formal/ neutral discursive essay will be taught.*	*Lab 8 television news will be broadcasted to them*	*Lab 11learners are given with a set of images where they need to write a story from it*	*Lab 14 students will listen to the great monologues of the time*
	SLO- 2	*It will help them to improve their fluency*	*It will teach them to write coherently and cohesively.*	*It will help them to understand the usage of words and the fluency of speaker*	*It helps them to keen on observation as well as to know their creativity.*	They will learn the importance of pronunciation, stress and pause in a speech
S-9	**SLO-1**	*To enable to listen to authentic sounds of the target language*	*Give different topics to debate to enable them talk fluently*	*The right pronunciation is checked with an access to articles fiction verses and speeches*	*Focus on writing is done*	writing topics in the IELTS writing test and TOFEL will be provided to assess the students.
	SLO- 2	*To enable them imitate the different sounds and accents and make them repeat it*	*To check the pace of their speech*	*Minute details and differences are marked and rectified*	*Conversational skills are enhanced*	Writing skills are assessed and tested
S-10	**SLO-1**	To enable to practice different accents focusing on intonation and voice modulation	*Dialogue delivery be checked by asking them to prepare for their own e- learning materials*	*Read and repeat passages*	Help in professionalwriting	Model IELTS and TOFEL test will be conducted for the students
	SLO- 2	The differences between intonation stress and modulations are explained	*Make the students speak and record*	*Check the ability to repeat the exact pronounciation*	Check and asses theirwritings	Assessment will be provided to the learners
S 11 - S 12	**SLO-1**	*Lab3 After listening to TedX, students need to jot down set of question.*	*Lab 6 learners will be taught to write a review for a film after watching*	*Lab 9 conversation between two people in every day context will be played for the studetns*	*Lab 12 students will listen to the writers note on publishing a novel/ short story*	*Lab 15 they will listen to grammar usage in the form of visual image and song*
	SLO- 2	This will help them to identify the key information in listening text.	*Leaner will need to think for the apt word. Through this language competency will be evaluated*	*It Will help them to understand the target language*	It will helps them to enhance their creativity also the language compétence	They will the foreign language easily and it enhances their competency of it

Learning Resources	***Theory:*** 1. Horizon- English Text Book – Compiled and Edited by the faculty of English Departement, FSH, SRMIST, 2020 2. *English Grammar in Use by Raymond Murphy* 3. *Raymond Murphy, Intermediate English Grammar, Cambridge University Press, 2007* 4. *R.P. Bhatnagar, English for Competitive Examinations, Trinity Press, 3rd Edition,2016* *5. http://www.aptitudetests.org/verbal-reasoning-test* *6. https://www.assessmentday.co.uk/aptitudetests_verbal.htm*

Learning Assessment									
Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (100% weightage)**							
		CLA – 1 (20%)		**CLA – 2 (20%)**		**CLA – 3 (30%)**		**CLA – 4 (30%)#**	
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	Remember	-	30%	-	30%	-	30%	-	30%
	Understand								
Level 2	Apply	-	30%	-	30%	-	30%	-	30%
	Analyze								
Level 3	Evaluate	-	40%	-	40%	-	40%	-	40%
	Create								
	Total	100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
	1. Prof. Daniel David, Prof & Head, Department of English, MCC, Chennai	*1. Dr. Shanthichitra, Associate Professor, & Head, Department of English, FSH,SRMIST*
		2. Dr K B Geetha, Assistant Professor, Department of English, FSH, SRMIST

Course Code	UCD20S02L	Course Name	*Quantitative Aptitude and Reasoning*	Course Category	S	*Skill Enhancement Course*	L	T	P	C
							0	0	2	1

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*Career Development Centre*	Data Book / Codes/Standards	-		

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning		
		1	2	3
CLR-1 :	*Demonstrate various principles involved in solving mathematical concepts*	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-2 :	*Develop interest and awareness in students regarding profit/ loss, interest calculations and average*			
CLR-3 :	*Critically evaluate basic mathematical concepts related to mixtures and alligations, permutation and combination, time and work*			
CLR-4 :	*Provide students with skills necessary to generate and interpret data and concepts related to time, speed and distance and blood relation.*			
CLR-5 :	*Enable students to understand reasoning skills*			
CLR-6 :	*Create awareness in students regarding the various concepts in quantitative aptitude and reasoning skills and also its importance in various competitive exams*			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	*Understand, analyze and solve questions based on numbers, logarithms.*	*3*	*80*	*70*	*H*	*H*	*M*	*H*	*L*	*M*	-	*H*	-	*H*	-	*H*	*M*	-	*H*
CLO-2 :	*Create, solve, interpret and apply basic mathematical models which are applicable in our day to day life*	*3*	*80*	*75*	*M*	*H*	*M*	*H*	-	*M*	-	*H*	-	*H*	-	*H*	*M*	-	*H*
CLO-3 :	*Understand the concepts of mixtures and alligations, permutation and combinations, probability, time and work and to approach questions in a simpler and innovative method*	*3*	*85*	*70*	*M*	*H*	*M*	*H*	-	*M*	-	*H*	-	*H*	-	*H*	*M*	-	*H*
CLO-4 :	*Understand the concept in time ,speed and distance*	*3*	*85*	*80*	*M*	*H*	*M*	*H*	-	*M*	-	*H*	-	*H*	-	*H*	*M*	-	*H*
CLO-5 :	*Ability to solve the problems on reasoning*	*3*	*85*	*75*	*M*	*H*	*M*	*H*	-	*M*	-	*H*	-	*H*	-	*H*	*M*	-	*H*
CLO-6 :	*Able to face different competitive exams*	*3*	*80*	*70*	*M*	*H*	*M*	*H*	-	*M*	-	*H*	-	*M*	-	*H*	*M*	-	*H*

Duration (hour)		6	6	6	6	6
S-1	SLO-1	Classification of numbers	Profit and Loss-Introduction	Mixtures and Alligations-Introduction	Time, Speed and Distance-Problems on Trains	Direction Sense-Introduction
	SLO-2	Test of divisibility	Profit and Loss- Basic Problems	Mixtures and Alligations-Problems	Time, Speed and Distance-Boats & Streams	Direction Sense-Problems
S-2	SLO-1	Unit digit	Statistics-Introduction	Permutation –Introduction& Basics	Data Interpretation – Bar chart	Number Series
	SLO-2	Tailed zeroes	Statistics-Mean, Median, Mode	Combination-Introduction& Basics	Data Interpretation – Pie chart	Word Series
S-3	SLO-1	HCF, LCM	Simple Interest-Introduction,Formulas &Problems	Probability-Introduction &Basics	Data Interpretation – Table	Seating Arrangements - Linear
	SLO-2	HCF, LCM - Solving problems	Compound Interest-Introduction ,Formulas &Problems	Probability-Problems	Data Interpretation – Line graph	Seating Arrangements - Circular
S-4	SLO-1	Logarithm –Introduction of log rules	Word problems on Line equations-Introduction	Time and work-Introduction	Data sufficiency-Introduction and Basics	Puzzles-Concepts

	SLO-2	Logarithm –Applications of log rules	Word problems on Line equations-Basic problems	Time and work-Men and Work	Data sufficiency-Problems	Puzzles-Problems
S-5	SLO-1	Percentage -Introduction	Averages-Introduction & Basics	Time and work-Pipes &Cisterns(Introduction)	Blood relation-Introduction	Clocks-Concepts Discussion
	SLO-2	Percentage- Basic problems	Averages-Tricky Problems	Time and work-Pipes &Cisterns(Problems)	Blood relation-Problems	Clocks-Problems
S-6	SLO-1	Percentage-Increasing & Decreasing functions	Ratio and Proportions-Introduction	Time, Speed and Distance-Introduction	Coding – Decoding-Introduction	Calendars-Introduction of basic concept
	SLO-2	Percentage- Miscellaneous problems	Ratio and Proportions-Basics & problems	Time, Speed and Distance-Basic problems	Coding – Decoding-Different types	Calendars-Problems

Learning Resources	1. Abhijit Guha, Quantitative Aptitude for Competitive Examinations, Tata McGraw Hill, 5th Edition 2. Dr. Agarwal.R.S, Quantitative Aptitude for Competitive Examinations, S. Chand and Company Limited, 2018 Edition 3. Archana Ram, PlaceMentor: Tests of Aptitude for Placement Readiness, Oxford University Press, Oxford, 2018	4. Edgar Thrope, Test Of Reasoning for Competitive Examinations, Tata McGraw Hill, 6th Edition 5. Dinesh Khattar, The Pearson Guide to Quantitative Aptitude for competitive examinations, Pearson, 3rd Edition *6. P A Anand, Quantitative Aptitude for competitive examinations, Wiley publications, e book, 2019*

Learning Assessment					
Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (100% weightage)**			
		CLA-1 (20%)	**CLA-2 (20%)**	**CLA-3 (30%)**	**CLA-4 (30%) ##**
		Practice	**Practice**	**Practice**	**Practice**
Level 1	Remember	10%	10%	30%	15%
	Understand				
Level 2	Apply	50%	50%	40%	50%
	Analyze				
Level 3	Evaluate	40%	*40%*	30%	35%
	Create				
	Total	100 %	100 %	100 %	100 %

CLA-1, CLA-2 and CLA-3 can be from any combination of these: Online Aptitude Tests, Classroom Activities, Case Studies, Poster Presentations, Power-point Presentations, Mini Talks, Group Discussions, Mock interviews, etc.
CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
1. Ajay Zener, Director, Career Launcher	-	*1. Dr. P Madhusoodhanan, HoD, CDC, E&T, SRMIST*
		2. Dr. M Snehalatha, Assistant. Professor, CDC, E&T, SRMIST

SEMESTER III

Course Code	UBT20301J	Course Name	ENZYMOLOGY	Course Category	C	Professional Core Course	L	T	P	C
							4	0	4	6

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards	Nil		

		Learning			Program Learning Outcomes (PLO)														
Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	*1*	*2*	*3*	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*100*	*11*	*12*	*13*	*14*	*15*
		Level of Thinking (Bloom)	*Expected Proficiency (%)*	*Expected Attainment (%)*	*Fundamental Knowledge*	*Problem Analysis*	*Design & Development*	*Analysis, Design, Research*	*Modern Tool Usage*	*Society & Culture*	*Environment & Sustainability*	*Ethics*	*Individual & Team Work*	*Communication*	*Project Mgt. & Finance*	*Life Long Learning*	*PSO - 1*	*PSO - 2*	*PSO – 3*
CLR-1 :	Understanding the classification of enzymes & properties																		
CLR-2 :	understanding the techniques used for purification of enzymes																		
CLR-3 :	Knowledge on enzyme involvement in lowering activation energy																		
CLR-4 :	Knowledge on different inhibitors and its role																		
CLR-5 :	Understanding the importance of coenzymes																		
CLR-6 :	Candidates acquire knowledge about the enzyme role and its importance																		
Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*																		
CLO-1 :	Sound knowledge on enzyme classification, nomenclature	*3*	*80*	*70*	*H*	*M*	*L*	*L*	*-*	*-*	*-*	*-*	*L*	*L*	*L*	*H*	*-*	*-*	*-*
CLO-2 :	Application of techniques for isolation and purification of enzymes	*3*	*85*	*75*	*H*	*H*	*H*	*H*	*H*	*-*	*-*	*-*	*H*	*H*	*H*	*H*	*-*	*-*	*-*
CLO-3 :	Knowledge on active site amino acids in reactions	*3*	*75*	*70*	*H*	*H*	*H*	*H*	*H*	*-*	*-*	*-*	*H*	*H*	*H*	*H*	*-*	*-*	*-*
CLO-4 :	Applying knowledge to design drugs	*3*	*85*	*80*	*H*	*H*	*H*	*H*	*H*	*-*	*-*	*-*	*H*	*H*	*H*	*H*	*-*	*-*	*-*
CLO-5 :	knowledge on coenzymes	*3*	*85*	*75*	*H*	*H*	*L*	*M*	*L*	*-*	*-*	*-*	*M*	*M*	*M*	*L*	*-*	*-*	*-*
CLO-6 :	Overall understanding the importance and activity of enzymes	*3*	*85*	*75*	*H*	*L*	*L*	*L*	*L*	*-*	*-*	*-*	*H*	*L*	*L*	*L*			

Duration (hour)		24	24	24	24	24
S-1	SLO-1	Classification - IUB system	Biological methods	Activation energy	Kinetics introduction	Introduction-coenzymes
	SLO-2					
S-2	SLO-1	Classification - IUB system	Preliminary purification	Acid- base catalysis	Michaelis Menten Equation	Structure of coenzymes
	SLO-2					Functions of coenzymes
S-3	SLO-1	Classification - IUB system	purification of soluble enzymes-chromatography	covalent catalysis	Michaelis Menten Equation	NAD
	SLO-2			Metal ion		
S-4	SLO-1	Characteristics of enzymes	purification of soluble enzymes-chromatography	proximity	Signifiicance of MM equation	NADP
	SLO-2					
S 5-8	SLO-1	Preparation of buffer.	Calculation for enzyme and specific activity of enzyme	Estimation of protein- urease	Optimum temperature determination- urease	Repetition lab
	SLO-2					
	SLO-3					
	SLO-4					

S-9	SLO-1	Factors affecting enzyme action- Effect of temperature, pH and substrate concentration on reaction rate.	purification of soluble enzymes- electrophoresis	orientation	Modifications of MM Equation	FAD
	SLO-2					
S-10	SLO-1	Factors affecting enzyme action- Effect of temperature, pH and substrate concentration on reaction rate.	purification of soluble enzymes- electrophoresis	Introduction- Chymotrypsin structure	Lineweaver Burk plot	FMN
	SLO-2					
S-11	SLO-1	Enzyme specificity: Group specificity	Purification of membrane bound enzymes-chromatography	Chymotrypsin mechanism	Eadie Hofstee plots	TPP
	SLO-2	absolute specificity	Purification of membrane bound enzymes- electrophoresis			
S-12	SLO-1	Stereo-Specificity	Purification of membrane bound enzymes-electrophoresis	Chymotrypsin structure	Inhibition introduction	Pyridoxal phosphate
	SLO-2	Stereo-Specificity				
S 13-16	SLO-1	Estimation of protein	Optimum pH determination- protease	Enzyme activity of urease	Optimum temperature determination- urease	Repetition lab
	SLO-2					
	SLO-3					
	SLO-4					
S-17	SLO-1	Introduction in to lock and key Hypothesis	Enzyme Immobilization – methods	Application of chymotrypsin	Reversible inhibition- competetive	Lipoic acids
	SLO-2				uncompetitive	
S-18	SLO-1	induced fit Hypothesis	Enzyme Immobilization – Applications	Functions of chymotrypsin	Non-competitive	THF
	SLO-2					
S-19	SLO-1	induced fit Hypothesis	Importance of enzyme immobilization	Discussion on various enzyme structures	Irreversible inhibiton	Vitamin B12- structure
	SLO-2					
S-20	SLO-1	Physical and chemical methods of isolation	Industrial application of immobilized enzymes.		allosteric inhibition	Functions of Vitamin B12
	SLO-2				feedback inhibition	
S 21-24	SLO-1	Enzyme activity of protease	Optimum temperature determination- protease	Optimum pH determination- urease	Affinity chromatography	Model Exam
	SLO-2					

Learning Resources	1. Nicholas C. Price and Lewis Stevens, *"Fundamentals of Enzymology"*, Oxford University Press, 2003. 2. Trevor Palmer and Philip Bonner, *"Enzymes - Biochemistry, Biotechnology, Clinical chemistry"*, 2nd edition, East-West Press Pvt. Ltd, 2004.	1. Lehninger, Nelson and Cox, *"Principles of biochemistry"*, 6th edition, W.H. Freeman & Company,2013. 2. Prakash M., DigmartiBhaskaraRao,Jena T, Enzyme Biotechnology, 1st edition, Discovery Publication, 2010.

Learning Assessment											
	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	1. Mrs. Vijayabharathi

Course Code	UBT20302J	Course Name	BIOPHYSICS & BIOINSTRUMENTATION	Course Category	C	Professional Core Course	L	T	P	C
							4	0	4	6

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Understanding the structure genome, chromosome and DNA
CLR-2 :	Understanding the concepts of central dogma
CLR-3 :	Knowledge on repairs and mutagens
CLR-4 :	Knowledge on gene regulation
CLR-5 :	Learning recent advances on techniques employed in molecular biology
CLR-6 :	Candidates understanding on fundamentals of microbiology useful for industry and academia

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Problem Analysis	Design & Development	Analysis, Design,Research	Modern Tool Usage	Society & Culture	Environment &Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO- 1	PSO- 2	PSO– 3
CLO-1 :	Learning about structure of DNA, chromosome and genome	3	80	70	H	-	-	M	-	-	-	-	L	L	-	H	-	-	-
CLO-2 :	Knowledge on central dogma useful for basic understanding of molecular biology	3	85	75	H	H	H	H	H	-	-	-	M	L	-	H	-	-	-
CLO-3 :	Knowledge on repairs and mutations necessary for applying during studies on DNA	3	75	70	H	-	-	H	-	-	-	-	M	L	-	H	-	-	-
CLO-4 :	Applying knowledge regulation during protein expression studies	3	85	80	H	-	-	H	-	-	-	-	M	L	-	H	-	-	-
CLO-5 :	Having updation on newer aspects of research in molecular biology	3	85	75	H	H	H	H	H	-	-	-	M	L	-	H	-	-	-
CLO-6 :	Overall understanding and application of molecular biological concepts in the progress of industry and academics	3	80	70	H	H	H	H	H	-	-	-	L	L	-	H	-	-	-

Duration (hour)		24	24	24	24	24
S-1	SLO-1	Principle of UV-Vis	Instrumentation and application of AAS	Instrumentation & application of HPLC	Principle of electrophoresis	Radioisotopes
S-2	SLO-1	Beer Lamberts law	Principle of chromatography- Rf values	Revision of concepts	Principle of electrophoresis	Introduction into Radioactivity
S-3	SLO-1	Instrumentation of UV-Vis	Instrumentation and application of Paper chromatography	Principle of centrifugation	Agarose gel electrophoresis	Decay
S-4	SLO-1	Application of UV-Vis	Principle of TLC	Types of centrifuge	SDS PAGE	Calculation of t1/2
S 5-8	SLO-1	GLP-1	Agarose Electrophoresis.	Native gel	Western blotting	Protein dialysis
	SLO-2					
S-9	SLO-1	Fluorescence Spectroscopy	Preparation of plates, separation process	Preparative	Applications of electrophoresis	Principle of GM counter
S-10	SLO-1	Principle of Mass spectroscopy	Application of TLC	Analytical	Isoelectric focusing	Instrumentation and application of GM counter

S-11	SLO-1	*Instrumentation of Mass spectroscopy, Application*	*Concepts in chromatography- Theoritical plates, void volumes, Dead Time*	*Density gradient*	*Instrumentation of 2 D electrophoresis*	*Scintillation Counter- Principles*
S-12	SLO-1	*Principle of Nuclear magnetic resonance*	*Principle Gel filtration chromatography*	*Application of density gradient*	*Staining of 2D gels*	*Applications of Scintillation counter*
S 13-16	SLO-1 SLO-2	*Column Chromatography.*	*SDS- PAGE*	*Differential Centrifugation.*	*Western blotting*	*Protein dialysis*
S-17	SLO-1	*Principle of Nuclear magnetic resonance*	*Instrumentation of GFC, Application*	*Differential*	*Application of 2D gels*	*Autoradiography*
S-18	SLO-1	*Instrumentation of Nuclear magnetic resonance*	*Principle of Ion exchange chromatography*	*Introduction to Cell disintegration-*	*Principle of Native gel electrophoreis*	*Use of radio isotopes in Life Sciences*
S-19	SLO-1	*Application of NMR*	*Affinity Chromatography*	*Types of disintegration*	*Application of Native gel*	*Safety aspects involved in handling radioisotopes*
S-20	SLO-1	*Principle of Atomic absorption spectroscopy*	*Principle of HPLC*	*Types of disintegration*	*Discussion*	*Revision of all concepts*
S 21-24	SLO-1 SLO-2	*Agarose Electrophoresis.*	*SDS- PAGE*	*Study of UV – Visible Spectroscopy*	*Blotting-Result and Discussion*	*Model exam*

Learning Resources	1. *Wilson and Walker's Principles and Techniques of Biochemistry and Molecular Biology. Edited by Andreas Hoffmann.* Cambridge University Press, 2018.

Learning Assessment

	Bloom's Level of Thinking	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (10%)**		**CLA – 3 (20%)**		**CLA – 4 (10%)#**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	DR. N. PRASANTH BHATT, SRM IST

Course Code	UBT20G01T	Course Name	MICROBIAL PHYSIOLOGY	Course Category	G	*Generic Elective Courses*	L	T	P	C
							4	0	0	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Understanding the use of nutrients microorganisms			
CLR-2 :	Understanding the different mode of nutrients uptake of microorganism			
CLR-3 :	Understanding the biosynthesis of bacteria			
CLR-4 :	Knowledge on photosynthetic metabolism of microorganisms			
CLR-5 :	Knowledge on microbial adaptation to nutrient stress			
CLR-6 :	Overall understanding and knowledge on microbial physiology and metabolism			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)															
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	*Describing the growth characteristics of the microorganisms*	2	80	70	*H*	-	-	*H*	-	-	L	-	-	M	-	H	H	H	H
CLO-2 :	*Learning basic mode of nutrient transport in microorganism*	3	85	75	*H*	*H*	*H*	*H*	*H*	-	L	-	-	M	-	H	H	H	H
CLO-3 :	*Applying knowledge biosynthesis of bacterial functional organelles*	3	75	70	*H*	-	-	*H*	-	-	L	-	-	M	-	H	H	H	H
CLO-4 :	*Applying knowledge on photosynthetic metabolism of microorganisms*	3	85	80	*H*	-	-	*H*	-	-	L	-	-	M	-	H	H	H	H
CLO-5 :	*Having knowledge on nutrient adaption of microorganisms.*	3	85	75	*H*	*H*	*H*	*H*	*H*	-	L	-	-	M	-	H	H	H	H
CLO-6 :	*Overall understanding on characteristics of the microorganisms which require different nutrient for growth and the associated mechanisms of energy generation.*	3	80	70	*H*	*H*	*H*	*H*	*H*	-	L	-	-	M	-	H	H	H	H

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		12	12	12	12	12
S-1	SLO-1	Introduction	Nutrient transport	Aerobic respiration	Photosynthesis- Introduction	Adaptation-Introduction
S-2	SLO-1	Nutrients-types	Active and passive diffusion	Pathway-EMP	Metabolism of autotrophs	Two component system
S-3	SLO-1	Microbial growth	Facilitated diffusion	Pathway-PPP	Types of photosynthetic prokaryotes- Oxygenic	Response to physiological stress
S 4	SLO-1	Growth curve	simple transport	Electron transport chain	Anoxygenic photosynthetic bacteria	aerobic-anaerobic shifts
S-5	SLO-1	Measurement of microbial growth	Group translocation	Alcoholic fermentation	Mechanism of photosynthesis	Arc and Fnr system
S 6	SLO-1	Bactch culture	Protein export system	Mixed acid fermentation	Cyanobacteria	Arc and Fnr system
S-7	SLO-1	Continuous culture	Iron uptake	Lactic acid fermentation	CO2 fixation	Response to nutritional stress

S -8	SLO-1	synchronous culture	Factors influencing microbial growth	Biological nitrogen fixation- Symbiotic	Green sulfer bacteria	phosphate supply and regulation
S -9	SLO-1	Sporulation	Microbial reserve compound	N_2 fixation- Nonsymbiotic	Microbial fuel- introduction	Stringent response
S-10	SLO-1	Endospore formation	Siberosphores	Nitrogen assimilation	Microbial fuel- production	Stringent response
S-11	SLO-1	Physiological aspect of sporulation	Bacterial bio film	Sulfate assimilation	Nutritional types of microorganisms	Revision on stress response
S-12	SLO-1	Genetic aspect of sporulation	Bacterial bio film	Sulfate assimilation	Nutritional types of microorganisms	Revision on stress response

Learning Resources	***Theory:*** 1. Prescott, Harley and Klein, "Microbiology", McGraw Hill publications, Fifth edition, 2003. 2. S. Meenakumari, Microbial Physiology, MJP publishers

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	*DR. D. THIRUMURUGAN, SRMIST*

Course Code	UBT20D01T	Course Name	MATHEMATICAL CALCULATIONS IN BIOLOGY	Course Category	E	Discipline Specific Elective Courses	L	T	P	C
							4	0	0	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards	Graph sheet needed; t, F and χ^2 table is needed		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning	Program Learning Outcomes (PLO)

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Knowledge on GLP and significant digits			
CLR-2 :	Knowledge onsolution and mixtures			
CLR-3 :	Knowledge on growth kinetics			
CLR-4 :	Knowledge on nucluiec acid quantification			
CLR-5 :	Knowledge on protein quantification			
CLR-6 :	Overall Knowledge On Using Mathematics In Biotechnology			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Scientific Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Learning on GLP and digits	3	85	80	L	L	L	M	L	-	-	-	L	M	H	M	-	-	-
CLO-2 :	Learning on calculation in solution and mixtures	3	80	75	M	H	M	M	M	-	-	-	M	M	H	M	-	-	-
CLO-3 :	Calculation on growth kinetics	3	85	80	H	H	M	H	M	-	-	-	M	M	H	H	-	-	-
CLO-4 :	Learning calculations on nucleic acids and DNA	3	85	80	M	H	M	H	M	-	-	-	M	M	H	H	-	-	-
CLO-5 :	Learning calculations on proteins	3	85	80	H	H	M	H	H	-	-	-	M	M	H	M	-	-	-
CLO-6 :	Learning basic calculations used on a daily basis in biotechnology laboratories	3	75	80	H	H	M	H	M	-	-	-	M	M	H	M	-	-	-

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		12	12	12	12	12
S-1	SLO-1	Introduction to mathematics in biology	concentrations by factor of X	manipulating cell concentration	Determination of concentration of dsDNA	Protein concentration Bradford assay
S-2	SLO-1	History of GLP	percent solutions	calculating generation time	Determination of concentration of dsDNA	Protein quantification by absorbance A280
S-3	SLO-1	Definition of GLP	Diluting percent solutions	calculating generation time	Determination of concentration of ssDNA	Protein quantification by absorbance A205
S 4	SLO-1	Significant digits	Moles and molecular weight	plotting OD vs time on a graph	Determination of concentration of RNA	absorbance coefficient
S-5	SLO-1	Significant digits	Molarity, Gram equivalents	Measuring cell concentration on a hemocytometer	purity of DNA	absorbance coefficient
S 6	SLO-1	converting numbers from scientific to decimal notations	Diluting molar solutions	Measuring cell concentration on a hemocytometer	oligonucleotide quantification	extinction coefficient

S-7	SLO-1	*converting numbers from scientific to decimal notations*	*conversion of molarity to percent solutions*	*Measuring cell concentration on a hemocytometer*	*determination of molecular weight*	*importance of extinction coefficient*
S -8	SLO-1	*conversion factors*	*conversion of % solutions to molarity*	*Multiplicity of phage infection*	*Molarity of DNA*	*specific activity of enzyme*
S -9	SLO-1	*Canceling terms*	*Normality*	*Measuring phage titer*	*nucleic acid length*	*specific activity of enzyme*
S-10	SLO-1	*Discussion on overall notations and clarifications*	*pH & pOH*	*Diluting bacteriophage*	*Problem solving questions*	*Problem solving questions*
S-11	SLO-1	*Calculating dilutions*	*Problem solving questions*	*Problem solving questions*	*Discussion of problems*	*Discussion on problems solved*
S-12	SLO-1	*concentrations by factor of X*	*Discussion of problems*	*Discussion on problems solved*	*Discussion of problems*	*Discussion on problems solved*

Learning Resources	*Theory:* *1.* Calculations for Molecular Biology and Biotechnology- A guide to mathematics in the laboratory". by Frank H. Stephenson. Academic Press- 2nd Edition (2014)

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.

Course Designers		
Experts from Academic		Internal Experts
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	Dr N. PRASANTH BHATT

Course Code	*UBT20S01T*	Course Name	DIAGNOSTIC TOOLS	Course Category	S	Skill Enhancement Courses	L	T	P	C
							2	0	0	2

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning	Program Learning Outcomes (PLO)

		1	2	3
CLR-1 :	Understanding the scope and significance of diagnostic products			
CLR-2 :	Understanding the principles of disease diagnosis			
CLR-3 :	Knowledge on ELISA and Immunoflorescence			
CLR-4 :	Knowledge on disease specific biomarkers			
CLR-5 :	Learning about DNA fingerprinting and its applications			
CLR-6 :	Learning the use and applications of diagnostic tools			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	1 Fundamental Knowledge	2 Problem Analysis	3 Design & Development	4 Analysis, Design, Research	5 Modern Tool Usage	6 Society & Culture	7 Environment & Sustainability	8 Ethics	9 Individual & Team Work	10 Communication	11 Project Mgt. & Finance	12 Life Long Learning	13 PSO - 1	14 PSO - 2	15 PSO – 3
CLO-1 :	To understand the scope and significance of diagnostic industry	2	80	70	*H*	-	-	-	-	-	-	-	-	-	-	-	*H*	*H*	*H*
CLO-2 :	To understand the tools used for diagnosis of various diseases	3	85	75	*H*	-	*H*	*H*	*H*	-	-	-	-	-	--	-	*H*	*H*	*H*
CLO-3 :	Applying knowledge on various diagnostic techniques	3	75	70	*H*	-	*H*	*H*	*H*	-	-	-	-	-	-	-	*H*	*H*	*H*
CLO-4 :	Having knowledge on biomarkers and its applications	3	85	80	*H*	-	*H*	*H*	*H*	-	*H*	-	-	-	-	-	*H*	*H*	*H*
CLO-5 :	Applying knowledge to use transcriptomes and proteomes as biomarkers	3	85	75	*H*	-	*H*	*H*	*H*	-	*H*	-	-	-	-	-	*H*	*H*	*H*
CLO-6 :	Overall understanding of diagnostic tools and its applications in biotechnology	3	80	70	*H*	-	*H*	*H*	*H*	-	*H*	-	-	-	-	-	*H*	*H*	*H*

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		6	6	6	6	6
S-1	SLO-1	Diagnostic industry - introduction	Enzyme assays- Invasive	ELISA	Biomarkers	DNA finger printing
S-2	SLO-1	Diagnostic industry – scope	Enzyme assays- Non – invasive	ELISA - direct,	Disease specific biomarkers	RFLP
S-3	SLO-1	Diagnostic industry - significance	Blood sample analysis for disease diagnosis	ELISA – indirect	Disease specific biomarkers	RAPD
S 4	SLO-1	Medical products	Urine sample analysis for disease diagnosis	ELISA – sandwich	Techniques for identification of disease markers.	Use of transcriptomes as diagnostic markers
S-5	SLO-1	Diagnostic products	Imaging techniques for diagnosis	Immunofluorescence	Techniques for identification of disease markers.	Use of proteomes as diagnostic markers
S 6	SLO-1	Diagnostic products	Imaging techniques for diagnosis	Immunofluorescence	Techniques for identification of disease markers.	Use of proteomes as diagnostic markers

Learning Resources	1. *Immunology and Immunobiotechnology Ashim K Chakravarty, Oxford University Press, 2006.* 2. *Cell and Molecular Biology: De Robertis EDP and De Robertis EMF.* 3. *Molecular Biology of the Cell (5th edition) Bruce Alberts, Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, Peter Walter. Garland Science Publications*

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	*Dr. G. SWAMYNATHAN, SRMIST*

Course Code	*UBT20S02T*	Course Name	ENTREPRENEURSHIP IN BIOTECHNOLOGY	Course Category	S	Skill Enhancement Courses	L	T	P	C
							2	0	0	2

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Understanding the scope and concept of entrepreneurship
CLR-2 :	Understanding the principles of sales and marketing
CLR-3 :	Knowledge on funding agencies for start ups and their roles
CLR-4 :	Knowledge on biotechnological sectors for start ups
CLR-5 :	Learning about start ups in pharma and clinical research
CLR-6 :	Developing the qualities of innovation and problem solving

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning: Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	PLO 1: Fundamental Knowledge	PLO 2: Problem Analysis	PLO 3: Design & Development	PLO 4: Analysis, Design, Research	PLO 5: Modern Tool Usage	PLO 6: Society & Culture	PLO 7: Environment & Sustainability	PLO 8: Ethics	PLO 9: Individual & Team Work	PLO 10: Communication	PLO 11: Project Mgt. & Finance	PLO 12: Life Long Learning	PLO 13: PSO - 1	PLO 14: PSO – 2	PLO 15: PSO – 3
CLO-1 :	*To understand and develop entrepreneurial traits*	2	80	70	*H*	*H*	-	*H*	-	-	-	-	*H*	-	-	-	-	-	-
CLO-2 :	*To develop managing and marketing skills*	3	85	75	*H*	*H*	*H*	*H*	-	-	-	-	-	-	-	-	-	-	-
CLO-3 :	*Applying knowledge to identify start up ideas*	3	75	70	*H*	-	-	*H*	-	-	-	-	-	-	-	-	-	-	-
CLO-4 :	*Having knowledge on modern biotechnological sectors for start ups*	3	85	80	*H*	-	*H*	*H*	-	-	*H*	-	-	-	-	*H*	-	-	-
CLO-5 :	*Applying knowledge to create and maintaining a start up*	3	85	75	*H*	-	*H*	*H*	-	-	*H*	-	-	-	-	*H*	-	-	-
CLO-6 :	*Overall understanding of entrepreneurship opportunities in biotechnology*	3	80	70	*H*	-	*H*	*H*	-	-	*H*	-	*H*	-	-	*H*	-	-	-

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		6	6	6	6	6
S-1	SLO-1	Entrepreneurship – Concept	Management principles	Funding agencies for start ups	Agricultural sector, food and nutrition	Start ups - drug designing
S-2	SLO-1	Entrepreneurship – Scope	Management principles	Funding agencies - types	Mushroom cultivation, polyhouse	Pharma companies
S-3	SLO-1	Entrepreneurial traits,	Functions of a manager	Funding agencies - roles	Dairy farming	Diagnostic labs
S 4	SLO-1	Creativity	Concept of sales	Governmental institutions for start ups	Apiculture	Clinical research
S-5	SLO-1	Innovation	Concept of marketing	Governmental institutions - types	Organic formulation	Waste management- solid, biogas
S 6	SLO-1	Problem solving games	Problem development	Governmental institutions - roles	Animal feed	Vermicomposting

Learning Resources	***Theory:*** 1. *Craig Shimasaki, (2014)."Biotechnology Entrepreneurship: Starting, Managing, and Leading Biotech Companies" Academic Press.* 2. *David H. Holt, (1991). "Entrepreneurship: New Venture Creation" Prentice-Hall.*	***Reference:*** 1. *Getting started in Entrepreneurship. Jack M. Kaplan* 2. *Essentials of Management. H. Koontz, H. Weihrich.*

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	*Dr. G. SWAMYNATHAN, SRMIST*

Course Code	UJK20301T	Course Name	Universal Human Values	Course Category	JK	Life Skill Course	L	T	P	C
							2	0	0	2

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	English		Data Book / Codes/Standards	Nil	

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
CLR-1 :	To generate in students a sensitivity to current regional and national issues such as gender marginalization Eco sensitivity, vision for the Nation and general humanness	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-2 :	An expanded consciousness with a mind to accommodate all is developed			
CLR-3 :	The ability to accept all and to co- exist is initiated			
CLR-4 :	To create community connectivity and interdependence			
CLR-5 :	To instill intrinsic link between freedom and responsibility for both individuals and communities			
CLR-6 :	Make them learn the basic nature of human beings			

Course Learning Outcomes (CLO): *At the end of this course, learners will be able to:*

		Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	PSO -1	PSO -2	PSO-3
CLO-1 :	Become sensitive toward every living life and be able to respect every religion recognizing the universal values	2	75	60	H	H	H	H	-	-	-	H	H	H	H	H	-	-	-
CLO-2 :	Every way of life and culture will kindle the curiosity in them to know them and will be able appreciate the beauty in it	2	80	70	H	H	H	H	-	-	-	H	H	H	H	H	-	-	-
CLO-3 :	The presumptuous or prejudiced mentality will be overcome by them	2	70	65	H	H	H	H		-	-	-	-	-	-	-	-	-	-
CLO-4 :	Critical thinking and accommodative nature will become so natural way of thinking for them	2	70	70	H	H	H	H	H	-	-	-	-	-	H	-	-	-	-
CLO-5 :	They will become aware of the social inequalities and justice	2	80	70	H	H	-	H	-	-	-	-	-	-	-	-	-	-	-
CLO-6 :	Will be able to explore their own emotions, hopes & fear and be able to describe them verbally	2	75	70	H	H	H	H	H	H	H	H	H	H	H	H	H	H	H

Duration (hour)		06	06	06	06	06
S-1	SLO-1	What is love? Forms of love. For self, parents, family, friends, spouse, community, nation, humanity and other beings, both for living and non living	*Love compassion empathy sympathy and non violence*	*Narratives and anecdotes from history, literature including local folklore*	*What will learners lose if they don't practice love and compassion?*	*Sharing learners' individual and/ or group experiences*
	SLO-2	Love and Compassion inter relatedness	*Individuals who are remembered in history for practicing compassion and love*	*Practicing Love and Compassion: what will they gain if they practice compassion?*	*Simulated situations*	Case studies

S-2	**SLO-1**	*What is Truth ?*	*Universal truth, truth as value, as fact,*	*Veracity, sincerity, honesty among others*	Individuals who are remembered in the history who have practiced these values	Practicing truths
	SLO-2	*: what will they gain if they practice truth*	*What will learners lose if they don't practice truth?*	*Sharing learners' individual and/ or group experiences*	*Simulated situations*	Case studies
S-3	**SLO-1**	*What is non violence – its need, love compassion,*	*empathy sympathy for others as pre- requisites for non- violence*	**Ahimsa as non violence and non killing**	*Individuals and their organizations which are known for their commitment for non violence*	Narratives and anecdotes about non violence from history and literature including local folklore
	SLO-2	Practicing non violence	*What will they gain if they practice non violence*	*What will learners lose if they don't practice non violence?*	*Simulated situations*	Case studies
S-4	**SLO-1**	*What is righteousness ?*	*Righteousness and Dharma*	*Righteousness and priority*	Individuals who are remembered in the history who have practicing righteousness.	Narratives and anecdotes about Righteousness from history and literature including local folklore
	SLO-2	Practicing *Righteousness*	*: Sharing learners' individual and/ or group experiences*	*what will learners lose if they don't practice Righteousness*	*Simulated situations*	Case studies
S-5	**SLO-1**	*What is peace?*	*Need of peace in Relation with harmony and balance*	Narratives and anecdotes about peace from history and literature including local folklore	Individuals who are remembered in the history who have practicing peace	Practicing peace
	SLO-2	*What will they gain if they practice peace*	*what will learners lose if they don't practice peace*	*Sharing learners' individual and/ or group experiences*	*Simulated situations*	Case studies
S-6	**SLO-1**	What is service and renunciation	*Forms of service , & renunciation Individuals who have recommended service in history*	*Practicing service and renunciation*	Narratives and anecdotes about Service & renunciation from history and literature including local folklore	Individuals who are remembered in the history who have practicing renunciation
	SLO-2	*Sharing learners' individual and/ or group experiences on renunciation*	*Sharing learners' individual and/ or group experiences on service*	*what will learners lose or gain if they do/don't practice Renunciation and service*	*Simulated situations*	Case studies

Learning Resources	***Theory:*** 1. "Universal Human Values: Text Book"– Compiled and Edited by the Faculty of Science and Humanites, SRMIST, 2020.

Learning Assessment									
Level	Bloom's Level of Thinking	Continuous Learning Assessment (100% weightage)							
		CLA – 1 (20%)		CLA – 2 (20%)		CLA – 3 (30%)		CLA – 4 (30%) #	
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	40%	-	40%	-	40%	-	40%	-
	Understand								
Level 2	Apply	40%	-	40%	-	40%	-	40%	-
	Analyze								
Level 3	Evaluate	20%	-	20%	-	20%	-	20%	-
	Create								
	Total	100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
	1. Prof. Daniel David, Prof & Head, Department of English, MCC, Chennai	*1. Dr. Shanthichitra, Associate Professor, & Head, Department of English, FSH,SRMIST*
		2. Dr K B Geetha, Assistant Professor, Department of English, FSH, SRMIST

SEMESTER IV

Course Code	UBT20401J	Course Name	BIOPROCESS TECHNOLOGY	Course Category	C	Professional Core Course	L	T	P	C
							4	0	4	6

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning
CLR-1 :	Understanding the basic concepts of bioprocess technology	1
CLR-2 :	Understanding the techniques used for fermentation	2
CLR-3 :	Knowledge on bioreactor	3
CLR-4 :	Knowledge on the types of fermentation	
CLR-5 :	Knowledge on industrial production	
CLR-6 :	Understanding on downstream processing	

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	To understand the methods of strain improvement	3	80	70
CLO-2 :	Having knowledge on design of bioreactor	3	85	75
CLO-3 :	Applying knowledge to understand the techniques of screening microbes	3	75	70
CLO-4 :	Understand about the microbial kinetics	3	85	80
CLO-5 :	Having knowledge on downstream processing methods	3	85	75
CLO-6 :	Overall understanding and application of bioprocess technology	3	80	70

Program Learning Outcomes (PLO)	1 Fundamental Knowledge	2 Problem Analysis	3 Design & Development	4 Analysis, Design,Research	5 Modern Tool Usage	6 Society & Culture	7 Environment &Sustainability	8 Ethics	9 Individual & Team Work	10 Communication	11 Project Mgt. & Finance	12 Life Long Learning	13 PSO- 1	14 PSO- 2	15 PSO– 3
CLO-1 :	L	H	H	H	L	-	-	-	L	L	-	H	-	-	-
CLO-2 :	M	H	L	M	L	-	-	-	M	L	-	H	-	-	-
CLO-3 :	M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-4 :	M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-5 :	H	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-6 :	L	H	M	H	L	-	-	-	L	L	-	H	-	-	-

Duration (hour)		24	24	24	24	24
S-1	SLO-1	Microbial growth kinetics: Introduction	Media preparation	Introduction to Bioprocess Technology	Downstream processing Introduction	Industrial Bioprocesses: Introduction
	SLO-2	Microbial growth kinetics: Introduction	Media preparation	Introduction to Bioprocess Technology	Downstream processing Introduction	Industrial Bioprocesses: Introduction
S-2	SLO-1	Batch reactors	Media preparation	History	Downstream processing Introduction	Ethanol production
	SLO-2	Batch reactors-	Media preparation	scope	Introduction into Cell disruption	Ethanol production

S-3	SLO-1	continuous reactors	sterilization	Modes of Operation of fermenter	Cell disruption	Citric acid production
	SLO-2	continuous reactors	sterilization	Modes of Operation of fermenter	Cell disruption methods	Citric acid production
S-4	SLO-1	Applications of reactors	Inoculum preparation	Batch reactor	Cell disruption methods	Pencillin production
	SLO-2	Applications of reactors	Inoculum preparation	Batch reactor	Cell disruption application	Pencillin production
S 5-8	SLO-1	Lab 1: Isolation of starch /cellulose degrading microorganism	Lab 4: Optimization of culture conditions for amylase production	Lab 7: Cell/Enzyme immobilization in alginate/polyacrylamide	Lab 10: Production of wine	Lab 13: Mushroom cultivation
	SLO-2					
	SLO-3					
	SLO-4					
S-9	SLO-1	Design of batch reactors	Isolation of microbes	Continuous reactor	Introduction of Recovery of products	Beer Production
	SLO-2	Design of batch reactors	Isolation of microbes	Continuous reactor	Recovery of products methods	Beer Production
S-10	SLO-1	Design of continuous reactors	screening of microbes	Types of reactors	Recovery of products methods	Beer Production
	SLO-2	Design of continuous reactors	screening of microbes	Types of reactors	Recovery of products methods	
S-11	SLO-1	Parts of reactors	screening of microbes	Types of reactors	Introduction purification of products	Bioplastic Production
	SLO-2	Parts of reactors		Types of reactors	purification of products-methods	Bioplastic Production
S-12	SLO-1	Parts of reactors	Strain improvement: General	Types of reactors	purification of products-methods	Bioplastic Production
	SLO-2	Parts of reactors	Strain improvement: General	Types of reactors	purification of products-methods	Bioplastic Production
S 13-16	SLO-1	Lab 2: Isolation of starch /cellulose degrading microorganism	Lab 5: Optimization of culture conditions for amylase production	Lab 8: Bread making	Lab 11: Production of wine	Lab 14: Mushroom cultivation
	SLO-2					
	SLO-3					
	SLO-4					
S-17	SLO-1	Functions of reactors	mutation	Applications of Bioprocess Technology	Introduction of Separation of soluble products	PHA Production
	SLO-2	Functions of reactors	mutation	Applications of Bioprocess Technology	Separation of soluble products	PHA Production
S-18	SLO-1	Computers in bioprocess control systems	recombination	Troubleshooting of Bioreactors	Separation of soluble products	Vermicompost

	SLO-2		recombination	Troubleshooting of Bioreactors	Separation of soluble products	Vermicompost
S-19	SLO-1	Computers in bioprocess control systems	Preservation of microbes	Troubleshooting of Bioreactors	Purification of soluble products	Vermicompost
	SLO-2		Preservation of microbes	Troubleshooting of Bioreactors	Crystallization of soluble products	Introduction of Biopesticides
S-20	SLO-1	Visualization of bioreactor	Preservation of microbes	Application of bioreactos	Drying methods of soluble products	Bacillus thuringiensis
	SLO-2	Visualization of bioreactor	Preservation of microbes	Application of bioreactos	Drying methods of soluble products	Application of
S 21-24	SLO-1 SLO-2 SLO-3 SLO-4	Lab 3: Growth kinetics.	Lab 6: Cell/Enzyme immobilization in alginate/polyacrylamide	Lab 9: Production of wine	Lab 12: Mushroom cultivation	Lab 15: Vermicomposting – demonstration

Learning Resources	1. Stanbury PF and Whitaker A. Pergamon, (2005), "Principles of Fermentation technology", second edition reprinted 2012,Pergamon Press, Oxford. **2.** P.T. Kalaichelvan and I. Arul Pandi, (2007), "Bioprocess Technology".MJP Publishers, Chennai

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr. Ravishankar	*Dr. Sumathi, MGR University Chennai*	*Dr. Infant Santhose*

Course Code	UBT20402J	Course Name	FOOD BIOTECHNOLOGY	Course Category	C	Professional Core Course	L	T	P	C
							4	0	4	6

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*	Learning		
		1	2	3
CLR-1 :	To practice sterilization technique for personal and societal safety	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-2 :	Application of techniques for determines the quality of food.			
CLR-3 :	Knowledge acquired to analysis a Qualitative of milk			
CLR-4 :	To understand the techniques required for Preparation of dairy products			
CLR-5 :	Techniques to determine the Quality checking of packaging material			
CLR-6 :	Overall learning of preparation of food and microbiological techniques.			

Course Learning Outcomes (CLO):	*At the end of this course, learners will be able to:*	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	To learn basic sterilization technique for personal and societal safety	3	80	70
CLO-2 :	Knowledge acquired for isolation and identification of food pathogens	3	85	75
CLO-3 :	Understanding the techniques required for quality of water and milk	3	75	70
CLO-4 :	Application of techniques required for Preparation of dairy products	3	85	80
CLO-5 :	Knowledge acquired to determine the Quality checking of packaging material	3	85	75
CLO-6 :	Overall knowledge on preparation and qualitative analysis of food	3	80	70

Program Learning Outcomes (PLO)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Fundamental Knowledge	Problem Analysis	Design & Development	Analysis, Design,Research	Modern Tool Usage	Society & Culture	Environment &Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO- 1	PSO- 2	PSO– 3
CLO-1 :	L	H	H	H	L	-	-	-	L	L	-	H	-	-	-
CLO-2 :	M	H	L	M	L	-	-	-	M	L	-	H	-	-	-
CLO-3 :	M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-4 :	M	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-5 :	H	H	M	H	L	-	-	-	M	L	-	H	-	-	-
CLO-6 :	L	H	M	H	L	-	-	-	L	L	-	H	-	-	-

Duration (hour)		24	24	24	24	24
S-1	SLO-1	Introduction– definition	Introduction to food processing	Introduction to food preservation	Microbial cultures in food fermentation	Functions of packaging
S-2	SLO-1	Significance of food microbiology	Sterilization-Physical	Principles of food preservation	culture maintenance	Type of packaging materials
S-3	SLO-1	Food as a substrate for microorganism	Sterilization-chemical	Methods of food preservation	starter cultures and their types	Type of packaging materials
S-4	SLO-1	Classification of food	Pasteurization	Preservation by low temperature	Probiotic dairy products	Selection of packaging material
S 5-8	SLO-1 SLO-2	Principles and method of sterilization– Heat, Filtration,	Standard Plate Count Method.	Bacteriological Analysis of Water by MPN method	Preparation of butter cake and assessment of its quality	Quality checking of packaging material.

		Radiation & pasteurization				
S-9	SLO-1	Classification of food	blanching	Preservation by drying-sun drying	Fermentation of milk	Selective properties of packaging film
S-10	SLO-1	shelf life of food	Principles of thermal processing	Mechanical drying	Cheese production	Methods of packaging
S-11	SLO-1	perishable foods	Thermal resistance of microorganisms	Factors affecting drying	Yogurt production	Methods of packaging
S-12	SLO-1	Semi perishable foods	Thermal Death Time	Canning	Beer production	packaging equipment
S 13-16	SLO-1 SLO-2	Principles and method of sterilization– Heat, Filtration, Radiation & pasteurization	Identification of Molds by lacto phenol cotton blue staining	Bacteriological Analysis of Water by MPN method	Preparation and evaluation of probiotic /prebiotic foods.	Repetition lab
S-17	SLO-1	Non perishable foods	Lethality concept.	Factor affecting canning	Wine production	packaging equipment
S-18	SLO-1	shelf stable foods	Factor affecting heat resistance	spoilage in canned foods	vinegar production	Testing Procedures for Packaged Foods
S-19	SLO-1	Food infection	Antimicrobial agents	Microbiological examination of water	lactic acid production	Testing Procedures for Packaged Foods
S-20	SLO-1	Food intoxication	Antimicrobial agents	Microbiological examination of food	lactic acid production	Testing Procedures for packaging macterials
S 21-24	SLO-1 SLO-2	Microbiological Examination of food	Qualitative analysis of milk by MBRT test	Bacteriological Analysis of Water by MPN method	Preparation and evaluation of probiotic /prebiotic foods.	Model Examination

Learning Resources	**1.**	Food Microbiology; WC Frazier; Tata McGraw Hill, Delhi.
	2.	Robertson GL, Food Packaging – Principles and Practice, CRC Press Taylor and Francis Group, 2012
	3.	Ramaswamy H and Marcott M,Food Processing Principles and Applications CRC Press, 2006.
	4.	Food Microbiology. 2nd Edition By Adams M & Moss, M. 2008. RSC Publishing

Learning Assessment

	Bloom's Level of Thinking	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (10%)**		**CLA – 3 (20%)**		**CLA – 4 (10%)#**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr. Ravishankar	*Dr. Sumathi, MGR University Chennai*	Dr. D. Thirumurugan, SRMIST

Course Code	UBT20D02T	Course Name	Human Physiology	Course Category	E	Discipline Specific Elective Courses	L	T	P	C
							4	0	0	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards		Graph sheet needed	

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning	Program Learning Outcomes (PLO)

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Understanding the blood & components			
CLR-2 :	Knowledge on digestion			
CLR-3 :	Knowledge on heart and respiratory system			
CLR-4 :	Knowledge on excretory system & reproduction			
CLR-5 :	Knowledge on endocrine glands			
CLR-6 :	Overall knowledge on human physiology			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					Scientific Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO – 3
CLO-1 :	Learning on blood components	1	85	80	H	H	L	L	L	-	-	-	-	-	-	M	-	-	-
CLO-2 :	Learning various aspects of digestion	1	80	75	H	M	M	L	L	-	-	-	-	-	-	H	-	-	-
CLO-3 :	Learning about anatomy of important organs	1	85	80	H	H	M	L	L	-	-	-	-	-	-	H	-	-	-
CLO-4 :	Learning about anatomy of important organs	1	85	80	H	H	M	L	L	-	-	-	-	-	-	H	-	-	-
CLO-5 :	Learning on endocrine glands and maintenance	1	85	80	H	H	M	L	L	-	-	-	-	-	-	H	-	-	-
CLO-6 :	Overall learning on human physiology	1	75	80	H	H	M	L	L	-	-	-	-	-	-	H	-	-	-

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		12	12	12	12	12
S-1	SLO-1	Introduction Blood-	Introduction to digestive system	Anatomy of Heart	Excretory System- organization	Endocrine glands
	SLO-2		Salivary gland			
S-2	SLO-1	Blood-Composition	Salivary gland	Anatomy of Heart	Excretory System- organization	Endocrine glands
	SLO-2					

S-3	SLO-1	Blood- formed elements	Anatomy- stomach	Cardiac cycle	Excretory System- organization	Importance of Thyroid
	SLO-2		Anatomy- stomach			
S 4	SLO-1	Lineages	Secretions in fundus	Cardiac cycle	Formation of urine	Importance of Thyroid
	SLO-2		Anatomy of stomach lining	Discussion on cardiac cycle		
S-5	SLO-1	RBC- functions	Anatomy of stomach lining	Heart rate	Formation of urine	Importance of parathyroid
	SLO-2	Structure of RBC	Anatomy of stomach lining	Factors regulating heart rate		
S 6-7	SLO-1	Structure of RBC	Secretions in pylori	Blood pressure	Regulation of urine formation	Importance of parathyroid
	SLO-2	erythropoeisis	Secretions in duodenum	Factors influencing BP		
S-8	SLO-1	Erythropoeisis-regulation	Anatomy of pancreas	Parts of respiration	Structure of ovary	Glucose homeostasis
	SLO-2		Cells in pancreas			
S 9	SLO-1	WBC- structure	Secretion of pancreas	mechanics of respiration	Menstrual cycle	Glucose homeostasis
	SLO-2		Bile and its significance			
S 10	SLO-1	WBC- function	Absorption by small intestine	Four factors involved in respiration	Hormonal changes during mestruation	Regulation by insulin
	SLO-2					
S-11	SLO-1	Platelet structure	Anatomy of SI	Factors regulating respiration	structure of testis	Regulation of glucagon
	SLO-2	function	Anatomy of SI		spermatogenesis	
S-12	SLO-1	Blood grouping	Fecal transport & Defecation	Factors regulating respiration	Hormones involved during spermatogenesis	Importance of regulation
	SLO-2	Blood grouping			Hormones involved during spermatogenesis	

Learning Resources	Theory: Sujith Kumar Chaudhuri. Concise Medical Physiology. New Central Book Agency (p) Ltd (2011). Khurana. Textbook Of Medical Physiology. 2005

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Academic		Internal Experts
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	*Dr.N.PRASANTH BHATT, SRMIST*

Course Code	UBT20D03T	Course Name	MEDICAL BIOTECHNOLOGY	Course Category	E	*Discipline Elective Course*	L	T	P	C
							4	0	0	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to:	Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*Understanding the basic concepts of medical biotechnology & drug design*			
CLR-2 :	*Understanding the techniques used for disease diagnosis*			
CLR-3 :	*Knowledge on ART & ACC*			
CLR-4 :	*Knowledge on the types of vaccines*			
CLR-5 :	*Knowledge on gene therapy & its applications*			
CLR-6 :	*Understanding on fundamentals of medical biotechnology & its applications*			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)															
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO – 1	PSO - 2	PSO – 3
CLO-1 :	*To understand the applications of medical biotechnology*	1	80	70	H	H	H	H	H	-	-	-	-	-	-	-	H	H	H
CLO-2 :	*Application of techniques for the diagnosis of diseases*	1	85	75	H	H	H	H	H	-	-	-	-	-	-	-	H	H	H
CLO-3 :	*Applying knowledge to understand the use of animal cell culture*	1	75	70	H	H	H	H	H	-	-	-	-	-	-	-	H	H	H
CLO-4 :	*Understand the vaccination process and the use of various vaccines*	1	85	80	H	H	H	H	H	-	-	-	-	-	-	-	H	H	H
CLO-5 :	*Having knowledge on gene therapy and stem cell therapy*	2	85	75	H	H	H	H	H	-	-	-	-	-	-	-	H	H	H
CLO-6 :	*Overall understanding and application of medical biotechnology in various fields*	2	80	70	H	H	H	H	H	-	-	-	-	-	-	-	H	H	H

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		12	12	12	12	12
S-1	SLO-1	Medical Biotechnology - Introduction	Diagnosis - Invasive techniques	Assisted reproductive technology	Vaccines -conventional	Hybridoma technique
	SLO-2					
S-2	SLO-1	Medical Biotechnology – Basic concepts	Diagnosis – Non-invasive techniques	Assisted reproductive technology	Vaccines -conventional	Gene therapy
	SLO-2					
S-3	SLO-1	Medical Biotechnology – Basic concepts	Diagnosis of pathogenic microbes	Pregnancy diagnosis	Vaccines-recombinant	Gene therapy: *ex vivo*
	SLO-2					
S 4	SLO-1	Medical Biotechnology - Scope	Diagnosis of pathogenic microbes – Classical methods	Pregnancy diagnosis	Vaccines-recombinant	Gene therapy: *in vivo*

	SLO-2					
S-5	SLO-1 SLO-2	Medical Biotechnology - Applications	Diagnosis of pathogenic microbes – Modern methods	Animal cell culture	Synthetic peptide	Gene therapy: *in vivo*
S 6-7	SLO-1 SLO-2	Medical Biotechnology - Applications	Diagnosis of pathogenic microbes – Modern methods	Animal cell culture - media	Synthetic peptide	Cell and tissue engineering
S-8	SLO-1 SLO-2	Drug designing - Introduction	Diagnosis using protein markers	Maintenance of cell lines	DNA Vaccines	Cell and tissue engineering
S 9	SLO-1 SLO-2	Drug designing - Introduction	Diagnosis using protein markers	Maintenance of cell lines	DNA Vaccines	Stem cell therapy
S 10	SLO-1 SLO-2	Developmental process	Diagnosis using enzyme markers	Organ culture	Antibiotics	Stem cell therapy
S-11	SLO-1 SLO-2	Developmental process	Diagnosis using enzyme markers	Organ culture	Antibiotics – mode of action	Nanomedicines
S-12	SLO-1 SLO-2	Developmental process	DNA markers	Organ culture - applications	Antibiotics – applications	Nanomedicines

Learning Resources	1. *Jogdand, S. N. Medical Biotechnology, Himalaya Publishing house, Mumbai, 2005.* 2. *Trevan. "Biotechnology: The Biological Principles*	1. *B. R. and Pasternak. Molecular Biotechnology: Principle and applications of recombinant DNA.*

Learning Assessment											
Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	*Dr. INFANT SANTHOSE, SRMIST*

Course Code	UBT20D04T	Course Name	ENVIRONMENTAL BIOTECHNOLOGY	Course Category	E	Discipline Elective Course	L	T	P	C
							4	0	0	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Understanding the ecosystem	1	2	3
CLR-2 :	Understanding the problems and issues in the environment			
CLR-3 :	Knowledge on waste treatment and possible measures			
CLR-4 :	Knowledge on Bioremediation process and methods			
CLR-5 :	Learning techniques on Biocontrol			
CLR-6 :	Candidates understanding on biotechnology role in clearing environmental hazards			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	1 Fundamental Knowledge	2 Problem Analysis	3 Design & Development	4 Analysis, Design, Research	5 Modern Tool Usage	6 Society & Culture	7 Environment & Sustainability	8 Ethics	9 Individual & Team Work	10 Communication	11 Project Mgt. & Finance	12 Life Long Learning	13 PSO - 1	14 PSO – 2	15 PSO – 3
CLO-1 :	To identify the ecosystem structure and functions	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-2 :	Gathering knowledge on environmental pollutions and pollutants	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-3 :	Applying knowledge on waste treatments and its methodologies	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-4 :	Applying knowledge on using organic compounds for bioremediation	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-5 :	Having knowledge on biotechnological applications for bioremediation treatments	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-6 :	Overall understanding and application of environmental issues and the solution through biotechnology	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		12	12	12	12	12
S-1	SLO-1	Ecosystem structure	An overview of atmosphere	Microbiology of waste water treatment	Treatment schemes for solid waste management	Metals, radionuclides
	SLO-2					Phosphates & nitrates
S-2	SLO-1	Structure and functions	An overview of hydrosphere	Aerobic process	Bioaugmentation	Bioremediation of xenobiotics
	SLO-2					Ecological consideration
S-3	SLO-1	Abiotic component	An overview of lithosphere	Activated sludge	*Biostimuation*	Decay behavior

	SLO-2					Degradative plasmids
S 4	SLO-1	Biotic component	An overview of anthrosphere	Oxidation ponds	Bioleaching	Molecular techniques in bioremediation
	SLO-2					Biotechnological applications to: pollution
S-5	SLO-1	Ozone depletion	Environmental pollution	Trickling filter	Microbial treatment for oil spillage	Restoration of degraded lands
	SLO-2	Greenhouse effect				Freecells
S-6	SLO-1	Acid rain due to anthropogenic activities	Impacts of pollution	Towers	Xenobiotic compounds	Immobilized cell technology
						Wastewater treatment
S-7	SLO-2	Acid rain due to anthropogenic activities	Impacts of pollution	Towers	Hydrocarbons,	Aerobic process
						Anaerobic digestion
S-8	SLO-1	Biotechnological approaches for management of ecosystems	Air pollution	Rotating discs	Polyaromatic hydrocarbons	Biogas from wastes
	SLO-2					
S 9	SLO-1	Biotechnological approaches for management	Land pollution	Rotating drums	Pesticides, surfactants	Methods of extraction
	SLO-2					Methods of extraction
S 10	SLO-1	Biotechnological approaches for management	Water pollution	Oxidation ditch	*Inorganic xenobiotics compounds*	Biotechniques for air pollution abatement
	SLO-2					
S-11	SLO-1	Biotechnological approaches for management	Methods of measurement of pollution	Anaerobic process, filters	Application of bioremediation to *inorganic xenobiotics compounds*	Factors influencing airpollution
	SLO-2					
S-12	SLO-1	Discussion	Fate of pollutants in the environment	Up-flow anaerobic sludge blanket reactors	Discussion	Methods of odour control
	SLO-2					

Learning Resources	1. Waste water engineering - treatment, disposal and reuse, Metcalf and Eddy Inc., Tata McGraw Hill, New Delhi. 2. Environmental Chemistry, AK. De, Wiley Eastern Ltd, New Delhi.	*1.* Bioremidation, Baaker, KH and Herson D.S., 1994. Mc.GrawHill Inc, NewYork. 2. Industrial and Environmental Biotechnology - Nuzhat Ahmed, Fouad M. Qureshi and Obaid Y. Khan, 2006. Horizon Press.

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	*Dr. T.G.NITHYA, SRMIST*

Course Code	UBT20D05T	Course Name	BIOETHICS, IPR AND BIOSAFETY	Course Category	E	*Discipline Elective Course*	L	T	P	C
							4	0	0	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Understanding the ethical issues in Biotechnology			
CLR-2 :	Through Knowledge on conserving the intellectual property and patenting			
CLR-3 :	Knowledge on models designed to patent the biological materials			
CLR-4 :	Safety measures to be handled before using potent vulnerable cultures and fragile instruments			
CLR-5 :	Wide knowledge on different environmental issues are been exposed			
CLR-6 :	Over all enlighten ideology on the conservation of Intellectual rights and ways to clear any ethical issues oriented issues in Biotechnology			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					Fundamental Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO – 2	PSO – 3
CLO-1 :	Identify the problem prone areas in Biotechnology	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-2 :	Understand the different ways to conserve the intellectual rights	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-3 :	Identify the possibilities in biological materials that deserve for patenting	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-4 :	Handle instruments with utmost care and safety precautions that ensures good laboratory practice	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-5 :	Address different environmental issue and a wide knowledge on the law enforcement related to Environment	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-6 :	Over all understanding the ethical and legal issues in pursuing Biotechnology and conserving the intellectual rights	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		12	12	12	12	12
S-1	SLO-1	Introduction to Bioethics	IPR - Introduction	Patents – Biological materials	Biosafety : principle	General idea on Social and Environment issue
	SLO-2					
S-2	SLO-1	Legal impact of Biotechnology	IPR- Patents	International Conventions	General lab equipments and purpose	Impact of Global warming
	SLO-2					Ecological consideration

S-3	SLO-1 SLO-2	Legal impact of Biotechnology	Trade secrets	Obligations with Patent Applications	General lab equipments and purpose	Impact of Acid rain
S 4	SLO-1 SLO-2	Socio economical impact of biotechnology	Copyrights	Implication of Patenting	Biosafety Cabinets Usage	Impact of Ozone layer
S-5	SLO-1 SLO-2	Ethical concerns in Biotechnology research	Trademarks	Patenting of live forms	Biosafety cabinets Working principles	Impact of Nuclear accidents
S-6	SLO-1	Ethical concerns in Biotechnology research	Mode of protection of IPR	Patenting of live forms	Biosafety Levels	Impacts of holocaust- Forest fire
S-7	SLO-2	Committees to approve Bioethical issues	Mode of protection of IPR	Patenting GMO, Genes and DNA sequences	Biosafety levels – Instructions and restrictions to be followed at each level	Environmental Protection Act
S-8	SLO-1 SLO-2	Committees to approve Bioethical issues	Plant Genetic Resources (PGR)	Patenting GMO, Genes and DNA sequences	Norms to be followed while shipping the biological samples for analysis	Air (Prevention and control of Pollution) Act
S 9	SLO-1 SLO-2	Committees to approve Bioethical issues	Plant Genetic Resources (PGR)	Patents for Higher Plants and Higher Animals	Decontamination principles and practice	Water (Prevention and control of Pollution) Act
S 10	SLO-1 SLO-2	OECD guidelines	General Agreement of Tariffs and Trade (GATT)	Patenting for Higher Plants and higher Animals	Decontamination principles and practice	Wildlife protection Act
S-11	SLO-1 SLO-2	OECD guidelines	General Agreement of Tariffs and Trade (GATT)	Plant Breeder's Right and Farmer's Right	Waste disposal and management	Forest Conservation Act
S-12	SLO-1 SLO-2	OECD guidelines	Trade related Intellectual Property (TRIP)	Plant Breeder's Right and Farmer's Right	Steps to be followed in case of emergency	Issues involved in enforcement of environmental legislation

Learning Resources	1. Singh B.D., Biotechnology, kalyani publishers, 2009. 2. Chawla H.S., Introduction to plant Biotechnology, Science publishers, 2004.	1. Shaleesha A, Stanley, Bioethics, Wisdom educational service, 2008. 2. Das H.K., Text book of Biotechnology, Wiley Publishers, 2010.

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	*Dr. T.G.NITHYA, SRMIST*

Course Code	UBT20S03T	Course Name	BIOFERTILIZER TECHNOLOGY	Course Category	S	Skill Enhancement Courses	L	T	P	C
							2	0	0	2

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Understanding the scope and concept of biofertilizer technology			
CLR-2 :	Understanding the biofertilizers in agriculture			
CLR-3 :	Knowledge on algal biofertilizer			
CLR-4 :	Knowledge on bacterial biofertilizer			
CLR-5 :	Knowledge on fungal biofertilizer			
CLR-6 :	Knowledge on liquid biofertilizer			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO – 2	PSO – 3
CLO-1 :	To understand about the importance of biofertilizer	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-2 :	To develop new biofertilizers	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-3 :	Applying knowledge to apply it in the field	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-4 :	Having knowledge on agricultural biofertilizers	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-5 :	Applying knowledge to create new biofertilizers	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-6 :	Overall understanding of biofertilizers and its usage	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		06	06	06	06	06
S-1	SLO-1	Biofertilizers: Definition	Algal Biofertilizers	Bacterial biofertilizers	Mycorrhizal fungi as biofertilizers	Liquid biofertilizers
	SLO-2					
S-2	SLO-1	types	Cyanobacteria (BGA) as biofertilizers - Anabaena	Azospirillum, Azotobacter	Importance of Ecto	Formulation
	SLO-2					
S-3	SLO-1	Importance of biofertilizers in agriculture	Nostoc and Tolypothrix	Rhizobium	Importance of Endo	Advantages - Application methodology
	SLO-2					
S	SLO-1	Strain selection	Algalization	N_2 fixation	Arbuscular mycorrhizae (VAM)	Role of liquid biofertilizer in tissue

4	SLO-2					culture
S-5	SLO-1 SLO-2	Plant-microbe interaction	Symbiotic association	Phosphate solubilization	Methods of collection	National and Regional biofertilizer production
S-6	SLO-1 SLO-2	Soil ecosystem	Field application of Cyanobacterial inoculants.	mobilization	inoculum production – Application	development Centers

Learning Resources	1. Dubey, R. C., "A Textbook of Biotechnology", S. Chand & Co., New Delhi.	*Reference:* 1.Newton, W. E. et al. "Recent Developments in Nitrogen Fixation", Academic Press, New York. 2.Schwintzer, C. R. and Tjepkema, J. D., "The Biology of Frankia and Actinorhizal Plants", Academic Press Inc., San Diego, USA. 3.Subba Rao, N. S., "Soil Microbiology", 4th ed. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	*Dr. INFANT SANTHOSE, SRMIST*

Course Code	UBT20S04T	Course Name	AGRICULTURAL BIOTECHNOLOGY	Course Category	S	Skill Enhancement Courses	L	T	P	C
							2	0	0	2

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to,
CLR-1 :	Understanding the scope and history of agriculture biotechnology
CLR-2 :	Understanding the crop improvement
CLR-3 :	Knowledge on cropping patterns
CLR-4 :	Knowledge on major diseases
CLR-5 :	Knowledge on economic importance
CLR-6 :	Knowledge on agro-waste utilization

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO – 2	PSO – 3
	Learning	1	2	3	Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CLO-1 :	To understand about the importance of agriculture	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-2 :	To develop new methods of cultivation	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-3 :	Applying knowledge to utilize agro waste	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-4 :	Having knowledge on crop improvement	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-5 :	Applying knowledge to produce products from agriculture crops	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-6 :	Overall understanding of major diseases in crops	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		06	06	06	06	06
S-1	SLO-1	History of Indian Agriculture	Crop Improvement	Production of essential amino-acids	Plant Pathology	Definition and History
	SLO-2	Green Revolution in India	Plant breeding	utilization of essential amino-acids	Major crops and major diseases in India	types of agroforestry
S-2	SLO-1	Cropping patterns in India	Plant cell and tissue culture	chemicals from micro-algae	Developing diseases	Effects of agroforestry to global problems-Environmental
	SLO-2	Soil patterns in India	Plant cell and tissue culture	Mycorrhiza	Drought	
S-3	SLO-1	Rainfall Patterns in India	protoplast technology	Applications in agriculture	Salinity	problems- economic & social.
	SLO-2					
S	SLO-1	History of Indian	Crop Improvement	Production of essential amino-acids	Plant Pathology	Definition and History

4	SLO-2	Agriculture Green Revolution in India	Plant breeding	utilization of essential amino-acids	Major crops and major diseases in India	types of agroforestry
S-5	SLO-1	Cropping patterns in India	Plant cell and tissue culture	chemicals from micro-algae	Developing diseases	Effects of agroforestry to global problems-Environmental
	SLO-2	Soil patterns in India	Plant cell and tissue culture	Mycorrhiza	Drought	
S-6	SLO-1	Rainfall Patterns in India	protoplast technology	Applications in agriculture	Salinity	problems- economic & social.
	SLO-2					

Learning Resources	**1.** Textbook of Agricultural Biotechnology by Dr. Ahindra Nag, PHI Learning Private Ltd., New Delhi, 2009	*Reference:* 1. Agricultural Biotechnology Edited by Arie Altman, Pub. Marcel Dekker, Inc., 1998 2. Biotechnology – Expanding Horizons. B. D. Singh. Kalyani Publishers, 2004. 3.Plant Genetic Engineering by J. H. Dodds, Cambridge University Press, 1983.

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	*Dr. INFANT SANTHOSE, SRMIST*

Course Code	UJK20401T	Course Name	Professional Skills	Course Category	-JK	Life Skill Course	L	T	P	C
							2	0	0	2

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Career Development Centre	Data Book / Codes/Standards		-	

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	expose students to the requirements of job market
CLR-2 :	develop resume building practice
CLR-3 :	increase efficiency in speaking during group discussions
CLR-4 :	prepare students for job interviews
CLR-5 :	instill confidence in students and develop skills necessary to face audience
CLR-6 :	develop speaking and presentation skills in students

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	understand the importance of resume preparation and build resume	3	80	70	M	M	L	L	M	H	-	-	-	M	H	L	H	H	H
CLO-2 :	acquire group discussion skills	3	85	75	M	M	L	L	M	H	-	-	-	M	H	L	H	H	H
CLO-3 :	face interviews confidently	3	85	80	M	M	L	L	M	H	-	-	-	M	H	L	H	H	H
CLO-4 :	Ask appropriate questions during an interview	3	85	80	M	M	L	L	M	H	-	-	-	M	H	L	H	H	H
CLO-5 :	understand various types of presentation and use presentation skills in projects	3	85	80	M	M	L	L	M	H	-	-	-	M	H	L	H	H	H
CLO-6 :	build confidence during any presentation	3	85	80	M	M	L	L	M	H	-	-	-	M	H	L	H	H	H

Duration (hour)		6	6	6	6	6
S-1	SLO-1	***Introduction of resume and its importance***	***Meaning and methods of group discussion***	***Meaning and types of interview (face to face, telephonic, video)***	***Types - Informative, Instructional, Arousing, Persuasive, Decision-making***	***PowerPoint presentation–body language and stage etiquettes***
	SLO-2	***Difference between a CV, Resume and Bio Data***	*Procedure of group discussion*	*Dress code, background research*	***Structure of a presentation – Introduction of the event, Introducing the speaker, vote of thanks***	***PowerPoint presentation–body language and stage etiquettes***
S-2	SLO-1	***Essential components of a good resume, common errors people make while preparing a resume***	*Group discussion – simulation*	*STAR Technique (situation, task, approach and response) for facing an interview*	***Working with audience – ice-breaking, Creating a 'Plan B',***	***PowerPoint presentation–practice session***

	SLO-2	***Resume building format***	*Group discussion – common errors*	*Interview procedure (opening, listening skills, closure, asking questions)*	***Getting the audience in the mood, working with emotions,***	***PowerPoint presentation– practice session***
S-3	SLO-1	***Resume building using templates***	***Group discussion – types – Topic based***	*Important questions generally asked in an interview*	***Improvisation and unprepared presentations, man-woman view, feedback – appreciation and critique***	***PowerPoint presentation– practice session***
	SLO-2	***Resume building using templates***	***Group discussion – types – Case study based***	*Important questions generally asked in an interview*	***Improvisation and unprepared presentations, man-woman view, feedback – appreciation and critique***	***PowerPoint presentation– practice session***
S-4	SLO-1	***Resume building activity***	***Group discussion – practice session- Topic based***	*Mock interview – face to face*	***Power point presentation, skit, drama, dance, mime, short films and documentary – Dos and Don'ts***	***PowerPoint presentation– practice session***
	SLO-2	***Resume building activity - Feedback***	***Group discussion - Feedback***	*Mock interview- Feedback*	***Power point presentation, skit, drama, dance, mime, short films and documentary – Dos and Don'ts***	***PowerPoint presentation– practice session***
S-5	SLO-1	***Video resume – Tips and tricks***	***Group discussion – practice session- Topic based***	*Mock interview - face to face*	***PowerPoint presentation – content preparation***	***PowerPoint presentation– practice session***
	SLO-2	***Video resume – Do's and Don'ts***	***Group discussion - Feedback***	*Mock interview - Feedback*	***PowerPoint presentation–logical arrangement of content***	***PowerPoint presentation– practice session***
S-6	SLO-1	***Video resume – Templates***	***Group discussion – practice session- Case study based***	*Mock interview - face to face*	***PowerPoint presentation–using internet source, citations, bibliography***	***PowerPoint presentation– practice session***
	SLO-2	***Video resume – Templates***	***Group discussion - Feedback***	*Mock interview- Feedback*	***PowerPoint presentation–using internet source, citations, bibliography***	***PowerPoint presentation– practice session***

Learning Resources	1. *Scott Bennett, The Elements of Resume Style: Essential Rules for Writing Resumes and Cover Letters That Work, AMACOM, 2014* 2. *David John, Tricks and Techniques of Group Discussions, Arihant, 2012* 3. *Singh O.P., Art of Effective Communication in Group Discussion and Interview, S Chand & Company, 2014*	*4. Paul Newton, How to deliver a presentation ; e-book* ***5.Eric Garner, A-Z of Presentation, Eric Garner and Ventus Publishing ApS, 2012, bookboon.com***

Learning Assessment					
Level	Bloom's Level of Thinking	Continuous Learning Assessment (100% weightage)			
		CLA-1 (20%)	CLA-2 (20%)	CLA-3 (30%)	CLA-4 (30%) ##
		Theory	Theory	Theory	Theory
Level 1	Remember	10%	10%	30%	15%
	Understand				
Level 2	Apply	50%	50%	40%	50%
	Analyze				
Level 3	Evaluate	40%	40%	30%	35%
	Create				
	Total	**100 %**	**100 %**	**100 %**	**100 %**

CLA-1, CLA-2 and CLA-3 can be from any combination of these: Online Aptitude Tests, Classroom Activities, Case Studies, Poster Presentations, Power-point Presentations, Mini Talks, Group Discussions, Mock interviews, etc.
CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Ajay Zener, Director, Career Launcher	-	*1. Mr Priyanand, Assistant Professor, CDC, E&T, SRMIST*
		2. Ms Sindhu Thomas, Head in charge, CDC, FSH, SRMIST
		3. Ms Mahalakshmi, Assistant Professor, CDC, FSH, SRMIST

SEMESTER –V

Course Code	UBT20501J	Course Name	PLANT AND ANIMAL BIOTECHNOLOGY	Course Category	C	*Professional Core Course*	L	T	P	C
							4	0	4	6

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,
CLR-1 :	Understanding the basic concepts of plant and animal biotechnology
CLR-2 :	Understanding the techniques used in plant tissue culture
CLR-3 :	Knowledge on plant genetic engineering
CLR-4 :	Knowledge on the media and preparation methods
CLR-5 :	Knowledge on animal biotechnology
CLR-6 :	Understanding on methods and applications in animal tissue culture

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO – 2	PSO – 3
CLO-1 :	To understand the applications of plant biotechnology	2	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-2 :	Application of techniques for the plant tissue culture	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-3 :	Applying knowledge to understand the gene transfer methods	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-4 :	Understand the methods in animal biotechnology	2	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-5 :	Having knowledge on animal cell culture media	2	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-6 :	Application of animal biotechnology	2	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-

Duration (hour)		24	24	24	24	24
S-1	SLO-1	Plant biotechnology –Introduction	Micropropagation	Gene transfer methods	Animal transgenesis- methods	Animal cell culture – Introduction
	SLO-2					
S-2	SLO-1	Lab Organization	Micropropagation	Physical methods	Animal transgenesis applications	Animal cell culture – basis
	SLO-2					
S-3	SLO-1	Sterilization methods	Callus	Chemical methods	Assisted reproduction techniques	Animal cell culture –basis
	SLO-2					
S-4	SLO-1	Surface sterilization	Callus Induction	Biological methods	Assisted reproduction techniques	materials

	SLO-2					methods
S 5-8	SLO-1 SLO-2	Sterilization techniques – glassware's, media and laminar air flow chamber	Organogenesis – caulogenesis and rhizogenesis	Isolation of plant protoplasts enzymatic method	Preparation of Animal cell monolayer.	Repetition lab
S-9	SLO-1 SLO-2	Different types of media	embryogenesis	Biological methods	Assisted reproduction techniques	animal cell lines
S-10	SLO-1 SLO-2	Media components	embryogenesis	Transgenic plants	methods of cryopreservation	animal cell lines
S-11	SLO-1 SLO-2	Composition of MS media	organogenesis	Transgenic plants	Animal cloning	types of culture
S-12	SLO-1 SLO-2	Gamborg media	organogenesis	Bt cotton	Animal cloning	types of culture
S 13-16	SLO-1 SLO-2	Preparation of plant tissue culture media – MS, B5	Isolation of plant genomic DNA.	Preparation of animal cell culture medium.	Subculturing of cell lines.	Repetition lab
S-17	SLO-1 SLO-2	Plant growth regulators- Auxins	somatic embryogenesis	Bt corn	case study Dolly	Organ culture
S-18	SLO-1 SLO-2	Gibberelins	Diagnosis using enzyme markers	Golden rice	Applications of animal biotechnology in medicine	Stem cells- Introduction
S-19	SLO-1 SLO-2	Cytokinin	somaclonal variation	GURT	Applications of animal biotechnology in medicine	Stem cells-basics , types
S-20	SLO-1 SLO-2	Ethylene	Agrobacterium technology	Arabidopsis thaliana – a model plant for genome analysis.	Applications of animal biotechnology in medicine	Stem cells - applications
S 21-24	SLO-1 SLO-2	Callus induction	Isolation of RNA from plant leaf tissue.	Preparation of single cell suspensions from animal tissue.	Cell counting – Quantitation of cells in culture.	Repetition lab

Learning Resources	1. IgnacimuthuS,*"Plant Biotechnology"*, Tata Mcgraw-Hill Pub., New Delhi, 2006. **2.** Dubey R.C.,"Textbook of Biotechnology" reprint 2005.S. Chand publishers, 2001	1. Satyanarayana U., *"Biotechnology"*KrishnaPakashan, 2009. 2. Das H.K.,*"Textbook of Biotechnology*", third edition, S.Chand*Publication,* 2007.

Learning Assessment											
	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	*Dr. INFANT SANTHOSE, SRMIST*

Course Code	UBT20502J	Course Name	GENOMICS AND PROTEOMICS	Course Category	C	*Professional Core Course*	L	T	P	C
							4	0	2	5

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Understand the decoding of DNA and its importance			
CLR-2 :	Analyze the genomic sequences and compare them for better understanding			
CLR-3 :	Generate the 3-D structure of proteins offering clues to their function			
CLR-4 :	Provide access to chemical information in database and their representations in structure searching			
CLR-5 :	Learn the inventive process of finding new medications based on the knowledge of a biological target			
CLR-6 :	Understand the study of computational analysis of whole genomes of organisms with respect to biomedical applications			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO – 2	PSO – 3
CLO-1 :	Understand the simulation of biological systems using computational platforms	2	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-2 :	Collectively characterize and quantify organism's genes and their interrelations	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-3 :	Exploit the sequence-structure-conservation for better understanding of protein function	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-4 :	Gain knowledge on computer-assisted structure elucidation and computer-assisted synthesis design	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-5 :	Understand the strength of the intermolecular interaction between the small molecule and its biological target	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-6 :	Understand the study of computational analysis of whole genomes of organisms with respect to biomedical applications	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-

Duration (hour)		24	24	24	24	24
S-1	SLO-1	Biological databases –	Gene prediction methods in	Protein secondary structure	Introduction to cheminformatics	Definition of drug. Properties of
	SLO-2	Classification	prokaryotes			drug compound
S-2	SLO-1	Genbank	Conventional method	Globular proteins	Databases: chemical structure -	Drug Discovery Pipeline
	SLO-2		Conventional method		Pubchem	
S-3	SLO-1	EMBI, DDBJ	Computational method	Chou fasman	Drug bank	Structure based drug design

	SLO-2	UNIPROT, PDB	Computational method			
S-4	SLO-1	Specialized databases	NN method	GOR method.	Databases of small molecules (ZINC)	Ligand based design
	SLO-2		HMM			
S 5-8	SLO-1	Study of Internet resources in Bioinformatics.	Genbank, EMBL, DDBJ	Sequence alignment – BLAST	Multiple sequence alignment - CLUSTAL X	Repetition lab
	SLO-2					
S-9	SLO-1	Sequence analysis – sequence alignment	Gene prediction methods in eukaryotes	Transmembrane prediction	Representation of molecules	Pharmacophore design
	SLO-2					
S-10	SLO-1	Dot Matrix	Conventional method	Protein tertiary structure	Representation of chemical reactions	De novo drug design
	SLO-2		Conventional method			
S-11	SLO-1	Global alignment	Computational method	Homology modelling	Different types of molecules	QSAR
	SLO-2		Computational method			
S-12	SLO-1	Local alignment	NN method	Threading	SMILES coding	QSAR - Descriptors
	SLO-2		HMM			
S 13-16	SLO-1	Searches on MEDLINE, PubMed and CDROM bibliographic databases.	Sequence alignment – BLAST	Pair wise alignment - Needleman - Wunsch & smith-Waterman algorithm	Evaluation of protein structure by Swiss PDB viewer and visualization tools - RASMOL	Repetition lab
	SLO-2					
S-17	SLO-1	BLAST, FASTA	Discriminant analysis	Ab initio Prediction	structure of Mol files and sdf files	virtual screening
	SLO-2					
S-18	SLO-1	Progressive alignment	Promoter and regulatory elements prediction methods in prokaryotes and eukaryotes	Coiled coil prediction	Molecular convertor	docking of ligands
	SLO-2					
S-19	SLO-1	Iterative alignment & Block based method	Consensus method	CASP	SMILES translator	ADMET Prediction
	SLO-2					
S-20	SLO-1	Construction of Phylogenetic tree - UPGMA, NJ method	Prediction evaluation	Computational servers for structure prediction	Similarity search of the molecule	Docking Tools
	SLO-2					
S 21-24	SLO-1	Introduction to sequence databases - UNIPROT	Sequence alignment – BLAST	Multiple sequence alignment - CLUSTAL X	Homology modelling of a given protein sequence	Repetition lab
	SLO-2					

Learning Resources	1. A Baxevanis and B.F. Ouellette. Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Wiley- Interscience, Hoboken, NJ, 2005. 2. A. M.Campbell & L. J. Heyer, Discovering Genomics, Proteomics & Bioinformatics, CSHL Press, 2003.	1. David W Mount, Bioinformatics: Sequence and Genome analysis, 2nd Edition, CBS Publishers, New Delhi, 2004.

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	*Dr. V.G.VIDHYA, SRMIST*

Course Code	UBT20D06T	Course Name	NANOBIOTECHNOLOGY	Course Category	E	*Discipline Elective Course*	L	T	P	C
							4	0	0	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	**Data Book / Codes/Standards**	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Understanding nanoscience	1	2	3
CLR-2 :	Understanding the concepts of nanomaterials			
CLR-3 :	Knowledge on characterization of nanomaterials			
CLR-4 :	Knowledge on nanobiotechnology applications in environment			
CLR-5 :	Understanding the applications of nanotechnology			
CLR-6 :	Candidates understanding on nanobiotechnology, nanomaterials and nanomedicine			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	1 Fundamental Knowledge	2 Problem Analysis	3 Design & Development	4 Analysis, Design, Research	5 Modern Tool Usage	6 Society & Culture	7 Environment & Sustainability	8 Ethics	9 Individual & Team Work	10 Communication	11 Project Mgt. & Finance	12 Life Long Learning	13 PSO - 1	14 PSO – 2	15 PSO – 3
CLO-1 :	To learn about nanoscience and their units and scales	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-2 :	Gathering knowledge on classes of nanomaterials	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-3 :	Applying knowledge on characterizing the nanomaterials	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-4 :	Applying knowledge on waste treatment using nanotechnology	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-5 :	Having knowledge on applications of nanobiotechnology	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-6 :	Overall understanding and application of nanoscience, nanomaterial and nanobiotechnology	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		07	09	12	12	12
S-1	SLO-1	Introduction to nanoscience	Introduction to nanomaterial	Synthesis of nanomaterials	Environmental issues	Applications of Nanomaterials
	SLO-2					
S-2	SLO-1	Fundamentals of nanoscience	Classes of nanomaterials	Characterization of Nanomaterials	Nanotechnology and Environment	Applications of Nanomaterials
	SLO-2					
S-3	SLO-1	History of nanoscience	Metal nanomaterials	Top-down method	Treatment of contaminated surface water	Application of nanomedicine

	SLO-2					
S 4	SLO-1	History of nanotechnology	Semiconductor Nanomaterials	Colloidal synthesis	Treatment of contaminated ground water	Application of biosensors
	SLO-2					Nanobiotechnology
S-5	SLO-1	Properties of nanoscale	Quantum Dots	solgel method Self-assembly method	Treatment of contaminated waste water	Drug Delivery
	SLO-2					
S-6	SLO-1	Theory of scale	Wells and Wires	Molecular design and modeling	Nanofiltration for water purification	Green Nanotechnology
S-7	SLO-2	definitions in nanoscale	Carbon Nanotubes	Physico-chemical characterization on nanomaterials	nanofilters for air pollution	Nanomaterials as solution to environmental problems
S-8	SLO-1	Scope and application	Organic-based nanomaterials.	optical method UV-vis absorption	environmental remediation	Nanomaterials for solar cells
	SLO-2					
S 9	SLO-1	concepts of scaling	Organic-based nanomaterials.	electron microscopy techniques,SEM	environmental remediation	Nanomaterials for fuel cells
	SLO-2					
S 10	SLO-1	Applications in medicine	Chemical based nanomaterials	electron microscopy techniques,SEM	Reduction of metal waste	Role of nanomaterials in drug delivery
	SLO-2					
S-11	SLO-1	Applications in medicine	Chemical based nanomaterials	electron microscopy techniques,TEM	Other appllications	Role of nanomaterials in drug delivery
	SLO-2					
S-12	SLO-1	Discussion	Discussion	scanning probe method	Discussion	Discussion
	SLO-2					

Learning Resources	1. David S. Goodsell, *"Bionanotechnology",* John wiley&sons inc., publications, 2004. 2. Shanmugam.S, *"Nanotechnology",* MJP publishers, 2010	1. Niemeyer, C.M. Mirking C.A., "*Nanobiotechnology concepts, Applications and Perpectives*", 2004. 2. Manasi Karkare, *"Nanotechnology"*, I.K. International publishing House Pvt.Ltd, 2008.

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	*Dr. T.G.NITHYA, SRMIST*

Course Code	UBT20D07T	Course Name	CANCER BIOLOGY	Course Category	E	Discipline Elective Course	L	T	P	C
							4	0	0	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Understanding nanoscience	1	2	3
CLR-2 :	Understanding the concepts of nanomaterials			
CLR-3 :	Knowledge on characterization of nanomaterials			
CLR-4 :	Knowledge on nanobiotechnology applications in environment			
CLR-5 :	Understanding the applications of nanotechnology			
CLR-6 :	Candidates understanding on nanobiotechnology, nanomaterials and nanomedicine			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	1 Fundamental Knowledge	2 Problem Analysis	3 Design & Development	4 Analysis, Design, Research	5 Modern Tool Usage	6 Society & Culture	7 Environment & Sustainability	8 Ethics	9 Individual & Team Work	10 Communication	11 Project Mgt. & Finance	12 Life Long Learning	13 PSO - 1	14 PSO – 2	15 PSO – 3
CLO-1 :	To learn about nanoscience and their units and scales	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-2 :	Gathering knowledge on classes of nanomaterials	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-3 :	Applying knowledge on characterizing the nanomaterials	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-4 :	Applying knowledge on waste treatment using nanotechnology	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-5 :	Having knowledge on applications of nanobiotechnology	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-6 :	Overall understanding and application of nanoscience, nanomaterial and nanobiotechnology	1	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		12	12	12	12	12
S-1	SLO-1	General ideology about Cancer and Properties of Cancer	Cell cycle: different phases,	Cancer critical genes : Loss of mutation and gain of mutation	Viral Oncogenesis	Cancer Screening: Biomarkers
	SLO-2				types of virus that cause cancer	Identification and detection of cancer genes
S-2	SLO-1	Origin of Cancer and its heterogeneity nature	role of Cyclin and CDK	Tumour Suppressor genes : pRB	types of virus that cause cancer	Drug resistance – Drug metabolism
	SLO-2					
S-3	SLO-1	Pathological grade, Different forms and	Regulation of Cyclin and CDk	Tumour Suppressor genes : pRB	Different ways by which Virus cause Cancer in host cell	Chemotheraphy- Alkylating agents

	SLO-2	Stages of cancer				
S 4	SLO-1 SLO-2	Carcinogens: Physical and Chemical carcinogens	Checkpoints G1/S, G2/M and M-phase	Tumour Suppressor genes : p53	Different ways by which Virus cause Cancer in host cell	Chemotheraphy- Anti-metabolites agents
S-5	SLO-1 SLO-2	Types of Chemical carcinogens : Direct	Checkpoints G1/S, G2/M and M-phase	Tumour Suppressor genes : p53 and other TSG	Cancer Invasion: Routes of transport	Natural products as Inhibitors
S-6	SLO-1	indirect carcinogens	DNA damage regulation	Proto-oncogene and mutation that convert to oncogene	Cell- Cell recognition,	Radiotherapy
S-7	SLO-2	Other factors that influence cancer	Apoptosis- Intrinsic	Proto-oncogene in growth factor and altered behavior in cancer	Cell-ECM interaction	Hormone theraphy
S-8	SLO-1 SLO-2	Metastasis- introdcution	Apoptosis- extrinsic pathway	RTK and dysfunction of RTK in Cancer	Adhesion molecules- Cadherins,	Immunotherapy
S 9	SLO-1 SLO-2	Metastasis-process	Defects of the apoptosis machinery in cancer cells	RTK and dysfunction of RTK in Cancer	Integrins in Cancer	Photodynamic therapy
S 10	SLO-1 SLO-2	Influence of Metastasis on cells	Defects of the apoptosis machinery in cancer cells	Altered pathway :Receptor kinases pathway :RAS-RAF-MEK-ERK-MAPK	Proteolytic enzymes in Cancer	Gene therapy
S-11	SLO-1 SLO-2	Influence of Metastasis on cells		Altered Kinase signaling pathway: PI-3K-PDK1-PKB Pathway	Proteolytic enzymes in Cancer	Gene therapy
S-12	SLO-1 SLO-2	Dicussion and revision		Altered Kinase signaling pathway: PI-3K-PDK1-PKB Pathway	Metastatic cascade	

Learning Resources	3. King R.J.B., *Cancer Biology*, Addision Wesley Longmann Ltd, U.K., 1996	1. Maly B.W.J., *Virology a practical approach*, IRL press, Oxford, 1987. 2. Dunmock.N.J and Primrose S.B., *Introduction to modern Virology*, Blackwell Scientific Publications. 3. Ruddon.R.W., *Cancer Biology*, Oxford University Press, Oxford, 1995.

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	*Mrs,NISHANTI, SRMIST*

Course Code	UBT20S05T	Course Name	PHARMACEUTICAL BIOTECHNOLOGY	Course Category	S	Skill Enhancement Courses	L	T	P	C
							2	0	0	2

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Understanding the pharmacologic agents and assays.	1	2	3
CLR-2 :	Understanding the animal model as cell line.			
CLR-3 :	Knowledge on Vaccines types and classification.			
CLR-4 :	Knowledge on basic Pharmaceutical Immunology.			
CLR-5 :	Understanding techniques on genetherapy recombinant protein.			
CLR-6 :	Candidates understanding on fundamentals of Pharmaceutical biotechnology useful for industry and academia.			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	1 Fundamental Knowledge	2 Problem Analysis	3 Design & Development	4 Analysis, Design, Research	5 Modern Tool Usage	6 Society & Culture	7 Environment & Sustainability	8 Ethics	9 Individual & Team Work	10 Communication	11 Project Mgt. & Finance	12 Life Long Learning	13 PSO - 1	14 PSO – 2	15 PSO – 3
CLO-1 :	To know the pharmacologic agents and assays	1	85	80	H	H	H	H	L	-	-	M	M	L	-	H	-	-	-
CLO-2 :	Application of techniques in cell culture	1	85	80	H	H	H	H	L	-	-	M	M	L	-	H	-	-	-
CLO-3 :	Applying knowledge on preparation of vaccines	1	85	80	H	H	H	H	L	-	-	M	M	L	-	H	-	-	-
CLO-4 :	Applying knowledge to prepare monoclonal antibodies	1	85	80	H	H	H	H	L	-	-	M	M	L	-	H	-	-	-
CLO-5 :	Having knowledge on recombinant technology for therapy	1	85	80	H	H	H	H	L	-	-	M	M	L	-	H	-	-	-
CLO-6 :	Overall understanding and application of pharmacologic agents in the progress of industry and academics	1	85	80	H	H	H	H	L	-	-	M	M	L	-	H	-	-	-

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		06	06	06	06	06
S-1	SLO-1	Introduction	Introduction-animal model	Vaccines-Introduction	Pharmaceutical Immunology-Introduction	Genetherapy- Introduction
	SLO-2					
S-2	SLO-1	Overview of products	Cell lines-HeLa cells	Vaccines-classification	Antisera	*Application of gene therapy*
	SLO-2					
S-3	SLO-1	Classification of pharmacologic agents based on chemistry	Cancer cell line	Genetically recombinant vaccines	Hyper immune gamma globulin	Recombinant proteins
	SLO-2					

S 4	SLO-1 SLO-2	Classification of pharmacologic agents based on source	Fly line	Hepatitis B vaccines	Monoclonal antibody production	Probiotics
S-5	SLO-1 SLO-2	Pharmaceutical assays	Immortal cell line	Cholera Vaccines	Monoclonal antibody production	prebiotics
S-6	SLO-1 SLO-2	Discussion on Pharmaceutical agents and assays	Transgenic animals	Advantages & disadvantages of vaccines	Applications monoclonal antibodies	Nutraceuticals

Learning Resources	1. Pharmaceutical biotechnology-Concept and applications. Gray Walsh, *Wiley John & Sons, Inc*. (2003). 2. Pharmaceutical Biotechnology by Dann, J.A, Crommelin& Robert D., Sindelar, Oct. 2002, *Taylor & Francis.* 3. Biotechnology, Satyanarayana U, Boooks and allied (P) lts, 2010

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember Understand	30%	-	30%	-	30%	-	30%	-	30%	-
Level 2	Apply Analyze	40%	-	40%	-	40%	-	40%	-	40%	-
Level 3	Evaluate Create	30%	-	30%	-	30%	-	30%	-	30%	-
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	*Dr. D. SANKARI, SRMIST*

Course Code	UBT20S06T	Course Name	ADVANCED BIOINFORMATICS	Course Category	S	Skill Enhancement Courses	L	T	P	C
							2	0	0	2

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,
CLR-1 :	Understanding the pharmacologic agents and assays.
CLR-2 :	Understanding the animal model as cell line.
CLR-3 :	Knowledge on Vaccines types and classification.
CLR-4 :	Knowledge on basic Pharmaceutical Immunology.
CLR-5 :	Understanding techniques on genetherapy recombinant protein.
CLR-6 :	Candidates understanding on fundamentals of Pharmaceutical biotechnology useful for industry and academia.

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO – 2	PSO – 3
CLO-1 :	To know the pharmacologic agents and assays	1	85	80	H	H	H	H	L	-	-	M	M	L	-	H	-	-	-
CLO-2 :	Application of techniques in cell culture	1	85	80	H	H	H	H	L	-	-	M	M	L	-	H	-	-	-
CLO-3 :	Applying knowledge on preparation of vaccines	1	85	80	H	H	H	H	L	-	-	M	M	L	-	H	-	-	-
CLO-4 :	Applying knowledge to prepare monoclonal antibodies	1	85	80	H	H	H	H	L	-	-	M	M	L	-	H	-	-	-
CLO-5 :	Having knowledge on recombinant technology for therapy	1	85	80	H	H	H	H	L	-	-	M	M	L	-	H	-	-	-
CLO-6 :	Overall understanding and application of pharmacologic agents in the progress of industry and academics	1	85	80	H	H	H	H	L	-	-	M	M	L	-	H	-	-	-

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		06	06	06	06	06
S-1	SLO-1	Concept of evolutionary trees	Interactomes	Protein-protein interaction	Drug. Properties	Bar Code of life
	SLO-2	Dendrograms	Macromolecular interactions			
S-2	SLO-1	Methods for construction	Protein-DNA interactions	Protein-protein interaction	Drug design - SBDD	Bar Code – types
	SLO-2	Maximum Parsimony	Interactomes			analysis
S-3	SLO-1	Distance methods – NJ	Macromolecular interactions	**network methods**	Drug design - LBDD	**Bar Code- understanding**

	SLO-2					
S 4	SLO-1	Concept of evolutionary trees Dendrograms	Protein-Ligand interactions	network methods	Identification and validation	Need for bar coding
	SLO-2					
S-5	SLO-1	Methods for construction Maximum Parsimony	Interactions database – ProNIT.	PPI Tools	Drug Discovery Pipeline	Applications of bar coding
	SLO-2					
S-6	SLO-1	Distance methods – NJ Character based method, Phylogenetic Tools – PHYLIP, PAUP	Interactions database – ProNIT.	PPI Tools	Docking methods	**Applications of Bioinformatics in Biodiversity**
	SLO-2				virtual screening	

Learning Resources	1. A Baxevanis and B.F. Ouellette. Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Wiley- Interscience, Hoboken, NJ, 2005. 2. A. M.Campbell & L. J. Heyer, Discovering Genomics, Proteomics & Bioinformatics, CSHL Press, 2003.

Learning Assessment

Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	*Dr. V.G. VIDHYA, SRMIST*

Course Code	UES20AE1T	Course Name	ENVIRONMENTAL STUDIES	Course Category	AE	Ability Enhancement Courses	L	T	P	C
							3	0	0	3

Pre-requisite Courses	*Nil*	Co-requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*Computer Applications*	Data Book / Codes/Standards		*Nil*	

Course Learning Rationale (CLR): *The purpose of learning this course is to:*

		Learning		
		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	*To teach the importance of environment*			
CLR-2 :	*To impart the knowledge about ecosystem*			
CLR-3 :	*To teach about Biodiversity*			
CLR-4 :	*To create awareness about environmental pollution*			
CLR-5 :	*To understand about Environment Protection*			

Course Learning Outcomes (CLO): *At the end of this course, learners will be able to:*

		Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	*To gain knowledge on the importance of natural resources and energy*	2	75	60	H	H	H	-	-	-	-	-	-	-	-	-	-	-	-
CLO-2 :	*To understand the structure and function of an ecosystem*	2	80	70	-	H	-	H	-	-	-	-	-	-	-	-	-	-	-
CLO-3 :	*To imbibe an aesthetic value with respect to biodiversity, understand the threats and its conservation and appreciate the concept of interdependence*	2	70	65	H	-	-		-	-	-	-	-	-	-	-	-	-	-
CLO-4 :	*To understand the causes of types of pollution and disaster management*	2	70	70	H	-	H	H	H	-	-	-	-	-	-	-	-	-	-
CLO-5 :	*To observe and discover the surrounding environment through field work*	2	80	70	-	H	-	H	-	-	-	-	-	-	-	-	-	-	-

Duration (hour)		9	9	9	9	9
S-1	SLO-1	*Environmental Studies- Concept*	*Concept of an ecosystem*	*Biodiversity at Global, National And Local Levels*	*Causes, Effects and Control Measures of Nuclear hazards*	*Need for equitable utilization*
	SLO-2	*Scope and Importance of Environmental Studies*	*Ecosystem degradation and Resource utilization*	*India as a Mega Diversity Nation*		*Equity – Disparity*
S-2	SLO-1	*Need for public awareness.*	*Structure and Functions of an ecosystem*	*Threats to biodiversity: habitat loss, poaching of wildlife*	*Solid Waste Management Causes, Effects and Control Measures of Urban and Industrial Waste*	*Urban – rural equity issues*
	SLO-2	*Institutions in Environment*	*Producers, consumers and decomposers*	*man-wildlife conflicts*		*The need for Gender Equity*
S-3	SLO-1	*People in Environment*	*Energy flow in the ecosystem*	*Endangered species of India*	*Role of Individuals In Pollution Prevention*	*Preserving resources for future generations*
	SLO-2	*Awareness about Environmental Studies*	*The water cycle , The Carbon cycle , The Oxygen cycle , The Nitrogen cycle , The energy cycle and, Integration of cycles in nature*	*Endemic species of India*		*The rights of animals*

S-4	**SLO-1**	*Introduction to natural resources- Associated Problems*	*Ecological succession*	*Environmental Pollution- Definition*	*Disaster management- Nature Floods, Earthquakes*	*The ethical basis of environment education and awareness*
	SLO-2	*Renewable and Nonrenewable resources*	*Food chains, Food webs and Ecological pyramids*			
S-5	**SLO-1**	*Forest resources*	*Ecosystem, Introduction, Types, Characteristic features, Structure and functions*	*Causes, Effects and Control Measures of Air Pollution*	*Cyclones Landslides*	*The conservation ethic and traditional value systems of India*
	SLO-2	*Water Resources*	*Forest ecosystem*			
S-6	**SLO-1**	*Mineral Resources*	*Grassland ecosystem*	*Causes, Effects and Control Measures of Water Pollution*	*Social Issues and the Environment From Unsustainable to Sustainable Development*	*Wasteland Reclamation*
	SLO-2	*Food Resources*	*Desert ecosystem*			
S-7	**SLO-1**	*Energy Resources*	*Aquatic ecosystems (ponds, lakes, streams)*	*Causes, Effects and Control Measures of Soil Pollution*	*Water Conservation*	*Climate change & Global warming*
	SLO-2	*Land Resources*	*Aquatic ecosystems (rivers, estuaries, oceans)*			
S-8	**SLO-1**	*Renewable and non-renewable resources- Wind*	*Value Of Biodiversity*	*Causes, Effects and Control Measures of Marine pollution*	*Rain Water Harvesting Watershed*	*Acid rain & Ozone layer depletion*
	SLO-2	*Renewable and non-renewable resources- geothermal*	*Consumptive Value And Productive Value*			
S-9	**SLO-1**	*Renewable and non-renewable resources- Solar*	*Social Value and Ethical Value*	*Causes, Effects and Control Measures of Noise Pollution*	*Environmental Ethics: Issues and Possible Solutions*	*Nuclear Accidents and Nuclear Holocaust*
	SLO-2	*Renewable and non-renewable resources- Biomass*	*Aesthetic Value and Option Value*	*Causes, Effects and Control Measures of Thermal Pollution*	*Resource consumption patterns*	

Learning Resources	**Theory:** 1. Bharucha Erach, (2013), Textbook of Environmental Studies for Undergraduate Courses (Second edition). Telangana, India: Orient BlackSwan. 2. Basu Mahua, Savarimuthu Xavier, (2017), SJ Fundamentals of Environmental Studies. Cambridge, United Kingdom: Cambridge University Press 3. Dr.R.Jeyalakshmi.2014.,Text book of Environmental Studies, Devi publications, Chennai 4. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad – 380013, India, Email:mapin@icenet.net (R)

Learning Assessment

Level	**Bloom's Level of Thinking**	**Continuous Learning Assessment (50% weightage)**								**Final Examination (50% weightage)**	
		CLA – 1 (10%)		**CLA – 2 (10%)**		**CLA – 3 (20%)**		**CLA – 4 (10%)#**			
		Theory	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**	**Theory**	**Practice**
Level 1	Remember	40%	-	40%	-	40%	-	40%	-	40%	-
	Understand										
Level 2	Apply	30%	-	30%	-	30%	-	30%	-	30%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	**Experts from Academic**	**Internal Experts**
1. Mr. Suresh S, Program Head, Hello FM	*1. Dr. G Balasubramania Raja, Prof & Head, Manonmaniam Sundranar University Mail- gbs_raja@yahoo.com*	*1. Dr. Rajesh R, Head, SRM IST*
		2.Dr.S.Albert Antony Raj, Associate Professor and Head, SRMIST

Course Code	UJK20501T	Course Name	Leadership and Management Skills	Course Category	JK	Life Skill Courses	L	T	P	C
							2	0	0	2

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Career Development Centre	Data Book / Codes/Standards	-		

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	help students to develop essential skills to influence and motivate others
CLR-2 :	Inculcate emotional and social intelligence and integrative thinking for effective leadership
CLR-3 :	create and maintain an effective and motivated team to work for the society
CLR-4 :	nurture a creative and entrepreneurial mindset
CLR-5 :	make students understand the personal values and apply ethical principles in professional and social contexts
CLR-6 :	manage competency-mix at all levels for achieving excellence with ethics

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Application of Concepts	Link with Related Disciplines	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	examine various leadership models and understand / assess their skills, strengths and abilities that affect their own leadership style and can create their leadership vision	3	80	75	L	M	H	-	M	M	-	-	-	M	H	L	-	H	H
CLO-2 :	learn and demonstrate a set of practical skills such as time management, self-management, handling conflicts, team leadership, etc	3	80	75	L	M	H	-	M	M	-	-	-	M	H	L	-	H	H
CLO-3 :	understand the basics of entrepreneurship and develop business plan	3	75	70	L	M	H	-	M	M	-	-	-	M	H	L	-	H	H
CLO-4 :	apply the design thinking approach for leadership	3	75	70	L	M	H	-	M	M	-	-	-	M	H	L	-	H	H
CLO-5 :	appreciate the importance of ethics and moral values for making of a balanced personality	3	75	70	L	H	H	-	M	M	-	-	-	M	H	L	-	H	H
CLO-6 :	be an integral human being	3	75	70	L	H	H	-	M	M	-	-	-	M	H	L	-	H	H

Duration (hour)		6	6	6	6	6
S-1	SLO-1	**Leadership - definition**	Team building	Management – definition	***Women in management***	*Entrepreneurship*
	SLO-2	**Leadership - qualities**	Team dynamics	Manager – traits	***Global gender perspective in business. Do women make good managers? - discussion***	*Entrepreneurship*

S-2	**SLO-1**	**Leadership - styles**	Work delegation	Scheduling work	***Confronting problems faced by women managers - case study***	*Successful Indian entrepreneurs – case study*
	SLO-2	**Leadership - styles**	Work delegation – activity	Scheduling work – activity	***Confronting problems faced by women managers - case study***	*Successful Indian entrepreneurs – case study*
S-3	**SLO-1**	***Difference between leader and boss***	Decision making	*Strategic planning*	***Successful women managers - documentary screening***	*Successful women entrepreneurs – case study*
	SLO-2	***Case study (based on leadership styles)***	Decision making - activity	*Strategic planning*	***Successful women managers - documentary screening***	*Successful women entrepreneurs – case study*
S-4	**SLO-1**	***Case study (based on leadership styles)***	Motivation	Change management	***Women labour force in work place***	*Ethics – definition*
	SLO-2	***Case study (based on leadership styles)***	Motivating for results	Change management – activity	***Problems faced by women labour force in work place - case study***	*Corporate ethics*
S-5	**SLO-1**	Leadership in diverse organizational structures, cultures and communications	Argumentation, Persuasion	*Energy management*	Sexual harassment of women at workplace (prevention, prohibition, and redressal) Act, 2013	***Essential elements of business ethics***
	SLO-2	Leadership in diverse organizational structures, cultures and communications	Negotiation , Networking	*Novel ways to manage energy in work place – activity*	Documentary screening - Sexual harassment of women at workplace	***Activity (students formulate ethical code of their business organization)***
S-6	**SLO-1**	Leading the organisation through stability and turbulence	Budget planning	*Work force management*	Transgender persons protection of rights act, 2019	***Ethical dilemma***
	SLO-2	Case study	Taking risk	*Grievance redressal policy in organisations*	Documentary screening –based on inclusiveness of the third gender in workplace	***Ethical dilemma - case study***

Learning Resources	1. *Craig E Johnson, Meeting the ethical challenges of leadership, Sage publications, 2018* 2. *Allan R Cohen, David L Bradford, Influence without authority, Wiley, 2018* 3. *T V Rao, Managers who make a difference: Sharpening your management skill, Random house India, 2016*	4. *Alexander Osterwalder, Business Model Generation,Wiley, 2013* 5. *Deborah Tannen, Talking from nine to five: Women and men in the workplace, Harper Collins publishers, 2010* 6. ***Amish Tandon, Law of sexual harassment at workplace: Practice and procedure,Niyogi books, 2017*** 7. ***Rashmi Bansal, Connect the dots, Westland books, 2012***

Learning Assessment					
Level	Bloom's Level of Thinking	Continuous Learning Assessment (100% weightage)			
		CLA-1 (20%)	CLA-2 (20%)	CLA-3 (30%)	CLA-4 (30%) ##
		Theory	Theory	Theory	Theory
Level 1	Remember	10%	10%	30%	15%
	Understand				
Level 2	Apply	50%	50%	40%	50%
	Analyze				
Level 3	Evaluate	40%	40%	30%	35%
	Create				
	Total	100 %	100 %	100 %	100 %

CLA-1, CLA-2 and CLA-3 can be from any combination of these: Online Aptitude Tests, Classroom Activities, Case Studies, Poster Presentations, Power-point Presentations, Mini Talks, Group Discussions, Mock interviews, etc.
CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
1. Ajay Zener, Director, Career Launcher	-	*1. Ms Sindhu Thomas B, Assistant Professor & Head in Charge, CDC, FSH, SRMIST*
		2. Mr Rajsekar, Assistant Professor, CDC, FOM, SRMIST

SEMESTER VI

Course Code	UBT20601J	Course Name	IMMUNOTECHNOLOGY	Course Category	C	*Professional Core Course*	L	T	P	C
							4	0	4	6

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,
CLR-1 :	Understanding the basics of immune reactions
CLR-2 :	Understanding the properties of antigens and function of immunoglobulins
CLR-3 :	Understanding the importance antigrn antibogy interaction in defense action
CLR-4 :	Knowledge on B & T cell response
CLR-5 :	Knowledge on immunological basis of AIDS, transplantation
CLR-6 :	Understanding the response of immune system

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO – 2	PSO – 3
CLO-1 :	Acquired basic Knowledge on immune cells, organs	2	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-2 :	Basic Knowledge on antigen, immunoglobulins	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-3 :	Strong basis for understanding the interactions of antigen & antibody	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-4 :	Better knowledge gained about immune response	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-5 :	Better knowledge gained about immune response in disease	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-6 :	Overall understanding of immune system in response reactions	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-

Duration (hour)		24	24	24	24	24
S-1	SLO-1	Introduction to immunology	Antigen – structure	Antigen - Antibody interaction introduction	Cell mediated immunity introduction	Autoimmunity- Introduction
	SLO-2					
S-2	SLO-1	Types of immunity-innate	Antigen -properties	Agglutination reactions	T cell activation	Mechanism of induction of organ specific
	SLO-2		types			
S-3	SLO-1	Types of immunity- acquired	Adjuvant	Precipitation reaction	proliferation	Autoimmunity-systemic
	SLO-2		Hapten			
S-4	SLO-1	Types of immunity- acquired	Superantigen	Immunodiagnosis	differentiation	Autoimmunity-systemic

	SLO-2					
S 5-8	SLO-1 SLO-2	Lab safety rules	Pregnancy test	Counter current immunoelectrophorosis	Reptition of experiment	Reptition of experiment
S-9	SLO-1 SLO-2	Phagocytosis - O_2 dependent	Opsonization	Immunodiagnosis	Humoral immune response	Rheumatoid arthiritis
S-10	SLO-1 SLO-2	Phagocytosis - O_2 independent	Immunoglobulin – structure function	Immunodiagnosis	B cell activation	Rheumatoid arthiritis
S-11	SLO-1 SLO-2	Celle of immune system	Immunoglobulin – structure function	Immunodiagnosis	proliferation	Immune response to tumor Immunodeficiency diseases (AIDS)
S-12	SLO-1 SLO-2	Celle of immune system	Immunoglobulin – structure function	Monoclonal antibody- Introduction	differentiation	Transplantation- Introduction
S 13-16	SLO-1 SLO-2	Agglutination: ABO Blood grouping	Single Radial immunodiffusion	Rocket immunoelectrophorosis	Reptition of experiment	Reptition of experiment
S-17	SLO-1 SLO-2	organs of immune system-primary	Components of complement system-classical	production	Hypersensitivity-I	Transplantation- Types
S-18	SLO-1 SLO-2	organs of immune system-secondary	Components of complement system-alternate	applications	Hypersensitivity-II	Transplantation- Types
S-19	SLO-1 SLO-2	organs of immune system-secondary	Components of complement system-lectin	Cytokines production	Hypersensitivity-III	immunologic basis of graft rejection.
S-20	SLO-1 SLO-2	Associated lymphoid tissues	Major Histocompatibility Complex	Cytokines functions	Hypersensitivity-IV	immunologic basis of graft rejection.
S 21-24	SLO-1 SLO-2	WiDALtest	Ouchterlony double immunodiffusion	DOT ELISA.	Reptition of experiment	Model exam

Learning Resources	1. Richard A. Goldsby “Immunology” 2. Barbara, A. Osborne, Janis KubyImmunology”, 5th Edition, W. H. Freeman & Company, 2006 3. Ivan Roitt. Element of Immunology. Wiley Blackwell publication, 13th edition, 2017

Learning Assessment											
	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)#			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	*Dr. S. VIJAYABHARATHI, SRMIST*

Course Code	UBT20602J	Course Name	rDNA TECHNOLOGY	Course Category	C	*Professional Core Course*	L	T	P	C
							4	0	4	6

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,	Learning	Program Learning Outcomes (PLO)

		1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLR-1 :	Understanding the basics of immune reactions			
CLR-2 :	Understanding the properties of antigens and function of immunoglobulins			
CLR-3 :	Understanding the importance antigrn antibogy interaction in defense action			
CLR-4 :	Knowledge on B & T cell response			
CLR-5 :	Knowledge on immunological basis of AIDS, transplantation			
CLR-6 :	Understanding the response of immune system			

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					Fundamental Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO – 2	PSO – 3
CLO-1 :	Acquired basic Knowledge on immune cells, organs	2	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-2 :	Basic Knowledge on antigen, immunoglobulins	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-3 :	Strong basis for understanding the interactions of antigen & antibody	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-4 :	Better knowledge gained about immune response	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-5 :	Better knowledge gained about immune response in disease	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-
CLO-6 :	Overall understanding of immune system in response reactions	3	85	80	L	H	H	H	H	-	-	M	M	L	-	H	-	-	-

Duration (hour)		24	24	24	24	24
S-1	SLO-1	History	Plasmid cloning vector PBR322	Bacterial Conjugation	Steps in molecular cloning Choice of host organism and cloning vector	Primer designing
	SLO-2	origin				
S-2	SLO-1	recognition site	Plasmid cloning vector PBR322	Transformation- principle	Steps in molecular cloning Choice of host organism and cloning vector	Primer designing
	SLO-2	types				
S-3	SLO-1	artificial enzymes	Vectors based on the lambda Bacteriophage	Transformation-procedure	Preparation of vector DNA	Variants of PCR
	SLO-2					
S-4	SLO-1	nomenclature	Vectors based on the lambda Bacteriophage	Transduction- principle	Preparation of vector DNA	RT - PCR
	SLO-2					

S 5-8	SLO-1 SLO-2	Isolation of Genomic DNA- plant	Restriction enzyme digestion-plasmid DNA	Transformation	northern blotting,	Repetition lab
S-9	SLO-1 SLO-2	application	Cosmids	Episomes	Preparation of DNA to be cloned	multiplex PCR
S-10	SLO-1 SLO-2	factors influence restriction enzyme activity	M13	Microinjection	Preparation of DNA to be cloned	nested PCR
S-11	SLO-1 SLO-2	factors influence restriction enzyme activity	Expression vectors	Electroporation	Creation of recombinant DNA with DNA ligase	Identification of PCR product
S-12	SLO-1 SLO-2	Star Activity	Vectors for cloning in Eukaryotic cells	Microprojectile	Introduction of recombinant DNA into host organism	Factors influencing PCR
S 13-16	SLO-1 SLO-2	Isolation of Genomic DNA- animal	Ligation	Colony PCR	northern blotting,	Repetition lab
S-17	SLO-1 SLO-2	What are modifying enzymes	expression in Eukaryotic cells	Shot Gun method	,Selection of organisms containing vector sequences	Cloning of PCR products
S-18	SLO-1 SLO-2	Function and types	YACs	Ultrasonication	,Selection of organisms containing vector sequences	Application of PCR technology
S-19	SLO-1 SLO-2	Application	BACs	Liposome fusion	Applications of molecular cloning	Molecular markers: RFLP, RAPD
S-20	SLO-1 SLO-2	Discussion	Function of YACs AND BACs	Microlaser	Applications of molecular cloning.	Molecular markers: SSCP and SNP
S 21-24	SLO-1 SLO-2	Plasmid DNA isolation	Transformation	Restriction enzyme digestion-genomic DNA	PCR	Model Exam

Learning Resources	1. Sandy B. Primrose and Richard Twyman, *"Principles of Gene Manipulation and Genomics*", 2009. 2. Desmond S. T. Nicholl. *"An Introduction to Genetic Engineering*" 2008.

Learning Assessment											
	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%)			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Short Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr. RAVISHANKAR	*Dr. SUMATHI, MGR University Chennai*	*Dr.D. SANKARI, SRMIST*

Course Code	*UBT20D08L*	Course Name	MINI PROJECT AND DISSERTATION	Course Category	E	Discipline Specific Elective Courses	L	T	P	C
							0	0	16	8

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Biotechnology	Data Book / Codes/Standards	Nil		

Course Learning Rationale (CLR):	The purpose of learning this course is to,
CLR-1 :	To test the ability to identify research gap
CLR-2 :	To test the ability to idetify the problem
CLR-3 :	To test the ability to devise a plan of study
CLR-4 :	To teach how to determine the methodology
CLR-5 :	To test the practical knowledge
CLR-6 :	To teach how to write a dissertation

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Fundamental Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO – 2	PSO – 3
CLO-1 :	Knowledge on reading the review of literature	2	85	80	H	H	H	H	-	-	-	H	H	-	H	H	H	H	H
CLO-2 :	Knowledge on problem solving methods	3	85	80	H	H	H	H	-	-	-	H	H	-	H	H	H	H	H
CLO-3 :	Knowledge on devising methodologies	3	85	80	H	H	H	H	-	-	-	H	H	-	H	H	H	H	H
CLO-4 :	Hands- on knowledge on various techniques	3	85	80	H	H	H	H	-	-	-	H	H	-	H	H	H	H	H
CLO-5 :	Knowlwdge to interpret the results	3	85	80	H	H	H	H	-	-	-	H	H	-	H	H	H	H	H
CLO-6 :	Understanding the importance of presentation and dissertation	3	85	80	H	H	H	H	-	-	-	H	H	-	H	H	H	H	H

Learning Assessment				
Project Work / Internship	Continuous Learning Assessment (50% weightage)		Final Evaluation (50% weightage)	
	Review – 1	Review – 2	Project Report	Viva-Voce
	20%	30 %	30 %	20 %