

CURRICULUM
(R2015)
CHOICE BASED CREDIT SYSTEM
(Applicable to the batches admitted from July 2015)
B.Sc. BIOTECHNOLOGY
I-VI SEMESTERS
SEMESTER - I

Part	Category	Sub Code	Sub Name	No. of periods per week			Credit	
				L	T	P		
THEORY								
Part I	HS	BAL101	Part - I -Tamil-I / Hindi-I / French – I	4	0	0	4	
Part II	HS	BEH101	Part - II- English	4	0	0	4	
Part III	MC	BBS101	Cell Biology	3	1	0	4	
	MC	BBS102	Genetics	3	1	0	4	
	MC	BBS103	Bioinstrumentation	3	1	0	4	
	PRACTICAL							
	MC	BBS1L1	Cell Biology Lab	0	0	4	2	
	AE		Seminar	1	0	0	-	
			Total				22	

SEMESTER - II

Part	Category	Sub Code	Sub Name	No. of periods per week			Credit
				L	T	P	
THEORY							
Part I	HS	BAL201	Part- II-Tamil- II/ Hindi - II /French – II	3	0	0	3
Part II	HS	BEH201	English – II	3	0	0	3
Part	MC	BBS201	Principles of	3	1	0	4

III			Biochemistry				
	MC	BBS202	Industrial Biotechnology	3	1	0	4
	MC	BBS203	Basics of Computer	3	1	0	4
	PRACTICAL						
	MC	BBS2L1	Biochemistry Lab	0	0	4	2
Part	HS	BCI204	Environmental Studies	2	0	0	2
IV	EC	BBC206	Value Education	2	0	0	2
Total							24

SEMESTER - III

Part	Category	Sub Code	Sub Name	No. of periods per week			Credit
				L	T	P	
THEORY							
Part I	HS	BAL301	Tamil- III/ Hindi-III /French – III	4	0	0	4
Part II	HS	BEH301	English – III	4	0	0	4
Part III	MC	BBS301	Microbiology	3	1	0	4
	MC	BBS302	Enzymology	3	0	0	3
	MC	BBS303	Bioinformatics	3	0	0	3
	PRACTICAL						
	MC	BBS3L1	Microbiology lab	0	0	4	2
Part IV	NE	BAL002 BCA3E1	Non Major Elective I – for those who studied Tamil under Part I a) Basic Tamil for other language students b) Special Tamil for those who studied Tamil upto 10 th +2 but opt for other languages in degree programme.	2	0	0	2
Total							22

SEMESTER - IV

Part	Category	Sub Code	Sub Name	No. of periods per week			Credit	
				L	T	P		
THEORY								
Part I	HS	BAL401	Tamil-IV / Hindi-IV /French-IV	3	0	0	3	
Part II	HS	BEH401	English-IV	3	0	0	3	
Part III	MC	BBS401	Molecular biology	3	1	0	4	
	MC	BBS402	Bio processing Technology	3	1	0	4	
	MC	BBS403	Genetic Engineering	3	1	0	4	
	PRACTICAL							
	MC	BBS4L1	Molecular biology and Genetic engineering lab	0	0	4	2	
Part IV	NE	BAL004	Non Major Elective II – for those who studied Tamil under Part I a) Basic Tamil for other language students	2	0	0	2	
		BCA4E1	b) Special Tamil for those who studied Tamil upto 10 th +2 but opt for other languages in degree programme					
	SE	BBS4E3	Skill Based Elective I	2	0	0	2	
Total							24	

SEMESTER - V

Part	Category	Sub Code	Sub Name	No. of periods per week			Credit
				L	T	P	
THEORY							

Part III	MC	BBS501	Immunology	3	2	0	5
	MC	BBS502	Molecular Genetics	3	1	0	4
	MC	BBS503	Plant & Animal Biotechnology	3	2	0	5
	ME	BBS5E4	Major Elective – I	4	0	0	4
	PRACTICAL						
	MC	BBS5L1	Immunology Lab	0	0	4	2
	MC	BBS5L2	Bioprocess Lab	0	0	4	2
Part IV	SE	BBS5E5	Skill Based Elective – II	2	0	0	2
	SE	BBS5E6	Skill Based Elective – III	2	0	0	2
Total							26

SEMESTER - VI

Part	Category	Sub Code	Sub Name	No. of periods per week			Credit
				L	T	P	
THEORY							
Part III	MC	BBS601	Environmental Biotechnology	3	1	0	4
	MC	BBS602	Nanobiotechnology	3	1	0	4
	ME	BBS6E7	Major Elective – II	3	0	0	3
	PRACTICAL						
	MC	BBS6L1	Plant & Animal Biotechnology Lab	0	0	4	2
	EE	BBS6P1	Project	0	0	12	6
PartV	EE	BBS6V1	Extension Activities	-	0	2	1
Total							20
GRAND TOTAL							138

LIST OF ELECTIVES

SUBJECT CODE	SUBJECT	L	T	P	C
MAJOR ELECTIVE – I					
BBS551	BIO FERTILIZER TECHNOLOGY	4	0	0	4
BBS552	HERBAL TECHNOLOGY	4	0	0	4
BBS553	VERMICULTURE	4	0	0	4
BBS554	BIOPHARMACEUTICAL TECHNOLOGY	4	0	0	4

BBS555	DAIRY TECHNOLOGY	4	0	0	4
BBS556	CANCER TECHNOLOGY	4	0	0	4
BBS557	WASTE MANAGEMENT TECHNOLOGY	4	0	0	4
BBS558	BIOFUEL TECHNOLOGY	4	0	0	4
MAJOR ELECTIVE – II					
BBS651	INDUSTRIAL SAFETY ENGINEERING	3	0	0	3
BBS652	STEM CELL AND TISSUE ENGINEERING	3	0	0	3
BBS653	GENOMICS AND PROTEOMICS	3	0	0	3
BBS654	BIostatISTICS	3	0	0	3
BBS655	FOOD PROCESS TECHNOLOGY	3	0	0	3
BBS656	FERMENTATION TECHNOLOGY	3	0	0	3
BBS657	MEDICAL BIOTECHNOLOGY	3	0	0	3

NON MAJOR ELECTIVE (NE) I

Sub Code	Sub Name	L	T	P	C
BAL002	Basic Tamil – I for those who studied other language under Part I	2	0	0	2
BCA3E1	Special Tamil – I for those who studied Tamil under Part I	2	0	0	2

NON MAJOR ELECTIVE (NE) II

Sub Code	Sub Name	L	T	P	C
BAL004	Basic Tamil – II for those who studied other language under Part I	2	0	0	2
BCA3E1	Special Tamil – II for those who studied Tamil under Part I	2	0	0	2

	□□□□□ -I	L	T	P	C
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LIST OF SKILL BASED ELECTIVES (Choose any three courses – one in semester IV & two in semester V):

S.NO	Sub Code	Sub Name	L	T	P	C
1	BBA011	BPO Management	1	0	2	2
2	BBE002	Desk Top Publishing	1	0	2	2
3	BCA001	Computer Application	1	0	2	2
4	BCA002	Graphical and Web Design	1	0	2	2
5	BCA003	Multimedia	1	0	2	2
6	BCA004	Networking and Maintenance	1	0	2	2
7	BCA006	Web Designing	1	0	2	2
8	BSC001	Animation	1	0	2	2
9	BSC002	Computer Hardware and Networking	1	0	2	2
10	BSC003	Computer Programming	1	0	2	2
11	BSC004	Computer Technology	1	0	2	2

	Total Contact Hours – 60	4	0	0	4
	Prerequisite course – +2 Level Tamil				
	Course Coordinator Name& Department: முனைவர்.ம.சித்ரா கண்ணு & தமிழ்த்துறை				

COURSE OBJECTIVES : இருபதாம் நூற்றாண்டு இலக்கியம் மற்றும் மொழி வரலாற்றை அறியச் செய்தல்

COURSE OUTCOMES (COs)

CO1	இருபதாம் நூற்றாண்டு கவிதை இலக்கியத்தைப் பற்றி அறிவர்
CO2	இருபதாம் நூற்றாண்டு கட்டுரை இலக்கியத்தைப் பற்றி அறிவர்
CO3	இருபதாம் நூற்றாண்டு சிறுகதை இலக்கியத்தைப் பற்றி அறிவர்
CO4	இக்கால இலக்கிய வரலாறு பற்றி அறிவர்
CO5	மொழி வரலாறு – செம்மொழி பற்றி அறிவர்
CO6	தற்கால இலக்கியத்தில் ஆழ்ந்த அறிவைப் பெறுவர்

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	M	
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies	Basic Sciences	Engg Sciences	Professional Core (PC)	Core Elective	Non-Major Elective	Open Elective	Any other	Project/Term Paper/Seminar/ Internship (PR)	
		✓									
4	Approval	Academic Council Meeting									

SEMESTER I

அலகு -1

இருபதாம் நூற்றாண்டு கவிதைகள்

9

1. பாரதியார் -யாமறிந்த மொழிகளிலே
2. பாரதிதாசன்-நீங்களே சொல்லுங்கள்!
3. கண்ணதாசன் -அழகை
4. பெருஞ்சித்திரனார்- தமிழா நீ எங்கே?

5. தமிழ் ஒளி - (I) வள்ளைப்பாட்டு (II) பட்டமரம்
6. அப்துல் ரகுமான் - கல்லின் காயம்

அலகு -2 உரைநடை (I) 4 கட்டுரைகள் 9

1. மனிதனும் அழகும் - திரு.வி.க.2. வீட்டிற்கோர் புத்தகசாலை-அறிஞர் அண்ணா
3. பொறியியல் தமிழ் - நா. மால் முருகன்
4. தேசியமறை திருக்குறள் - வ.சுப.மாணிக்கம்

அலகு -3 உரைநடை (II) சிறுகதை - 4 கதைகள் 9

1. நட்சத்திரக் குழந்தைகள் - பி.எஸ்.இராமையா2. விடியுமா-கு.ப.ராசகோபாலன்
3. குருபீடம் - ஜெயகாந்தன்4. கடவுளும் கந்தசாமிப் பிள்ளையும்-புதுமைப்பித்தன்

அலகு -4 இக்கால இலக்கிய வரலாறு 9

1. இருபதாம் நூற்றாண்டு கவிதை இலக்கிய வரலாறு
2. இருபதாம் நூற்றாண்டு உரைநடை இலக்கிய வரலாறு
3. இருபதாம் நூற்றாண்டு சிறுகதை இலக்கிய வரலாறு

அலகு -5 மொழி வரலாறு 9

1. தமிழ்மொழி வரலாறு 2. உலகச் செம்மொழிகளின் வரலாறு
3. தமிழுக்கும் உலகச் செம்மொழிகளுக்குமான உறவு வரலாறு

பாட நூல்கள்:

1. இருபதாம் நூற்றாண்டு கவிதை, உரைநடை, சிறுகதை(அலகு-3) பாரத் பல்கலைக்கழக வெளியிடு

பார்வை நூல்கள்

1. சு. ஆனந்தன், "தமிழ் இலக்கிய வரலாறு", பாரி நிலையம், 2012
2. ஞானப்பிரகாசர், "தமிழ் அமைப்புற்றவரலாறு", வியாபார ஐக்கிய சங்கம், 2012
3. ஞா.தேவநேயன், "தமிழ் வரலாறு", பூம்புகார் பதிப்பகம், 2009
4. ஞா.தேவநேயன், "முதல் தாய்மொழி", பூம்புகார் பதிப்பகம், 2008
5. ஞா.தேவநேயன், "சுட்டு விளக்கம்", பூம்புகார் பதிப்பகம், 2006
3. மெளனி, "மெளனி படைப்புகள்", காலச்சுவடு பதிப்பகம், 2010
4. புதுமைப்பித்தன், "காஞ்சனை", அன்னம் பதிப்பகம், 2013

பாடநெறி ஒருங்கிணைப்பாளர்

துறைத்தலைவர்

	Hindi-I	L	T	P	C
BAL101	Total Contact Hours – 60	4	0	0	4
	Prerequisite course – Hindi as second language in Grade 12				
	Course Coordinator Name & Department:- Mrs Rani Selvan & Department of Hindi				
COURSE OBJECTIVES: -					
To understand , read, write and speak Hindi language with grammatical.					

COURSE OUTCOMES (COs)											
CO1	Remember the behaviour										
CO2	Understand the importance of money by story										
CO3	Apply the concept of Hindi grammar										
CO4	Analyze the usage of translation from English to Hindi										
CO5	Evaluate the unseen passage to answer the questions										
CO6	Create the knowledge in Hindi Language										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H		
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
		✓									
4	Approval	Academic Council Meeting									

UNIT I

9

NAVEEN GADYA CHAYANIKA – 2 - Bholaram ka jeev - Mehamaan se Bhagavaanbachaaye -
NumberovaliThijori – Kaffan - Gunda

UNIT II

9

NON DETAILED TEXT: KAHANI KUNJ - Stories: 6 – 10 only

UNIT II

9

GRAMMAR: SHABDA VICHAR ONLY - NOUN, PRONOUN, ADJECTIVE, VERB, TENSE, CASE ENDINGS - Theoretical & Applied

UNIT-I **9**

TRANSLATION - English – Hindi only - ANUVADH ABHYAS – III - 1 – 15 Lessons Only

UNIT V **9**

COMPREHENSION - 1 Passage from ANUVADH ABHYAS – III (16 – 30)

TEXT BOOKS:

UNIT 1 - Dakshina Bharat Hindi Prachar Sabha, Chennai – 600017

UNIT II - Govind Prakashan, SadharBagaar, Mathura, Uttar Pradesh – 281001 - Editor:

Dr V.P. Amithab

UNIT III - Vyakaran Pradeep by Ramdev - Hindi Bhavan, 36, Tagor Town, Allahabad –

211002.

UNIT IV - Dakshina Bharat Hindi Prachar Sabha, Chennai – 600017.

UNIT V - Dakshina Bharat Hindi Prachar Sabha, Chennai – 600017

CourseCoordinator

HOD

BAL101	Française	L	T	P	C
	Total Contact Hours – 60	4	0	0	4
Prerequisite course – French as second language in Grade 12					
Course Coordinator Name & Department:- Ms. Tushita Naidu K / Département De Française					

COURSE OBJECTIVES: -

Initier les étudiants aux principes de base et à la pratique de la communication orale et écrite.

COURSE OUTCOMES (COs)											
CO1	Comprendre les bases de la langue.										
CO2	Analyser les modèles de phrases et former la grammaire.										
CO3	Pour apprendre les bases de la grammaire ainsi que ses principes.										
CO4	Se souvenir de l'anatomie des conjugaisons.										
CO5	Créer des dialogues et des conversations par eux-mêmes dans la langue et pratiquer des compétences orales et écrites.										
CO6	Se souvenir des règles nécessaires de la langue										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H		
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
		√									
4	Approval	Academic Council Meeting									

UNIT I - Vous comprenez

9

Alphabets - French Accents - Les Nombres – Pronunciations.

UNIT II Au travail!

9

Masculine Singular and Feminine singular - Conjugaison des verbes (present tense) -

Les articles définis.

UNIT III En se detend? 9

Conjugaison (faire-aller-venir-Vouloir-Pouvoir-Devoir)

UNIT IV Racontez-moi 9

La date et l'heure – les saisons – les couleurs

UNIT V Bon voyage! 9

Adjectifs demonstratives - Adjectifs possessives - Les Voyages / les transport-Bon appétit!-
Article

partitif - Emploi des articles - Interrogation (Forme avec inversion) - Les repas - La fête

TEXT BOOKS:

A1 ECHO- J. GIRARDET, J. PECHEURB CLE PUBLICATION.

Course Coordinator

HOD

BEH101	ENGLISH I	L	T	P	C
	Total Contact Hours – 60	4	0	0	4
	Prerequisite course – + 2 level English				
	Course Coordinator Name & Dept: Mrs. SHEEBA - English				
COURSE OBJECTIVES:- :- To use English effectively for study purpose and enable the learner to communicate appropriately in real life situation.					
COURSE OUTCOMES (COs)					

CO1	Remember and recall the words according to the given context.										
CO2	Understand the necessity of grammar in Communication										
CO3	Apply the plots and themes discussed										
CO4	Analyze the various characters involved										
CO5	Evaluate the characters and summarizes the prescribed literature										
CO6	Create essays by evaluating the literary techniques and devices used.										
Mapping of Course Outcomes with Program outcomes (POs)											
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PS O1	PSO2	PS O3
2	CO1	H	L						H		
	CO2	H	L								
	CO3	H	L								
	CO4	H	L								
	CO5	H	L								
	CO6	H	L								
3	Category	Humanities & Social Studies (HS)		Basic Sciences (BS)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
		✓									
4	Approval	Academic Council Meeting									

UNIT I –POETRY

12

Lucy Gray William Wordsworth – Author biography – Summary – Critical Analysis - Ulysses Alfred Lord Tennyson– Author biography – Summary – Critical Analysis - The Road Not Taken – Robert Frost – Author biography – Summary – Critical Analysis

UNIT II – ONE ACT PLAYS

12

The Boy Comes Home - A.A.Milne – Author biography – Summary – Critical Analysis - The Referee - W.H.Andrews and Geoffrey Dearmer – Author biography – Summary – Critical Analysis

UNIT III- SHORT STORIES**12**

The Unicorn in the Garden – James Thurber – Author biography – Summary – Critical Analysis -
 The Avenger – Anton Chekov – Author biography – Summary – Critical Analysis - The Gift of the
 Magi - O.Henry – Author biography – Summary – Critical Analysis

UNIT IV –PROSE B**12**

Six Thinking Hats - Edward de Bono– Author biography – Summary – Critical Analysis - My Early
 Days Abdul Kalam – Author biography – Summary – Critical Analysis- I Have a Dream Martin
 Luther King– Author biography – Summary – Critical Analysis.

UNIT V – GRAMMAR**12**

Introduction to Basics of Communication Definitions, Types Listening Speaking Reading Writing

TEXT BOOKS:

1. Six Thinking Hats by Edward de Bono, Little Brown and Company, 1985
2. My Early Days by Abdul Kalam, October 7, 2013

REFERENCE BOOKS:

1. English for Communication by Board of Editors, Emerald
2. Roche Marc, “Advanced English Writing Skills: Master class for English Language, Roche Publishing ESL, 2019
3. Strings of Gold (Part- II) Edited by Prof. Jasbir Jain (MacMillan), 2007

Course Coordinator**HOD**

	CELL BIOLOGY	L	T	P	C
BBS101	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – Biology at Higher Secondary Education				
	Course Coordinator Name & Department :- Dr. S.Sharmila & Biotechnology				
COURSE OBJECTIVES: - Learners will be familiar with the basics of Cells and cellular components. Learners will understand the structure, function and its types.					

COURSE OUTCOMES (COs)											
CO1	Recall the history and fundamental principles of cellular biology										
CO2	Understand the cellular components, their structure and functions										
CO3	Apply the role of cell organelles in physiology										
CO4	Analyze the cell cycles and growth of cells										
CO5	Analyze the molecular and sub-cellular components of a cell to a framework of heredity and evolution.										
CO6	Analyze the mechanism and types of cancer.										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	L	
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

UNIT

12

An Overview of cells – **Origin and evolution of cells**- Cell theory, Classification of cells – Prokaryotic cells and Eukaryotic cells- **Comparison of prokaryotic and eukaryotic cells** **Cell cycle – components in cell cycle control** – cyclic- CDKs – check points in cell cycle - abnormalities in cell cycle.

UNIT II

12

Cell Membrane – Fluid mosaic model of membrane structure- **Membrane proteins** and their

properties-Membrane carbohydrates and their role- **Transport across membranes** – Diffusion - active and passive diffusion.

UNIT III **12**
 Endoplasmic reticulum – Types, structure and function- Golgi apparatus – Structure and function-Lysosome– **Structure and functions- Morphology and functions of peroxisomes and glyoxisomes**-Ribosomes – Types structure and function.

UNIT IV **12**
 Nucleus: Structure and function. Chromosomes, chromatin structure- **Mitochondria – Structure and functions**- Cytoskeleton: Types of filaments and their functions. Microtubules – Chemistry and functions – **Cilia and flagella**- Cell –cell interactions.

UNIT V **12**
 Introduction to Necrosis, **Senescence**, Apoptosis – Programmed cell death- Mechanism of Apoptosis- Oncogenes – Types of cancer.

TEXT BOOKS:

1. Harvey Lodish, Arnold Berk, Chris A. Kaiser and Monty Krieger. Molecular CellBiology, 4th ed., WH Freeman and Co, New York, 1999.
2. Cooper, Geoffrey M, Sunderland. The Cell - A Molecular Approach, SinauerAssociates, 2nd ed., Inc, 2000.

REFERENCE BOOKS:

1. Alexander Johnson, Julian Lewis, Martin Raff, Keith Roberts, and Peter Walter. Molecular Biology of the Cell, Garland Science publisher, USA, 4th ed, 2002.
2. Gerald Karp. Cell and Molecular Biology: Concepts and Experiments, 4th ed., NCBI mart, 2004.

Course Coordinator

HOD

BBS102	GENETICS	L	T	P	C
	Total Contact Hours – 60	3	1	0	4
Prerequisite course – Biology at Higher Secondary Education					
Course Coordinator Name & Department :- Dr. S.Selvakumar & Biotechnology					

COURSE OBJECTIVES: - Learners will be familiar with the fundamental knowledge on laws of genetics, inheritance, and heredity. Learners will understand the causes of genetic disorders and the methods

of gene transfer.

COURSE OUTCOMES (COs)

CO1	Recal the basics about genes and hereditary.
CO2	Understand the structure and organization of genetic materials
CO3	Understand the different laws of genetics.
CO4	Apply the concept of alleles to ABO blood grouping
CO5	Apply pedigree analysis to understand genetic disorders
CO6	Analyze the molecular mechanism of crossing over

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	L	
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval		Academic Council Meeting								

UNIT I

12

Classical genetics, Mendelian Laws- Mendel's experiment-monohybrid cross-phenotype, genotype, Dihybrid inheritance, Interaction of genes, Fine structure of Genes.

UNIT II

12

Chromosome structure and organization in prokaryotes and eukaryotes, Unusual chromosomes-chromosome banding, chromosome abnormalities- genetic disorders.

UNIT III

12

Classical concepts of allelomorphism, Multiple alleles, ABO blood groups, Rh factor, sex linkage in Drosophila, linkage in human beings, mechanism of sex determination, XX-XY mechanisms of sex determination, sex determination in Drosophila, environmental factors and sex determination, sex differentiation.

UNIT IV

12

Coupling and Repulsion-Hypothesis, Test cross in maize and crossing over, theory of crossing over, molecular mechanism of crossing over, sex chromosomes and sex linked inherited disorders, colour blindness, hemophilia, Muscular dystrophy.

UNIT V

12

Transformation, Transduction, Conjugation, Plasmids and Episomes.

TEXT BOOKS

1. Gardener EJ, Simmons MJ and Snustad DP. Principles of Genetics, J.Wiley and Sons Pubs., 1998.
2. Obe G and Natarajan AT. Chromosomal Aberrations: Basic and Applied aspects, Springer Verlag, Berlin, 1990.
3. Tamarin R.H. (2012). Principles of Genetics. Tata McGrawHill, New York

REFERENCE BOOKS:

1. Winter PC, Hickey GI, and Fletcher HL. Instant notes in Genetics, Viva Books Pvt.Ltd. 2003
2. Sinha U, Sunita Sinha, and Vikas. Cytogenetics, Plant Breeding and evolution, Publishing House Private, Limited, 1998
3. Brooker, R.J. (1999). Genetics, Principles and Analysis. Addison Wesley Longman, California.
4. Gardner, E.J. (2011). Human Genetics. Viva Books Pvt. Ltd., India.

Course Coordinator

HOD

BBS103	BIOINSTRUMENTATION	L	T	P	C
	Total Contact Hours – 60	3	1	0	4
Prerequisite course – Biology at Higher Secondary Education					
Course Coordinator Name & Department :- Dr.S.Anbuselvi & Biotechnology					

COURSE OBJECTIVES: - Learners will be familiar with basic instruments used in the field of biochemistry, microbiology and biotechnology. Learners will understand the theory and application of chromatography, electrophoresis, spectroscopy and radioisotope techniques.

COURSE OUTCOMES (COs)

CO1	Recall basic principles and concepts of different instrumentation
CO2	Understand the applications of various instruments.
CO3	Understand basic parameters of different equipment.
CO4	Apply knowledge in working of devices.
CO5	Apply different instruments for desired applications.
CO6	Analyze the data from devices and interpret the results

Mapping of Course Outcomes with Program outcomes (POs)
(H/ML indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M							H	M
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

UNIT I

12

Sedimentation Principle, Types of rotors, Preparative and Analytical Centrifuges, Density Gradient Centrifugation, Differential centrifugation.

UNIT II

12

Exchange Chromatography, Affinity Chromatography, GLC and HPLC.

UNIT III **12**

Theory and Application of PAGE, Agarose Gel Electrophoresis 2DE, Iso-electric Focusing, Immuno diffusion, Immuno Electrophoresis, ELISA, RIA, Southern, Northern and Western Blotting.

UNIT IV **12**

Theory and Application of UV and Visible Spectroscopy, Fluorescence Spectroscopy, MS, NMR, ESR, Atomic Absorption Spectroscopy.

UNIT V **12**

Introduction to Radioisotopes and their Biological Applications, Radioactive Decay – Types and Measurement, Principles and Applications of GM Counter, Solid and Liquid Scintillation Counter, Autoradiography, RIA.

TEXT BOOKS

1. Webster JG. Bioinstrumentation. John Wiley & Sons Incorporated; 2004.
2. Wilson PD, Wilson K, Walker J, Walker JM, editors. Principles and techniques of practical biochemistry. Cambridge University Press; 2000.
3. Veerakumari L. Bioinstrumentation. MJ Publisher; 2019.

REFERENCE BOOKS:

1. Katoch R. Analytical techniques in biochemistry and molecular biology. Springer Science & Business Media; 2011.
2. Kates M, Work E. Laboratory techniques in biochemistry and molecular biology. North-Holland Publishing Company; 1986.
3. Harvey DT. The Essence of Chromatography. ACS Publications; 2003.
4. Westermeier R, Westermeier R. Electrophoresis in practice. Weinheim Germany: Wiley-Vch; 2001.

Course Coordinator

HOD

		Total Contact Hours –30	0	0	4	2					
		Prerequisite course – Biology at Higher Secondary Education									
		Course Coordinator Name & Department :- Dr. S.Sharmila & Biotechnology									
COURSE OBJECTIVES: - Learners will be familiar with basic cell biology experiments. Learners will understand the microscopical observation of cells											
COURSE OUTCOMES (COs)											
CO1	Perform the differential staining and measure osmotic potential.										
CO2	Differentiate the structure of prokaryotes and eukaryotes										
CO3	Grasp the microscopic observation of chromosomes in cells.										
CO4	Manipulate the estimation of Hb, WBC and RBC levels as compared to the control										
CO5	Sketch the difference between mitosis and meiotic division										
Mapping of Course Outcomes with Program outcomes (POs) (H/ML indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M							H	M
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

I QUALITATIVE ANALYSIS

1. Cell Division: Mitosis – onion root tip: Meiosis – Transdescantia
2. Polytene chromosomes – chironomous larvae
3. Microscopic observation of prokaryotic and eukaryotic cell (differential staining)
4. Screening of leaf pigments – paper chromatography
5. Haemoglobin estimation
6. WBC and RBC count – Haemocytometer
7. Osmotic potential – (sucrose / salt solution)

II PERMANENT SLIDE OBSERVATION

8. Meiosis
9. Plant cell
10. Mitochondria
11. Chloroplast

TEXT BOOKS

1. Smith and Wood, Cell Biology, Chapman and Halls, 1996.
2. Bruce Alberts and other, Molecular Biology of the Cell, Garland Publishing, 3rd ed., 1994.
3. Veerakumari L. Bioinstrumentation. MJP Publisher; 2019.

REFERENCE BOOKS:

1. Julio E. Celis, Cell Biology: A Laboratory Handbook, Academic Press, 3rd ed, 2005.
2. Gerald Karp, Cell and Molecular Biology”, John Wiley and Sons Inc. New York, 1996.
3. Kates M, Work E. Laboratory techniques in biochemistry and molecular biology. North-Holland Publishing Company; 1986.
4. Harvey DT. The Essence of Chromatography. ACS Publications;2003.
5. Westermeier R, Westermeier R. Electrophoresis in practice. Weinheim Germany: Wiley-Vch; 2001.

Course Coordinator

HOD

SEMESTER II

BAL201	□□□□□ - II	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite course- TAMIL – I				
	Course Coordinator Name& Department: முனைவர்.ம.சித்ரா கண்ணு & தமிழ்த்துறை				

COURSE OBJECTIVES : சிற்றிலக்கியம் மற்றும் சமய இலக்கியத்தை அறியச் செய்தல்

COURSE OUTCOMES (COs)

CO1	சிற்றிலக்கியமான தூது,பள்ளு ,குறவஞ்சி பற்றி அறிந்துகொள்வர்
CO2	சைவ சமயஇலக்கியம்பற்றி அறிந்துகொள்வர்
CO3	வைணவ சமயஇலக்கியம்பற்றி அறிந்துகொள்வர்
CO4	பௌத்த, இசுலாம், கிறித்துவ சமயஇலக்கியம்பற்றி அறிந்துகொள்வர்
CO5	சிற்றிலக்கியம் மற்றும் சமய இலக்கிய வரலாறுபற்றி அறிந்துகொள்வர்
CO6	சிற்றிலக்கியம் மற்றும்சமய இலக்கியம் பற்றிய தெளிவான அறிவைப் பெறுவர்

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	M	M
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
		✓									
4	Approval	Academic Council Meeting									

அலகு 1

அழகர்கிள்ளைவிடுதூது

முக்கூடற்பள்ளு - நாட்டுவளம்

9

- 1 - 20

- 21,22,25,26,35

திருக்குற்றாலக்குறவஞ்சி- குறத்திமலைவளங்கூறுதல் - 1 - 5

அலகு2

அற்புதத்திருவந்தாதி - 1 - 5 9
திருஞானசம்பந்தர் - தேவாரம் - திருவெண்காட்டுப்பதிகம் - 1 - 10
மாணிக்கவாசகர் - திருவாசகம் - திருச்சாழல் - 1 - 10

அலகு3

பெரியாழ்வார் - முதல்திருமொழி - 1 - 10 9
ஆண்டாள் - திருப்பாவை - 1 - 10
தொண்டரடிப்பொடிஆழ்வார் - திருமாலை - 1 - 5

அலகு4

ஆசியஜோதி - கருணைக்கடல் - அறவுரைகூறுதல் - 1 - 10 9
பராபரக்கண்ணி - குணங்குடிமஸ்தான்சாகிபு - 1 - 20
இயேசுகாவியம் - பாடுகளின்பாதை - கண்ணதாசன்

அலகு5

சிற்றிலக்கியவரலாறு ,சமயஇலக்கியவரலாறு

பாட நூல்கள்

1. கதிர்முருகு, "அழகர்கிள்ளைவிடுதாது", சாரதாபதிப்பகம், 2011
2. சோ.கந்தசாமி"பன்னிருதிருமுறை", உலகத்தமிழாராய்ச்சிநிறுவனம், 2008
3. கண்ணதாசன், "இயேசுகாவியம்", கண்ணதாசன்பதிப்பகம், 2014

பார்வைநூல்கள்

1. கதிர்முருகு, "முக்கூடற்பள்ளுமூலமும்உரையும்", சாரதாபதிப்பகம், 2017
2. புலியூர்க்கேசிகன், "திருக்குற்றாலக்குறவஞ்சி", செண்பகாபதிப்பகம், 2010
3. தமிழமுதன், "அற்புதத்திருவந்தாதி", பாரிநிலையம், 2011
4. த.கோவேந்தன், "நாலாயிரத்திவ்யப்பிரபந்தம்உரை", சாரதாபதிப்பகம், 2015
5. கமலாமுருகன், "ஆசியஜோதிமூலமும்உரையும்", சாரதாபதிப்பகம், 2012
6. கமலாமுருகன், "பராபரக்கண்ணிமூலமும்உரையும்", சாரதாபதிப்பகம், 2013
7. சு.ஆனந்தன், "தமிழ்இலக்கியவரலாறு", பாரிநிலையம், 2018

பாடநெறி ஒருங்கிணைப்பாளர்

துறைத்தலைவர்

	Hindi-II	L	T	P	C
BAL201	Total Contact Hours – 45	3	0	0	3
	Prerequisite course – Grade 12				
	Course Coordinator Name & Department:- Dr. K. MustakHusaaain / Department of Hindi				

COURSE OBJECTIVES: -

To understand and improve the skills in the Language of Hindi

COURSE OUTCOMES (COs)

CO1 Remember of Ramayana In Sabari part

CO2 Understand the historical stories

CO3 Apply the concept of translation

CO4 Analyze and develop the letter writing skills

CO5 Analyze and develop the speaking skills

CO6 Apply the knowledge in letter writing and speaking skills

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H		
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
		✓									
4	Approval		Academic Council Meeting								

UNIT I**9**

MODERN POETRY - SHABARI

UNIT II**9**

ONE ACT PLAY - EKANKI SANKALAM

UNIT III **9**

TRANSLATION - HINDI – ENGLISH ONLY

UNIT IV **9**

LETTER WRITING - Leave letter - Job Application - Ordering books - Letter to Publisher
- Personal letter

UNIT V **9**

CONVERSATION - Doctor & Patient - Teacher & Student - Storekeeper & Buyer - Two
Friends - Booking clerk & Passenger at Railway station – Auto rickshaw driver and
passenger.

Text Books:

By Naresh Mehtha, Veerendra Kumar Mishra

Reference Books:

UNIT 1 – Publisheres - LokbharathiPrakashan ,1 Floor, DuebariBuilding,Mahathma Gandhi
Marg,

Allahabad – 1.

UNIT II – Publishers – Vani Prakasam, New Delhi-110002

UNIT III – Publishers – Dakshin Bharath Hindi Prachar Sabha, Chennai- 17

CourseCoordinator

HOD

	Française -II	L	T	P	C
BAL201	Total Contact Hours – 45	3	0	0	3
	Prerequisite course – French as second language in Grade 12				
	Course Coordinator Name & Department: - Ms. Tushita Naidu K / Département De Française				

COURSE OBJECTIVES: -

Présenter aux élèves la complexité de la grammaire et comment la surmonter avec des règles simples

COURSE OUTCOMES (COs)

CO1	Être capable d'interpréter la langue.
CO2	Se familiariser avec les approches méthodologiques de l'étude des textes littéraires et culturels, telles que la lecture attentive, la contextualisation socio-historique et la théorie littéraire et culturelle.
CO3	Acquérir une maîtrise avancée du français parlé et écrit.
CO4	Encourager le développement de compétences en linguistique, en traduction et en études comparatives.
CO5	Se souvenir de l'anatomie des conjugaisons au passé.
CO6	Pour évaluer le texte donné de manière critique et améliorer les compétences en communication.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H		
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS) √	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)	
4	Approval		Academic Council Meeting								

UNIT I -Quelle journée!

9

La Conjugaison pronominale -L'imperatif -L'expression de la quantité (peu-in peu de- quelque – etc.)

UNIT II - Qu'on est bien ici !

9

Prepositions et adverbs de lieu - Verbs exprimant un déplacement (employ des prepositions)

Le lodgement/la localisation/ l'orientation/l'etat physique/le temps qu'il fait

UNIT III -En se detend? 9

L'imparfait-Emplois du passé composé et de l'imparfait-Expression de la durée-L'enchaînement des idées (alors, donc, mais) /Le sens réciproque

UNIT IV- On s'appelle? 9

Les pronoms compléments direct -Les pronoms compléments indirects de personne -c'est/ il est- Imperatif des verbes avec pronoms-La formation des mots

UNIT V Un bon conseil ! 9

Expression du déroulement de l'action--passé récent--Présent progressif-future proche-Les phrases rapportées- La place de l'adjectif- La proposition relative finale avec -qui

TEXT BOOKS:

A1 ECHO- J. GIRARDET, J. PECHEURB CLE PUBLICATION.

Course Coordinator

HOD

	ENGLISH II	L	T	P	C
BEH201	Total Contact Hours – 60	3	0	0	3
	Prerequisite course – + 2 level English				
	Course Coordinator Name & Dept.: Mr.S.KUMARESAN - English				
COURSE OBJECTIVES:- To have a better understanding of the English language skills and its implementation in day to day life activities.					
COURSE OUTCOMES (COs)					

CO1	Remember and recall the concepts of English language										
CO2	Understand the necessity of grammar in Communication										
CO3	Apply the plots and themes discussed										
CO4	Analyze the various characters involved										
CO5	Evaluate the characters and summarize the prescribed literature										
CO6	Create essays by evaluating the literary techniques and devices used.										
Mapping of Course Outcomes with Program outcomes (POs)											
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PS O	PSO2	PS O3
2	CO1	H	L						H		
	CO2	H	L								
	CO3	H	L								
	CO4	H	L								
	CO5	H	L								
	CO6	H	L								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)	
		✓									
4	Approval	Academic Council Meeting									

UNIT 1: PROSE

12

The Refugee – K.A. Abbas – Author biography – Summary – Critical Analysis.- The Lion and the Lamb – Leonard Clark – Author biography – Summary – Critical Analysis.

UNIT 2: POEMS

12

1. The Solitary Reaper – William Wordsworth – Author biography – Summary – Critical Analysis.- Gift – Alice Walker – Author biography – Summary – Critical Analysis.

UNIT 3: SHORT STORIES**12**

The Fortune-Teller – Karel Capek – Author biography – Summary – Critical Analysis - The Postmaster – Rabindranath Tagore – Author biography – Summary – Critical Analysis.

UNIT 4: ONE-ACT PLAYS**12**

The Death Trap – Saki (H.H. Munro) – Author biography – Summary – Critical Analysis -. The Dear Departed: A Comedy in One-Act – Stanley Houghton – Author biography – Summary – Critical Analysis.

UNIT 5: COMMUNICATIVE GRAMMAR**12**

Seeking and giving information – statements and questions 2. Being informal – phrasal verbs 3. Expressing ability, possibility, etc – Modals and other devices

TEXT BOOKS:

1. The Death Trap by Saki, The Novels and Plays of Saki, 2001
2. Pooja Khanna, “English Communication”, S.CHAND Publishing, 2016
3. Rabindranath Tagore, “The Postmaster”, Penguin India, 2000

REFERENCE BOOKS:

1. K.A.Abbas Suresh Kohli, “An Evening in Calcutta”, HarperCollins, 2015
2. Stanley Houghton, “Five one act plays”, Alpha Edition, 2019
3. Edited Prof. Jasbir Jain, “Strings of Gold (Part- II)”, MacMillan, 2016

Course Coordinator**HOD**

	PRINCIPLES OF BIOCHEMISTRY	L	T	P	C
BBS201	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – Biology at Higher Secondary Education				
	Course Coordinator Name & Department :- Dr.S.Anbuselvi & Biotechnology				

COURSE OBJECTIVES: -

Learners will be familiar with basic principles of biochemistry. Learners will understand the bioenergetics

and biomolecular structures.

COURSE OUTCOMES (COs)

CO1	Recall the basic properties of water, acids, bases and buffer.
CO2	Understand the structures of Carbohydrates, proteins, amino acids and lipids
CO3	Understand the structural aspects of protein and enzymes; Factors influencing enzyme activity.
CO4	Apply knowledge in the law of thermodynamics
CO5	Apply chromatographic technique to separate biological materials
CO6	Analyze the enzyme activity, mechanisms and kinetics

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L--Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	M	
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval		Academic Council Meeting								

UNIT I

12

Aqueous solutions - properties of water - hydrogen ion concentration - acids, bases and their concept - buffers and electrolytes and their functions - acidity, alkalinity and pH determination.

UNIT II

12

Bioenergetics - energy and its forms - free energy - laws of thermodynamics - enthalpy and entropy - redox potential - redox coupling and ATP bioenergetics.

UNIT III **12**

A brief account on the biochemistry of Carbohydrates (sugars, starch, cellulose), Lipids (triglycerides, fats), Proteins (structural, catalytic) - primary, secondary, tertiary and quaternary structure and characteristics of proteins and amino acids.

UNIT IV **12**

Enzymes: classification and nomenclature of enzymes - physico chemical nature of enzymes - enzyme kinetics - mechanism of enzyme action - factors affecting enzyme activity

UNIT V **12**

A brief account on the biochemistry of the secondary plant products: Alkaloids, flavonoids, anthocyanins, terpenes - Elementary treatment of fractionation of biological materials by chromatography (PC,TLC), electrophoresis (principle and types), centrifugation (principle and types).

TEXT BOOKS:

1. Murray K, Rodwell V, Bender D, Botham KM, Weil PA, Kennelly PJ. Harper's illustrated biochemistry. 28. New York: McGraw-Hill; 2009.
2. Lehninger AL, Nelson DL, Cox MM. Principles of Biochemistry. 3rd edit. (2000). CBS publishers, New Delhi.
3. Satyanarayana, U., and U. Chakrapani. "Biochemistry, Books and allied (P) Ltd." 2006.

REFERENCE BOOKS:

1. Henrissat, Bernard. "A companion for students of enzymology: Understanding Enzymes, 3rd edn by Trevor Palmer, Ellis Horwood, 1991
2. Voet, Donald, Judith G. Voet, and Charlotte W. Pratt. Fundamentals of biochemistry: life at the molecular level. 2013.
3. Champe, Pamela C., Richard A. Harvey, and Denise R. Ferrier. Biochemistry. Lippincott Williams & Wilkins, 2005.
4. Zubay GL, Parson WW, Vance DE. Principles of Biochemistry, Wm. C. C. Brown, Dubuque. 1996.

Course Coordinator

HOD

	INDUSTRIAL BIOTECHNOLOGY	L	T	P	C
BBS202	Total Contact Hours – 60	3	1	0	4
Prerequisite course – Biology at Higher Secondary Education					

Course Coordinator Name & Department :- Dr. S.Sharmila & Biotechnology

COURSE OBJECTIVES: - Learners will be familiar with major commercial products production using microbes. Learners will understand the different types of bioreactors and microbial culture process.

COURSE OUTCOMES (COs)

CO1	Recall the different microorganisms involved in production of commercial products.
CO2	Understand methods of the strain improvement.
CO3	Understand the features, and operations of different type of fermenters.
CO4	Apply the stoichiometry of bioprocess
CO5	Apply downstream processing techniques
CO6	Analyze the growth kinetics of microorganisms

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	M	
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					√						
4	Approval	Academic Council Meeting									

UNIT I

12

Introduction to biotechnology and products. Major classes of commercial products using microorganisms-enzymes, amino acids, vitamins, antibiotics, organic solvents, organic acids, food and beverages.

UNIT II**12**

Industrially important microorganisms: **screening techniques** - detection & assay of fermentation products-strain improvements - **mutations, protoplast fusion and rDNA techniques for strain development.**

UNIT III**12**

Bioreactors / Fermentor: Types, features, operation: sterilization (Batch and Continuous), inoculation and sampling. **Control of bioprocess parameters.** Microbial growth and media formulation. **Microbial culture - batch, fed batch, semi-continuous, continuous.** Growth kinetics of microorganisms

UNIT IV**12**

Downstream processing: Solid-liquid separation, flotation, flocculation, filtration, centrifugation, cell disruption, concentration, evaporation, **liquid-liquid extraction, membrane filtration,** precipitation, adsorption. **Product purification by chromatography.**

UNIT V**12**

Industrial process of beverages - enzymes - amino acid - organic acids - organic solvents – antibiotics-Introduction to nanotechnology - **history and recent developments** - **sources of nanoparticles** - microbial production of nanoparticles - advantages of microbial nanoparticles – applications

TEXT BOOKS:

1. Reed. C, Prescott and Dann's, Microbiology, Macmillan publishers. 1982.
2. Prave. P, Faust, V and Sutih. W, Fundamentals of Biotechnology, ASM press. 1987.
3. Demain A.L, Manual of industrial microbiology and Biotechnology, ASM press. 1986.
4. Satyanarayana, U, Biotechnology, Books and Allied (P) Ltd, 2006.

REFERENCE BOOKS:

1. Wulf Cruger and Anneliese Cruger, "A Textbook of Industrial Microbiology",Panima Publishing Corporation.
2. Michael J. Waites, Neil L.Morgan, John.S. Rockey and Grey Higton, "Industrial Microbiology": An Introduction, Blackwell science publishing house.
3. Casida Jr, L. E., "Industrial Microbiology", New Age International(p) Ltd
4. Prescott. Dunn, "Industrial Microbiology", Agrobios (India).

Course Coordinator**HOD**

	BASICS OF COMPUTER	L	T	P	C
	Total Contact Hours – 60	3	1	0	4

BBS203		Prerequisite course – Biology at Higher Secondary Education									
		Course Coordinator Name & Department :- Dr. S.Selvakumar & Biotechnology									
COURSE OBJECTIVES: - Learners will be familiar with computer usage and programming. Learners will Understand Components of Computer System											
COURSE OUTCOMES (COs)											
CO1	Recall the Basic Applications of Computer										
CO2	Understand Components of Computer System.										
CO3	Apply the Basics of Operating System.										
CO4	Analyze the PowerPoint presentation.										
CO5	Apply the Programming languages.										
CO6	Analyze the applications of Internet.										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M								
	CO2	H	M								
	CO3	H	M								
	CO4	H	M							H	M
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

UNIT I

12

Introduction - Basic Applications of Computer, Components of Computer System- Input devices; Output devices; Computer Memory; Concept of Hardware and Software; Antivirus

UNIT II**12**

Introduction- Basics of Operating System; Basics of popular operating system (LINUX, WINDOWS); the User Interface; Task Bar; Icons; Menu; Running an Application; Changing Mouse Properties.

UNIT III**12**

Introduction – Basics of PowerPoint presentation; Entering and Editing Text; Preparation of Slides and slideshow; Inserting Word Table or An Excel Worksheet; Adding Clip Art Pictures; Inserting Other Objects; Resizing and Scaling an Object Presentation of Slides; Choosing a Set Up for Presentation; Rehearse timing: Short cut keys

Introduction – Basics of Spreadsheets; Manipulation of Cells; Entering Text, Numbers and Dates; Creating Text, Number and Date Series; Editing Worksheet Data; Formatting spread sheet; Formulas and Function; Short cut keys

UNIT IV**12**

Introduction – Flowcharts – Algorithms - Pseudocodes – Programming languages: data types, variables, constants, operators, input output, expressions, control flow constructs (conditional and loop statements) - functions, arrays, structures and unions - Pointers - Data structures - File handling. Programming languages for Bioinformatics

UNIT V**12**

Introduction - Basic of Computer Networks; Local Area Network (LAN); Wide Area Network (WAN); Internet; Concept of Internet; Applications of Internet; Connecting to the Internet; Troubleshooting; World Wide Web (WWW). E-mail Account & Its Functions. Role of computer in Biological field.

TEXT BOOKS:

1. The complete reference Microsoft Reference access 2007 by Virginia Andersen

REFERENCE BOOKS:

1. Microsoft Office 2003: The Complete Reference (Osborne Complete Reference Series) by Jennifer Kettell, Guy Hart-Davis, Curt Simmons and Jennifer Kettell
2. E-Book: Microsoft Office 2010 Ultimate Tips & Tricks

Course Coordinator**HOD**

	BIOCHEMISTRY LAB	L	T	P	C
	Total Contact Hours – 30	0	0	4	2

BBS2L1		Prerequisite course – Biology at Higher Secondary Education									
		Course Coordinator Name & Department :- Dr.S.Anbuselvi & Biotechnology									
COURSE OBJECTIVES: - Learners will be familiar with various biochemical experiments .Learners will understand the principle and determination of biomolecules by each experiment.											
COURSE OUTCOMES (COs)											
CO1	Perform qualitative analyses of lipids										
CO2	Operates the amino-acids separation by TLC.										
CO3	Grasp the basic principle involved in qualitative analysis of amino acids										
CO4	Manipulates the determination of saponification, acid and iodine number										
CO5	Sketches the classification of carbohydrates										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M								
	CO2	H	M								
	CO3	H	M								
	CO4	H	M							H	M
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

I Analysis of Sugars

1. Monosaccharide-Glucose, Fructose, Galactose, Mannose, Pentose.

2. Disaccharides-Sucrose, Maltose and Lactose.

3. Polysaccharides-Starch and Dextrin.

II. Analysis of Amino Acids

1. Histidine

2. Tyrosine

3. Tryptophan

4. Methionine

5. Cysteine

6. Arginine

III Lipid Analysis [Group Experiments]

1. Determination of Saponification number.

2. Determination of Acid number.

3. Determination of Iodine number.

IV Demonstration Experiments

1. Separation of amino acids by TLC.

TEXT BOOKS

1. Wilson PD, Wilson K, Walker J, Walker JM, editors. Principles and techniques of practical biochemistry. Cambridge University Press; 2000.
2. Mu P, Plummer DT. Introduction to practical biochemistry. Tata McGraw-Hill Education; 2001.
3. Varley H. Practical clinical biochemistry. Practical clinical biochemistry. 1954.

REFERENCE BOOKS:

1. Jayaraman J, Jayaraman J. Laboratory manual in biochemistry. Delhi: Wiley Eastern; 1981.
2. Fasman GD. Practical handbook of biochemistry and molecular biology. CRC press; 1989.
3. Sawhney SK, Singh R, editors. Introductory practical biochemistry. Alpha Science Int'l Ltd.; 2000.
4. Wood EJ, editor. Practical biochemistry for colleges. Elsevier; 2012.

Course Coordinator

HOD

BCI203	ENVIRONMENTAL STUDIES	L	T	P	C
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	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – Biology at Higher Secondary Education				
	Course Coordinator Name & Department :- Dr.S.Anbuselvi & Biotechnology				

COURSE OBJECTIVES: - To make the students learn about the science from the basic and understood all theoretical background with all concepts thoroughly to protect the habitat of biotic and abiotic ecosystem

COURSE OUTCOMES (COs)

CO1	Recall the basic concepts of natural resources, ecosystem and environmental pollution
CO2	Understand about the Biodiversity and its conservation
CO3	Analyze Environmental Pollution and Management.
CO4	Apply organic environmental approach to protect our habitat for the next generation.
CO5	Analyze the impact of population and Urbanization to affect the system of habitat loss
CO6	Analyze case studies relate to environment and health.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M							H	M
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

Introduction to Environmental Sciences: Natural Resources: Environmental sciences – relevance – significance – public awareness – forest resources – water resources – mineral resources – food resources – conflicts over resource sharing – exploitation – land use pattern – environmental impact – fertilizer – pesticide Problems - case studies

UNIT II

6

Ecosystem, Biodiversity and its conservation: Ecosystem – concept – structure and function – producers, consumers and decomposers – food chain – food web – ecological pyramids – energy flow – forest, grassland, desert and aquatic ecosystem – definition – genetic, species and ecosystem diversity – biodiversity – definition – genetic, species and ecosystem diversity – values and uses of biodiversity – biodiversity at global, national (india) and local levels – hotspots, threats to biodiversity – conservation of biodiversity – insitu and ex-situ..

UNIT III

6

Environmental Pollution and Management- Environmental pollution – causes – effects and control measures of air, water, marine, soil, solid waste. Thermal, nuclear pollution and disaster management – floods, earth quake, cyclone and land slides, role of individuals in prevention of pollution – pollution case studies.

UNIT IV

6

Social issues – Human population: Urban issues – energy – water conservation – environmental ethics – global warming – resettlement and rehabilitation issues – environmental legislations – environmental production act. 1986 – air, water, wildlife and forest B.C.A.: syllabus (CBCS) conservation act – population growth and explosion – human rights and value education – environmental health – HIV/AIDS – role of it in environment and human health – women and child welfare – public awareness – case studies

UNIT V

6

Visit to a local area / local polluted site / local simple ecosystem – report submission.

TEXT BOOKS:

1. Sharma J.P., 'Environmental Studies', 3rd Edn, University Science Press, New Delhi (2009)
2. Anubha Kaushik and C.P.Kaushik, 'Environmental Science and Engineering', 3rd Edn New age International Publishers, New Delhi (2008)
3. K. Kumarasamy, A. Alagappa Moses and M. Vesanthy, 2004, Environmental Studies, Bharathidasan University Pub, 1, Trichy.

REFERENCE BOOKS:

1. Rajamannar, 2004, Environmental Studies, EVR College Pub, Trichy.
2. S. Kalavathy, (ED.) 2004, Environmental Studies, Bishop Heber College Pub., Trichy
3. G.Tyler Miller, JR, 'Environmental Science', Tenth Edition, Thomson BROOKS/COLE (2004)
4. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd Edition Pearson Education (2004).

Course Coordinator

HOD

BSS201	VALUE EDUCATION						L	T	P	C	
	Total Contact Hours – 30						2	0	0	2	
	Prerequisite course – Higher Secondary level										
	Course Coordinator Name & Department:- Ms. G. Vinothini, Commerce										
COURSE OBJECTIVES: - To enable the students to understand the Social values. To provide knowledge on the features for life. To acquire the knowledge on Human rights. To impart the knowledge on Environment and Ecological balance. To educate the knowledge on Social evils..											
COURSE OUTCOMES (COs)											
CO1	Recall the basic concept of human values, Social Value role of medias, Self-introspection – Self esteem										
CO2	Understand the duties and responsibilities of individuals and role of media										
CO3	Apply Salient features for life, : Truth, commitment,, honesty and integrity, forgiveness and love and also positive creative thinking										
CO4	Demonstrate Universal declaration of Human rights, peace and nonviolence – Dr. APJ Abdul Kalam’s ten points for enlightened citizenship.										
CO5	Analyze living and nonliving environmental balance, Ecological balance and conservations and enrichment										
CO6	Manipulate the awareness on Corruption, crime, terrorism, Alcoholism, Drug addiction, Dowry										
Mapping of Course Outcomes with Program outcomes (POs)											
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO 1	PO2	PO3	PO4	PO5	PO 6	PO7	PS O1	PSO 2	PS O3
2	CO1	H	M	M					H		
	CO2	H	H	H		L					
	CO3	M	H	M	M						
	CO4	H	M	L							
	CO5	H	H	M			M				
	CO6	M	M	L							
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)	
		✓									
4	Approval	Academic Council Meeting									

UNIT I **6**

Value Education - Definition - relevance to present day - Concept of Human Values - self introspection - Self esteem.

UNIT II **6**

Family values - Components, structure and responsibilities of family - Neutralization of anger - Adjustability - Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

UNIT III **6**

Ethical values - Professional ethics - Mass media ethics - Advertising ethics - Influence of ethics on family life - psychology of children and youth - Leadership qualities - Personality development..

UNIT IV **6**

Social values- Faith, service and secularism - Social sense and commitment - Students and Politics - Social awareness, Consumer awareness, Consumer rights and responsibilities - Redressal mechanisms

UNIT V **6**

Effect of international affairs on values of life/ Issue of Globalization - Modern warfare – Terrorism- Environmental issues - mutual respect of different cultures, religions and their beliefs.

TEXT BOOK

1. N. Arumugam, S. Mohana, Lr. Palkani- value based education- Saras Publication, 2009
2. DN Ghose, Value Education- dominant publishers, 2005
3. M.G. Chitakra, Education and Human values, A.P.H Publishing Corporation. New Delhi

REFERENCE BOOKS

- 1) For Life, for the future: Reserves and Remains – UNESCO Publications.
- 2) Values, A Vedanta kesari presentations, Sri Ramakrishna Math, Chennai
- 3) Values for Excellence in Life Compiled by then Curriculum Development Cell Thiagarajar College, Madurai, in collaboration with the Education wing, Brahma Kumaris, Madura

Course Coordinator

HOD

SEMESTER III

BAL301	தமிழ் – III	L	T	P	C
	Total Contact Hours – 45	4	0	0	4
	Prerequisite course – TAMIL –II				
	Course Coordinator Name& Department : முனைவர்.ம.சித்ரா கண்ணு & தமிழ்த்துறை				

COURSE OBJECTIVES : காப்பிய இலக்கியம் மற்றும் நீதி இலக்கியத்தை அறியச் செய்தல்

COURSE OUTCOMES (COs)

CO1	ஐம்பெரும் காப்பியங்களைபற்றி அறிவர்
CO2	பிற்கால காப்பியங்களைபற்றி அறிவர்
CO3	முக்கால நீதி இலக்கியங்களைபற்றி அறிவர்
CO4	பிற்கால நீதி இலக்கியங்களைபற்றி அறிவர்
CO5	காப்பிய மற்றும் நீதி இலக்கிய வரலாற்றைபற்றி அறிவர்
CO6	காப்பியம் மற்றும் நீதி இலக்கியங்களில் தெளிவான அறிவைப் பெறுவர்

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	M	M
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
		✓									
4	Approval	Academic Council Meeting									

COURSE OUTCOMES (COs)											
CO1	Remember of Ramayana in Panchavati part										
CO2	Understand the history of Hindi literature										
CO3	Apply the concept of Hindi grammatical speech										
CO4	Analyze and develop the translation skills										
CO5	Evaluate and develop the unseen passage skills										
CO6	Create the skills in Hindi language										
Mapping of Course Outcomes with Program outcomes (POs)											
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H		
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
		√									
4	Approval	Academic Council Meeting									

UNIT I **9**
POETRY - PANCHAVATI

UNIT II **9**
HISTORY OF HINDI LITERATURE - Aadi Kaal and Bhakthi Kaal - general knowledge of the trends of the difference streams

UNIT III **9**
ALANKAR – Anupras – Yamak - Slesh - VakrokthiUpama – Rupak – Drishtanth –

Virodhabas.

UNIT IV **9**
TRANSLATION - HINDI – ENGLISH

UNIT V **9**
COMPREHENSION

Text Books:

By MaithilisharanGupt, AnuvadhAbhyas – III

Reference Books:

Publisheres - Dakshin Bharath Hindi Prachar Sabha, Chennai- 17

CourseCoordinator

HOD

	Française -III	L	T	P	C
BAL301	Total Contact Hours – 45	4	0	0	4
	Prerequisite course – French as second language in Grade 12				
	Course Coordinator Name & Department: - Ms. Tushita Naidu K / Département De Française				
COURSE OBJECTIVES :- Développer les aspects techniques de la langue et des nuances grammaticales variées pour interpréter le sujet.					

COURSE OUTCOMES (COs)											
CO1	Transmettre les différents aspects qui composent la langue.										
CO2	Pour apprendre certains faits, procédures, pratiquer certaines structures grammaticales et pratiquer des stratégies de communication.										
CO3	Pour apprendre la culture des natifs de la langue.										
CO4	Analyser les différences entre la grammaire de base et avancée.										
CO5	Se souvenir de l'interdépendance entre les conjugaisons										
CO6	Comprendre les restrictions grammaticales.										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H		
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
		✓									
4	Approval	Academic Council Meeting									

UNIT I Vivement demain!

9

Le future- La comparaison des qualities, des quantities et des actions

UNIT II Le Tu as du boulot?

9

	ENGLISH- III	L	T	P	C
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Le pronom (en)-Le pronom (Y)-Expression de la condition

UNIT III -Qu'en pensez - vous? 9

Le subjonctif (employ lie a quelques verbs)- Expression de la quantite (poids et mesure-
evaluation-restriction)

UNIT IV - C'est tout un programme! 9

Les propositions relatives introduites par (qui, que, ou)-Les adverbs (place, formation des adverbs
en-ment)-La forme ((en + participe present))

UNIT V On se retrouve ! 9

Emploi et conjugaison des quatre temps de l'indicatif quatre temps de l'indicatif:--passe recent--
Present -Passe compose-Imparfait et future

TEXT BOOKS:

A2 ECHO- J. GIRARDET, J. PECHEURB CLE PUBLICATION.

		Total Contact Hours – 60				4	0	0	4			
		Prerequisite course – + 2 level English										
		Course Coordinator Name & Dept: Mrs. B.JANUA SHERLY – English										
COURSE OBJECTIVES:- To enhance the reading, writing, listening and speaking of the English language skills..												
COURSE OUTCOMES (COs)												
CO1	Remember and recollect the value of LSRW skills.											
CO2	Understand the competence of the four modes of language skills.											
CO3	Apply the grammatical concepts and the correct usage of the English language.											
CO4	Analyze their personality traits and develop interpersonal skills for a better career in life											
CO5	Evaluate the knowledge and write resume official letters and reports											
CO6	Create and develop their ability as critical thinkers and readers.											
Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low												
1	COs/Pos	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PS O3	
2	CO1	H	L						H			
	CO2	H	L									
	CO3	H	L									
	CO4	H	L									
	CO5	H	L									
	CO6	H	L									
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)		
		✓										
4	Approval	Academic Council Meeting										

UNIT 1 - LISTENING SKILLS**12**

Types of Listening (Theory / Definition) - Tips for Effective Listening -Academic Listening (Lectures) - Listening to Radio and Television

UNIT 2 - TELEPHONE SKILLS**12**

Basics of Telephone communication -How to handle calls- telephone manners -Leaving a message - Making requests -Greeting and Leave Taking over phone (etiquette) - Handling the situations especially trouble shooting Teleconference - handling Tele interviews for Call Centers

UNIT 3 - WRITING SKILLS**12**

Standard Business letter - Report writing- Email drafting and Etiquettes - Preparing Agenda and writing minutes for meetings - Making notes on Business conversations

UNIT 4 - CAREER SKILLS**12**

Applying for job -Cover letters -Resume and Effective Profiling - Interviews - Group discussions

UNIT 5 – PERSONAL SKILLS**12**

Empathy (Understanding third person’s point of view) -Intrapersonal skills -Interpersonal skills- Problem solving

TEXT BOOKS:

1. Improve Your IELTS Listening and Speaking Skill by Barry Cusack, 2007
2. Roche Marc, “Advanced English Writing Skills: Master class for English Language, Roche Publishing ESL, 2019

REFERENCE BOOKS:

1. Frederick H. Wentz, “A Workbook to Develop Skills For Employment”, Create space Independent Pub,2012
2. S. P. Dhanavel, “English and Soft Skills”, Orient Black Swan, First edition, 2010
3. English for Communication by Board of Editors, Emerald

Course Coordinator**HOD**

	MICROBIOLOGY	L	T	P	C
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BBS301	Total Contact Hours – 60					3	1	0	4		
	Prerequisite course – Biology at Higher Secondary Education										
	Course Coordinator Name & Department:- Dr.L.Jeyanthi Rebecca & Biotechnology										
COURSE OBJECTIVES: -Learners will be familiar with basics of microbiology. Learners will understand the overall applications of microbiology in biotechnological field.											
COURSE OUTCOMES (COs)											
CO1	Recall the basics about microorganisms.										
CO2	Understand the classification and morphology of microbes.										
CO3	Apply the methods for identification of microorganisms.										
CO4	Apply techniques for the isolation and growth of microbes.										
CO5	Analyze the various roles of microorganisms in food and dairy Industry.										
CO6	Analyze the role of microorganisms in clinical diagnosis.										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	M	
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

UNIT I**12**

Microbiology - definition, history and scope – **Prokaryotes and eukaryotes** – Microorganisms- bacterial cell – size, shape and arrangement - General structure – functions of microbial cellular compounds (viruses, bacteria, algae, fungi, protozoa) –Microscopy – Principles of Light, dark field and **Phase contrast microscopy**.

UNIT II**12**

Principles & classification of microbes – binomial nomenclature **Whittaker five kingdom classification**– sterilization and disinfection - Physical and chemical methods of sterilization – MIC: Disc Diffusion, Well Diffusion; **Stain and staining methods – principles of staining - simple, differential, capsule, nuclear and spore staining methods**.

UNIT III**12**

Microbial media – Types of Media, Reviving, culturing and sub culturing of microbes; Isolation and enumeration of microorganisms in soil, water and air – methods of obtaining Pure cultures – Inoculum preparation- methods for microbial identification. Microbial growth – Phases of growth curve, **Factors influencing the growth of microbes-classification based on that. (Temperature, pH, Nutrition)** and nutritional types of microorganisms. .

UNIT IV**12**

Food and Industrial Microbiology - **Microbiology of fermented food and dairy products – cheese, yogurt**, Alcoholic beverages-beer, wine, biological specimen diagnosis, prevention and control of important microbial diseasesetc. **Food spoilage and Preservation processes**. Microbes as source of food - single cell protein, Application of Microbes in industries production of antibiotics (penicillin, streptomycin), amino acids (Glutamic Acid) **organic acids (citric acid and Lactic acid)**.

UNIT V**12**

Medical microbiology – pathogenesis, lab diagnosis, **Pathogenic bacteria diseases** (E.coli, Leprosy, **Tuberculosis, Salmonella typhi**, Staphylococcus aureus, Vibrato cholera), Fungal diseases- Mycotoxicoses (Candida sp, Aspergillus, Cryptococcus), Viral Diseases (HIV,Rabies,Hepatitis and Polio Virus) and Protozoan diseases (Plasmodium, Trypanosoma).

TEXT BOOKS:

1. Pelczar Chan and Klieg Tate, Microbiology, McGraw Hill Publications, 1993.
2. Pelczar, M. J, Reid R. D and Chan E. C. Microbiology,5th ed. New York: McGraw-Hill.1977.
3. Stainier RY, Ingraham JL, Wheelis ML & Painter PR General Microbiology. Publisher: MacMillan

REFERENCE BOOKS:

1. Jecquelyn G. and Black, Microbiology -Principles and Explorations.
2. Prescott, Harley and Klein, Microbiology, Fifth edition ,McGraw Hill publications, 2003.
3. Madigan M.T., Martinko J.M. and Parker J., Brock Biology of Microorganisms: Prentice-Hal, Inc USA.
4. Brock TD., Milestones in Microbiology, Infinity Books

Course Coordinator**HOD**

BBS302	ENZYMOLOGY	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite course – Biology at Higher Secondary Education				
	Course Coordinator Name & Department:- Dr.S.Anbuselvi & Biotechnology				

COURSE OBJECTIVES:-Learners will be familiar with classification of enzymes. Learners will understand their structure, kinetics, interactions and applications of enzymes.

COURSE OUTCOMES (COs)

CO1	Remember the basics concepts of enzymes and its characteristics.
CO2	Understand the mechanism of action of enzymes.
CO3	Apply the factors influencing rate of enzyme catalyzed reaction
CO4	Apply the kinetics for the enzymes catalyzed reactions
CO5	Analyze the regulation of enzymes and mechanisms involved.
CO6	Analyze the applications of enzymes and their immobilization methods.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	M	
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval		Academic Council Meeting								

UNIT I**12**

Classification - IUB system, rationale, overview and specific examples. Characteristics of enzymes, enzyme substrate complex. Concept of active centre, binding sites, stereo specificity and ES complex formation. Effect of temperature, pH and substrate concentration on reaction rate. Activation energy. Transition state theory. Enzyme activity, international units, specific activity, turnover number.

UNIT II**12**

Enzyme catalysis-Factors affecting catalytic efficiency - proximity and orientation effects, distortion or strain, acid - base and nucleophilic catalysis. Isoenzymes and multiple forms of enzymes. Mechanism of action chymotrypsin, ribonuclease.

UNIT III**12**

Michaelis - Menten Equation - form and derivation, steady state enzyme kinetics. Significance of V_{max} and K_m . Bisubstrate reactions. Graphical procedures in enzymology - advantages and disadvantages of alternate plotting. Enzyme inhibition - types of inhibitors - competitive, noncompetitive and uncompetitive, their mode of action and experimental determination.

UNIT IV**12**

Protein ligand binding including measurements, analysis of binding isotherms, cooperativity and kinetics of allosteric enzymes. Enzyme regulation: Product inhibition, feedback control, enzyme induction and repression and covalent modification. Allosteric regulation.

UNIT V**12**

Relative practical and economic advantage for industrial use, effect of partition on kinetics and performance with particular emphasis on charge and hydrophobicity (pH, temperature and K_m). Various methods of immobilization - ionic bonding, adsorption, covalent bonding (based on R groups of amino acids), microencapsulation and gel entrapment.

TEXT BOOKS:

1. Zubay GL, W M C, Biochemistry, 4th edition, Brown Publishers, 1988.
2. Nelson, David I and Cox, Principles of Biochemistry, Macmillan/worth, NY, 1999
3. Stryer L., Biochemistry. ,W.H. Freeman and Company.

REFERENCE BOOKS:

1. Berg JM, Tymoczko.JL, Stryer, L. Biochemistry. 6 th ed. Freeman, 2006.
2. Tripathi,G, Enzyme Biotechnology, ABD Publishers. 2009.
3. Devlin 's Textbook of Biochemistry with Clinical correlations. John Wiley and Sons Inc.
4. Mathews C.K.,Van Holde K.E. and Ahern K.G., Biochemistry, Benjamin /Cummings.

CourseCoordinator**HOD**

BBS303	BIOINFORMATICS					L	T	P	C		
	Total Contact Hours – 45					3	0	0	3		
	Prerequisite course – Biology at Higher Secondary Education										
	Course Coordinator Name & Department:- Dr.S.Selvakumar & Biotechnology										
COURSE OBJECTIVES: - Learners will be familiar with basics of bioinformatics in Bioscience field. Learners will understand the applications of sequence analysis and phylogenetic tree construction.											
COURSE OUTCOMES (COs)											
CO1	Remember the basic principle and applications of biological databases										
CO2	Understand the sequence alignment tools and its use.										
CO3	Apply the basic concepts of bioinformatic matrices.										
CO4	Analyze the various biological datas & bioinformatic tools										
CO5	Analyze the application of bioinformatics with the biological data										
CO6	Analyze the Bootstrapping strategies										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	M	
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

UNIT I **12**

Introduction to bioinformatics, **Biological data formats**. Application of bioinformatics in various fields .

UNIT II **12**

Biological databases – Nucleotide databases – **Genbank, EMBL, DDBJ**; Protein Sequence Databases – Swiss Prot, Trembl, PIR, **UNIPROT**, Various Data retrieval formats in biological databases – **ENTREZ, SRS**

UNIT III **12**

Sequence Analysis: sequence similarity, **identity and homology** - Definitions of homologues, **orthologues and paralogues**

Pairwise Sequence Alignment: Dot matrix, Dynamic programming alignment, BLAST and FASTA. Scoring matrices: **PAM and BLOSUM**.

UNIT IV **12**

Multiple Sequence Alignments (MSA): various approaches for MSA - Progressive, Hierarchical and Iterative – Clustal W, clustal X , T-COFFEE and their application for sequence analysis

UNIT V **12**

Evolutionary analysis: distances - **clustering methods** - rooted and un-rooted tree representation - Bootstrapping strategies – phylogenetic trees – **PHYLIP, PAUP**

TEXT BOOKS:

1. Introduction to Bioinformatics by Teresa Attwood and David Parry-Smith-2001

REFERENCE BOOKS

1. Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins by Andreas D. Baxevanis and B. F. Francis Ouellette -2002
2. Bioinformatics: Sequence and Genome Analysis, Second Edition by David W. Mount-2004
3. Essential Bioinformatics by Jin Xiong -2006
4. Introduction to Bioinformatics by Arthur M. Lesk-2008

Course Coordinator

HOD

BBS3L1	MICROBIOLOGY LAB	L	T	P	C
	Total Contact Hours – 30	0	0	4	2
	Prerequisite course – Biology at Higher Secondary Education				
	Course Coordinator Name & Department:- Dr.L.Jeyanthi Rebecca & Biotechnology				

COURSE OBJECTIVES:- Learners will be familiar with sterilization and inoculation methods. Learners will understand the staining method and microbes identification.

COURSE OUTCOMES (COs)

CO1	Perform the basic microbiological tests
CO2	Handle different sterilization and staining techniques.
CO3	Grasp different inoculation techniques.
CO4	Manipulates various biochemical tests.
CO5	Operates microscope for microbe identification.
CO6	Perform the basic microbiological tests

Mapping of Course Outcomes with Program outcomes (POs)
(L/M/H indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M								
	CO2	H	M								
	CO3	H	M								
	CO4	H	M							H	M
	CO5	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval		Academic Council Meeting								

1. Sterilization techniques
2. Demonstration of microbial culture
3. Simple staining - differential staining –capsular staining – spore staining – hanging drop
4. Inoculation techniques – pour plate – spread plate
5. Dilution techniques
6. Biochemical tests for bacterial identification – catalase test –oxidase test – IMVIC test
–
TSI test
7. Starch degradation –carbohydrate fermentation – Gelatin liquefaction
8. Viable bacteria – haemocytometer
9. Morphological identification of fungi.

TEXT BOOKS:

1. General Microbiology - Stanier R.Y., 5th edition, Macmillan Publication, UK. 1987.
2. Nina Parker, Microbiology Manual, OpenStax CNX,2001.
3. Stanier RY, Ingraham JL, Wheelis ML & Painter PR General Microbiology. Publisher: MacMillan

REFERENCE BOOKS:

1. Pelzer, Chan and Kreig. Microbiology. 5th Edition. McGraw-Hill. 1986.
2. James Cappuccino. Microbiology: A Laboratory Manual, 10 ed., Pearson, 2013.
3. Madigan M.T., Martinko J.M. and Parker J., Brock Biology of Microorganisms: Prentice-Hal, Inc USA.
4. Brock TD., Milestones in Microbiology, Infinity Books

Course Coordinator

HOD

BAL351	அடிப்படைத் தமிழ் - I	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – +2 Level Tamil				
	Course Coordinator Name & Department :- ஸ்ரீதேவி&தமிழ்த்துறை				

COURSE OBJECTIVES : தமிழ்மொழியின் அடிப்படைக்கூறுகள் பற்றி அறியச்செய்தல்

COURSE OUTCOMES (COs)

CO1	தமிழ் எழுத்துக்களை அறிவர்
CO2	தமிழ் எழுத்துக்களில் உள்ள வேறுபாடுகளை அறிவர்
CO3	சொல்லமைப்பு பற்றி அறிவர்
CO4	சொற்களை உருவாக்கும் அறிவை பெறுவர்
CO5	சொற்களை தொடராக மாற்றும் திறனை பெறுவர்
CO6	எழுத்துக்கள், சொற்கள், தொடர்கள் பற்றி தெளிவான அறிவை பெறுவர்

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	M	H						M	H	M
	CO2	M	H								
	CO3	M	H								
	CO4	M	H								
	CO5	M	H								
	CO6	M	H								
3	Category	Humanities & Social Studies (HSS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)	
						✓					
4	Approval	Academic Council Meeting									

அலகு -1

9

தமிழ் எழுத்து அறிமுகம் - உயிரெழுத்து - மெய்யெழுத்து - பெயர், முறை , வடிவம், ஒலி அளவு (மாத்திரை) - சுட்டு வினா எழுத்துக்கள் - எழுத்துக்களை கண்டறியும் பயிற்சி

அலகு - 2

12

உயிர்மெய் எழுத்துக்கள் - எண்ணிக்கை, பெயர், முறை , வடிவம், ஒலி அளவு (மாத்திரை) - எழுத்துக்களை அகரவரிசைப்படுத்துதல் - எழுத்து வேறுபாடு அறியும் பயிற்சி

அலகு - 3

12

சொல்லமைப்பு - ஒரேழுத்துச் சொற்கள், பல எழுத்துச் சொற்கள் - சொல்வகை - பெயர் வினை - சொற்பொருள் வேறுபாடு அறிதல் - சொற்களை உருவாக்கும் பயிற்சி

அலகு - 4

12

தொடர் அமைப்பு - சொற்கள் தொடராக அமையும் முறை - தொடர் வேறுபாடு - செய்தித் தொடர், வினாத் தொடர், உணர்ச்சித் தொடர், ஏவல் தொடர்- சொற்களை தொடரில் பயன்படுத்தும் பயிற்சி

பாட நூல்கள்

1. ஆறுமுகநாவலர், "தமிழ் இலக்கணம்", பாரிநிலையம், 2012
2. கழகப்புலவர்குழுவினர், "நன்னூல்-எழுத்ததிகாரம்", கழகவெளியீடு, 1996
3. கழகப்புலவர்குழுவினர், "நன்னூல்-சொல்லதிகாரம்", கழகவெளியீடு, 1996

பார்வைநூல்கள்

1. பவணந்திமுனிவர், "நன்னூல் -எழுத்ததிகாரம்", முல்லைநிலையம், 1994
2. சோம.இளவரசு, "நன்னூல்சொல்லதிகாரம்", : மெய்யப்பன்பதிப்பகம், 2012
3. கூழங்கைத்தம்பிரான், "நன்னூல்", உலகத்தமிழாராய்ச்சிநிறுவனம், 1998

பாடநெறி ஒருங்கிணைப்பாளர்

துறைத்தலைவர்

	சிறப்புத்தமிழ் - I	L	T	P	C
BAL351	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – Tamil Under Part 1				
	Course Coordinator Name& Department : முனைவர்.ம.சித்ரா கண்ணு & தமிழ்த்துறை				
COURSE OBJECTIVES : பண்டைத்தமிழரின்நாகரிகமும்பண்பாடும்பற்றி அறியச்செய்தல்					

COURSE OUTCOMES (COs)

CO1	தமிழரின் அரசியல், தொழில், சமூக அமைப்பு பற்றி அறிவர்
CO2	தமிழர் திருமண முறை, குடும்ப வாழ்வு பற்றி அறிவர்
CO3	தமிழரின் உணவு, உடை, உறைவிடம் பற்றி அறிவர்
CO4	தமிழரின் கல்வி, வானியல், விளையாட்டு, மகளிர், விழாக்கள் பற்றி அறிவர்
CO5	சங்ககால மருத்துவம், கட்டடக்கலை பற்றி அறிவர்
CO6	சங்ககால தமிழரின் நாகரிகம் பண்பாடு பற்றி தெளிவான அறிவைப் பெறும்

Mapping of Course Outcomes with Program outcomes (POs) (L/M/H indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	M			H				H	M	M
	CO2	M			H						
	CO3	M			H						
	CO4	M			H						
	CO5	M			H						
	CO6	M			H						
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)	
							✓				
4	Approval	Academic Council Meeting									

அலகு 1

9

நாகரிகமும் பண்பாடும் - சங்ககாலத்து அரசியல் நிலை - சங்ககாலத்தொழிற்பிரிவினரும் சமூக அமைப்பும்

அலகு 2

9

பண்டைத் தமிழர் திருமண முறை, நல்லறம் - குடும்ப வாழ்வு பற்றிய தமிழர் கொள்கை -
பண்டையத் தமிழரின் உணவு, உடை, உறையுள்

அலகு 3

9

பண்டைத் தமிழரின் கல்வி நிலை - பண்டைத் தமிழரின் வானியல் அறிவு -
பண்டைத் தமிழரின் விளையாட்டும் பொழுதுபோக்கும்

அலகு4

9

மகளிர் நிலை - சங்கத் தமிழரின் சமய வாழ்வு - சங்ககால விழாக்கள்

அலகு5

9

இந்திய நாகரீகத்தில் தமிழ்ப் பண்பாட்டுக்கூறுகள் - மருத்துவக் கலை - தமிழகக் கோயில் கட்டிடக்கலை வளர்ச்சி

பாடநூல்கள்

1. அ.தட்சிணாமூர்த்தி, "தமிழர்நாகரிகமும்பண்பாடும்", ஐந்திணைப்பதிப்பகம், 2010
2. பாவாணர், "பண்டைத்தமிழர்நாகரிகமும்பண்பாடும்", பூம்புகார்பதிப்பகம், 2012
3. கே.கே.பிள்ளை, "தமிழகவரலாறுமக்களும்பண்பாடும்", மணிவாசகர் பதிப்பகம், 2012

பார்வைநூல்கள்

1. நா. வானமாமலை, "தமிழ்ப்பண்பாடும் தத்துவமும்", அலைகள் வெளியீட்டகம், 2011
2. பேரின்பன், "தமிழர்வரலாறு: சிலகேள்விகளும் தேடல்களும்", அலைகள் வெளியீட்டகம், 2011
3. மா. இராசமாணிக்கனார், "தமிழகவரலாறும் தமிழ்ப்பண்பாடும்", செண்பகாபதிப்பகம், 2012

பாடநெறி ஒருங்கிணைப்பாளர்

துறைத்தலைவர்

SEMESTER IV

	□□□□□ - IV	L	T	P	C
BAL401	Total Contact Hours – 45	3	0	0	3
	Prerequisite course – TAMIL –III				
	Course Coordinator Name & Department : முனைவர். ம. சித்ரா கண்ணு & தமிழ்த்துறை				

COURSE OBJECTIVES : சங்க இலக்கியத்தைப் பற்றி அறியச் செய்தல்

COURSE OUTCOMES (COs)

CO1	எட்டுத்தொகையில் நற்றிணை, குறுந்தொகை, கலித்தொகை இலக்கியங்களை அறிவர்
CO2	எட்டுத்தொகையில் புறநானூறு, பதிற்றுப்பத்து இலக்கியங்களை அறிவர்
CO3	பத்துப்பாட்டு இலக்கியத்தில் பொருநராற்றுப்படை, பெரும்பாணாற்றுப்படை பற்றி அறிவர்
CO4	பத்துப்பாட்டில் நெடுநல்வாடை, பட்டினப்பாலை, முல்லைப்பாட்டு பற்றி அறிவர்

CO5	எட்டுத்தொகை, பத்துப்பாட்டு இலக்கிய வரலாற்றை அறிவர்										
CO6	சங்க இலக்கியத்தைப் பற்றிய உயரிய சிந்தனையைப் பெறுவர்										
Mapping of Course Outcomes with Program outcomes (POs)											
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	M	M
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
		✓									
4	Approval	Academic Council Meeting									

□□□□ 1		9
□□□□□□□□	- 10, 110, 129	
□□□□□□□□□□	- 8, 25, 32	
□□□□□□□□□□	- 6, 37, 51	
□□□□ 2		9
□□□□□□□□□□	- 89, 109, 204	
□□□□□□□□□□□□□□	- 42,46,49(5□□ □□□□□)	
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□□□□□□□□□□□□□□□□	- 151 - 213	
□□□□□□□□□□□□□□□□□□	- 5 - 15,	
	- 170 - 184	
□□□□ 4		9
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	CO3	H	M									
	CO4	H	M								H	
	CO5	H	M									
	CO6	H	M									
3	Category	Humanities & Social Studies	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)		
		✓										
4	Approval		Academic Council Meeting									

UNIT I **09**
 DRAMA – Andher Nagari

UNIT II **09**
 NOVEL - GABAN - Premchand

UNIT III **09**
 GENERAL ESSAY

UNIT IV **09**
 TRANSLATION - HINDI – ENGLISH

UNIT V **09**
 COMPREHENSION

Text Books:

ByBharathendu Harischandra, Veerendra Kumar Mishra, Anuvadh Abhyas – III

Reference Books:

- UNIT 1 - Publisher–Vani Prakashan, New Delhi – 110 002.
- UNIT II – Publisher - Rajkamal Prakashan, New Delhi – 110 002
- UNIT III – Aadarsh Nibnandh, Vinodh Pustak Mandir, Hospital Road, Agra -282002
- UNIT IV - Dakshin Bharath Hindi Prachar Sabha, Chennai- 17
- UNIT V - Dakshin Bharath Hindi Prachar Sabha, Chennai- 17

CourseCoordinator

HOD

BAL401	Française -IV					L	T	P	C		
	Total Contact Hours – 45					3	0	0	3		
	Prerequisite course – French as second language in Grade 12										
	Course Coordinator Name & Department: - Ms. Tushita Naidu K / Département De Française										
COURSE OBJECTIVES: - Initier les étudiants aux niveaux avancés de la langue..											
COURSE OUTCOMES (COs)											
CO1	Pour apprendre la culture des natifs de la langue dans la configuration avancée.										
CO2	Comprendre la structure grammaticale intégrale en français.										
CO3	Encourager le développement de compétences en linguistique										
CO4	Évaluer l'ensemble des compétences orales et écrites										
CO5	Se souvenir de la construction du langage										
CO6	Pour améliorer la maîtrise avancée de la langue										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3

2	CO1	H	M						H		
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences	Engg Sciences (ES)	Professional Core (PC)	Core Elective	Non-Major Elective	Open Elective	Any other	Project/Term Paper/Seminar/ Internship (PR)	
		✓									
4	Approval		Academic Council Meeting								

UNIT I Vous plaisantez! 9

Le conditionnel present -expression de l'hypothese-demandes polies-suggestions et conseils

UNIT II On s'entend bien! 9

Les constructions du discours rapport-Les constructions (faire + verbe)-et (laisser + verbe)

UNIT III A vos risqué et perils! 9

Le subjonctif Present- La construction passive pour metre en valeur l'objet direct de l' action

UNIT IV C'est tout un programme! 9

Les pronom possessives -Les adjectifs et les pronoms indefinis-Les pronom demonstratifs:

Les constructions --celui+de

UNIT V C'est la fete ! 9

Les formes de l'appreciation : trop/ pas assez -si-Les constructions verbe+verbes

TEXT BOOKS:

A2 ECHO- J. GIRARDET, J. PECHEURB CLE PUBLICATION.

BEH401	ENGLISH- IV					L	T	P	C		
	Total Contact Hours – 45					3	0	0	3		
	Prerequisite course – + 2 level English										
	Course Coordinator Name & Dept. :Ms.E.REKHA - English										
COURSE OBJECTIVES: - To focus on the balanced development of the English language communication skills.											
COURSE OUTCOMES (COs)											
CO 1	Remember the basic concepts of English literature										
CO 2	Understand the importance of the English language.										
CO 3	Apply the themes and values by comprehending the given text.										
CO 4	Analyse the grammar and the literary texts.										
CO 5	Evaluate the characters and the genre prescribed.										
CO 6	Create comprehensive essays efficiently.										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO

1. Corbett, "My India", Rupa Publications India Pvt. Ltd., 2018
2. Stories of Innocent by C.Rajagopalachari, Bharathiya Vidya Bhavan, 2009

REFERENCE BOOKS:

1. Shakespeare – The Complete Work; Wilco Publishing House, Mumbai, India. 2005
2. Hilaire Belloc, "Matilda", Random House UK, 1994
3. Shakespeare, "Macbeth", Macmillan Publisher, 2014

Course Coordinator

HOD

	MOLECULAR BIOLOGY	L	T	P	C
BBS401	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – Biology at Higher Secondary Education				
	Course Coordinator Name & Department:- Dr.L.Jeyanthi Rebecca & Biotechnology				
	COURSE OBJECTIVES: -Learners will be familiar with genetic material and their importance in living creatures. Learners will understand the genetic code, replication, transcription and translation of prokaryotes and eukaryotes.				
COURSE OUTCOMES (COs)					
CO1	Remember the basics concepts behind central dogma of molecular biology.				
CO2	Understand how DNA acts as genetic material and gene organization.				
CO3	Apply the role of enzymes in replication events.				
CO4	Apply the mechanisms of DNA repair and mutations.				
CO5	Analyze the mechanisms involved in transcription and translation processes.				
CO6	Analyze the significance of genetic code and post translational modifications.				

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	M	
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HSS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval		Academic Council Meeting								

UNIT I

12

DNA as the vehicle of inheritance-structure of DNA-forms of DNA-nucleic acid biosynthesis-experimental evidence: Griffith, McLeod, McCarty and Avery, Hershey-Chase experiments-Definition of gene-organization of genes and non coding DNA in prokaryotes- Eukaryotes-unique, moderately repetitive and highly repetitive DNA sequence-satellite DNA- Cot value-DNA binding proteins

UNIT II

12

DNA replication in prokaryotes and eukaryotes- modes of replication-semi continuous and semi discontinuous replication- Okazaki fragments- RNA primers – enzymes of replication – DNA polymerases I, II, III, -DNA modifying enzymes: topoisomerases-helicases- binding proteins and ligases- replication in E.coli-replisomes-events at OriC (initiation), events on the replication fork (elongation) and termination- Fidelity of replication-Sigma or rolling circle mode of replication in Φ x 174-Inhibitors of replication.

UNIT III

12

Repair of DNA-types of damages- repair by direct reversal of damage- excision repair-recombination repair- SOS repair-Mutation: definition-type of mutations (spontaneous and induced) point mutation-Gene mutation and chromosomal aberrations- Cause of mutations-chemical and physical agent

UNIT IV**12**

Transcription in prokaryotes and eukaryotes: RNA polymerases—enzyme structure- role of sigma factor- promoter-closed and open promoter complexes-Initiation-elongation and termination of RNA synthesis-Post transcriptional modification in prokaryotes and eukaryotes- transcription factors

UNIT V**12**

Genetic code—Basic features of genetic code-Deciphering of genetic code-Wobble hypothesis-Protein biosynthesis-activation of amino acids-initiation-elongation and termination of translation in prokaryotes and eukaryotes-Post translational modifications-Inhibitors of translation - Regulation of gene expression in prokaryotes and eukaryotes- operon concept.

TEXT BOOKS:

1. Harvey Lodish, Arnold Berk, S Lawrence Zipursky, Paul Matsudaira, David Baltimore and James Darnell, Molecular Cell Biology, 3rd Edition., W.H. Freeman Publishers, 1995.
2. Brown, T.A. Genomes, John Wiley and Sons Inc.
3. Lodish, H., Berk, A., Zipursky, S., Matsudaira, P., Baltimore, D. and Darnell, J.E Molecular Cell Biology, W.H. Freeman and Company

REFERENCE BOOKS:

1. McLennan A, Bates A, Turner P and White M. Bios Instant Notes Molecular Biology, 4th ed. Taylor and Francis, 2012.
2. Verma PS and Agarwal VK. Cell Biology (Cytology, Biomolecules, Molecular Biology), Paperback, S. Chand and Company Ltd., 2016
3. Brown. T.A. Molecular Biology LabFax, Bios Scientific Ltd. Oxford.
4. Lewin, B. Gene X, Oxford University Press

Course Coordinator**HOD**

		BIOPROCESSING TECHNOLOGY	L	T	P	C
BBS402	Total Contact Hours – 60		3	1	0	4
	Prerequisite course – Biology at Higher Secondary Education					
	Course Coordinator Name & Department:- Dr.S.Sharmila& Biotechnology					
	COURSE OBJECTIVES:- Learners will be familiar with the fermentor and fermentation process. Learners will understand the isolation and culture of industrially important microbes and industrial bioprocesses.					
COURSE OUTCOMES (COs)						
CO1	Remember the basics concepts behind stem cells.					
CO2	Understand how stem cell based therapies are carried out.					
CO3	Apply the culturing techniques for stem cells.					
CO4	Apply the knowledge of stem cells in transplantation and therapies					
CO5	Analyze the mechanisms involved in stem cell based therapies.					

CO6	Analyze the significance of tissue culture and engineering processes.										
sMapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M							H	M
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HIS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval		Academic Council Meeting								

UNIT I

12

Introduction to Bioprocess Technology: History and Scope- Bioreactor: Design, parts and accessories, functions- Modes of Operation of fermenter- Batch, fed batch, Continuous, Semi continuous, Perfusion- Types of reactors CSTR, Tower, Jet loop, Airlift, Bubble column, Packed bed- Applications of Bioprocess Technology.

UNIT II

12

Microbial growth kinetics: Batch and continuous reactors- Immobilized cell systems- Bioreactor instrumentation, control and monitoring variables such as Temperature, agitation, pressure, pH - On line measurement. On/off control. PID control. Computers in bioprocess control systems. Transport phenomena in bioprocess – Mass transfer and Mass transfer coefficient for gases and liquids.

UNIT III

12

Isolation and screening of microbes: primary and secondary metabolites, new metabolites- Preservation of microbes- Strain improvement: General, mutation and recombination- Media formulation and sterilization of gases and nutrient solutions- Inocula preparation – Immobilized cells- Enzyme co-immobilization

UNIT IV

12

Downstream processing- Cell disruption: Mechanical and non-mechanical methods - Recovery and purification of products: Separation of insoluble products-filtration – Micro to Nano

filtration, centrifugation, flocculation and coagulation-Separation of soluble products- liquid-liquid extraction, precipitation, adsorption, dialysis, reverse osmosis, chromatography-purification-crystallization and drying

UNIT V

12

Industrial Bioprocesses: Anaerobic processes-ethanol, lactic acid production- Aerobic processes-Citric acid, yeast, penicillin- Organic acid (acetic acid)- antibiotics(Streptomycin)- malt beverages-enzymes (Amylase and protease), vitamins, biopolymers, biofertilizers, biopesticides, recombinant products-insulin and hepatitis B – Waste water management

TEXT BOOKS:

1. Shuler M. L. and Kargi, F, Bioprocess engineering: Basic concepts, 2nd ed, Prentice Hall Upper Saddle River, NJ, 2002.
2. Okafor N, Modern Industrial Microbiology and Biotechnology, Science Publishers, USA, 2007.
3. Bioprocess Engineering: Basic Concepts, Shuler, M.L. and Kargi, F., Prentice Hall, Engelwood Cliffs, 1991

REFERENCE BOOKS:

1. Mansi EMT, Bryce CFA, Dahhou B, Sanchez S, Demain AL and Allman AR, Fermentation Microbiology and Biotechnology, CRC press, Taylor & Francis group, New York, 2012.
2. Stanbury PF, Whitaker A and Hall SJ, Principles of Fermentation technology, 3rd ed, Joe Hayton, Elsevier Ltd, 2017.
3. Fermentation Microbiology and Biotechnology (2002), Mansi El-Mansi and Charlie Bryce, Taylor and Francis Ltd., London (Replika Press Pvt. Ltd., Kundli – 131 028)

Course Coordinator

HOD

		GENETIC ENGINEERING		L	T	P	C
BBS403	Total Contact Hours – 60	3	1	0	4		
	Prerequisite course – Biology at Higher Secondary Education						
	Course Coordinator Name & Department:- Dr.S.Selvakumar & Biotechnology						
	COURSE OBJECTIVES: -Learners will be familiar with basics of genetic engineering. Learners will understand the construction of cDNA libraries & applications of rDNA technology in plants, animals and industries						
COURSE OUTCOMES (COs)							
CO1	Remember the basics concepts of genetic engineering						
CO2	Understand the role of vectors and restriction enzymes						
CO3	Apply the knowledge of genetic engineering in cDNA and genomic construction						
CO4	Apply the function of restriction enzymes in DNA mapping						

CO5	Analyze the mechanisms involved in gene transfer and animal cloning										
CO6	Analyze the significance of genetic engineering in health care.										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	M	
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval		Academic Council Meeting								

UNIT I

12

Introduction to Genetic engineering; Role of genes within cells- method of creating recombinant DNA molecules.-Role of vectors plasmid, cosmid, BAC, YAC etc.-Restriction enzymes and mapping of DNA-Role of Transposons in genetic engineering-Safety guidelines of creating recombinant DNA research.

UNIT II

12

Characterization of recombinant clones by Southern, Northern, Western and PCR analysis. Construction of genomic and cDNA libraries, methods of nucleic acid sequencing, factors involved in expression of cloned genes.

UNIT III

12

Method of gene transfer to plants- agrobacterium mediated / chemical mediated, Biolistics. Transgenic plants- Ri and Ti plasmids, Screening of recombinants, Biopharmaceuticals, Single cell proteins.

UNIT IV**12**

Animal cloning, Ethical aspects of animal cloning, -Transgenic animals- sheep, goat, cattle, fish etc- Methods of gene transfer to animals-**embryo transfer**.

UNIT V**12**

Health care: Vaccines, **hormones**, **antibiotics** & **pharmaceuticals**- Industrial enzymes and agriculture.

TEXT BOOKS:

1. Brown TA, Gene cloning-and introduction, VNR (U.K) Co Ltd. 2000.
2. Slater A, Scott NW and Fowler MR, Plant Biotechnology: an Introduction to Genetic Engineering. Oxford: Oxford University Press, 2008.
3. Levine AD, 2009, "Cloning" The Rosen publishing group, 1st.

REFERENCE BOOKS:

1. Setlow JK, Genetic engineering: Principles and methods, Springer. 2004.
2. Fridal R, Genetic engineering, Lerner publications. 2006.
3. LeVine H, 2006, "Genetic engineering-A reference handbook" ABC-CLIO.
4. Watson JD. The Molecular Biology of the Gene, Benjamin Cummings, 1987

Course Coordinator**HOD**

		MOLECULAR BIOLOGY AND GENETIC ENGINEERING LAB	L	T	P	C
BBS4L1	Total Contact Hours – 30		0	0	4	2
	Prerequisite course – Biology at Higher Secondary Education					
	Course Coordinator Name & Department:- Dr.L.Jeyanthi Rebecca & Biotechnology					
	COURSE OBJECTIVES: -Learners will be familiar with molecular biology. Learners will understand the genetic engineering techniques.					
COURSE OUTCOMES (COs)						
CO1	Perform the isolation of DNA and plasmids on different electrophoresis					
CO2	Handle and operate the transformation techniques					
CO3	Fixes the staining procedure for DNA and proteins.					
CO4	Manipulate data structures and algorithms					

CO5	Sketches real time application using a suitable data structure										
CO6	Perform the isolation of DNA and plasmids on different electrophoresis										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M							H	M
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

1. Isolation and visualization of plasmids on agarose gels
2. Restriction mapping
3. Ligation
4. Transformation, Screening for recombinants
5. Chemical and transposon mutagenesis
6. Selection of hyper producers of secondary metabolite
7. Characterization of medium components
8. Characterization of secondary metabolites by polyacrylamide gel electrophoresis, silver
9. Staining of protein on gels.
10. HPLC.

TEXT BOOKS:

1. Anselm FM, Brent R, Kingston RE, Moore DD, Current Protocols I Molecular Biology, Greene Publishing Associates, NY, 1988.
2. Old RW, Primrose SB, Principles of Gene Manipulation, An Introduction To Genetic Engineering, Blackwell Science Publications, 1993.

REFERENCE BOOKS:

1. Friefelder, David and George M. Malacinski, Essentials of Molecular Biology, 2nd Edition, Panima Publishing, 1993.
2. Bailey, James E. and David F. Ollis, Biochemical Engineering Fundamentals, 2nd Edition. McGraw Hill, 1986.

Course Coordinator

HOD

		அடிப்படைத் தமிழ் - II	L	T	P	C
BAL004		Total Contact Hours – 45	2	0	0	2
Prerequisite course – Basic Tamil – I						
Course Coordinator Name & Department : <input type="text"/> & <input type="text"/>						
COURSE OBJECTIVES : தமிழ்மொழியின் அடிப்படைக் கூறுகள் பற்றி அறியச் செய்தல்						
COURSE OUTCOMES (COs)						
CO1	தமிழ்மொழியின் சொல்வகை, திணை, பால்பாகுபாடு பற்றி அறிவர்					
CO2	அடுக்குத்தொடர், இரட்டைக்கிளவி, ண, ன, ர, ற, ள, ழ வேறுபாடு பற்றி அறிவர்					
CO3	பத்திகளை சுருக்கியும், விரிவாக்கி எழுதும் அறிவைப் பெறுவர்					
CO4	சொற்களை கையாண்டு உரையாடுவது பற்றி பெறுவர்					

CO5	கட்டுரை, கடிதம்எழுதும்அறிவைப்பெறுவர்										
CO6	தமிழ்மொழியில்சரளமாகபேசும்எழுதும்திறனைப்பெறுவர்										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	M	H						M	H	M
	CO2	M	H								
	CO3	M	H								
	CO4	M	H								
	CO5	M	H								
	CO6	M	H								
3	Category	Humanities & Social Studies	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
							✓				
4	Approval	Academic Council Meeting									

அலகு -1

- 1.1 தமிழ் மொழி அறிமுகம்
- 1.2 சொல் வகைகள்
- 1.3 திணை, பால் பாகுபாடு

9

அலகு - 2

- 2.1 அடுக்குத் தொடர், இரட்டைக் கிளவி
- 2.2 ஒரு ஓர் வேறுபாடு
- 2.3 ண,ன,ர,ற,ள,ழ வேறுபாடு

9

அலகு - 3

- 3.1 பத்தியிலிருந்து வினாக்களுக்குரிய விடைகளை கண்டறியும் பயிற்சி
- 3.2 சுருக்கி வரைதல்
- 3.3 விரிவாக்கி எழுதுதல்

9

அலகு - 4

- 4.1 உரையாடல்
- 4.2 கட்டுரை
- 4.3 மடல் வரைதல்

9

பாட நூல்கள்

1. மருதூர் அரங்கராசன், "தவறின்றித் தமிழ் எழுத", ஐந்திணைப்பதிப்பகம், 2012
2. ஞா.தேவநேயப்பாவாணர், "உயர்தரக் கட்டுரை இலக்கணம்", கௌராபதிப்பகம், 2013
3. க. கயிலாயநாதன், "தமிழ் மொழி விளக்கம்", முல்லைநிலையம், 2006

பார்வை நூல்கள்

1. பாரதிதாசன், "தவறின்றித்தமிழ்எழுத", நாம்தமிழ்ப்பதிப்பகம், 2013
2. ஆசிரியர்குழு, "கடிதம்வரைதல்", லியோபப்ளிகேஷன்ஸ், 2013
3. பாவாணர், "கட்டுரைவரைவதுஎப்படி?", தமிழ்மண்பதிப்பகம், 2012

பாடநெறி ஒருங்கிணைப்பாளர்

துறைத்தலைவர்

		சிறப்புத்தமிழ் – II	L	T	P	C
BAL453		Total Contact Hours – 30	2	0	0	2
		Prerequisite course – SPECIAL TAMIL – I				
		Course Coordinator Name& Department : முனைவர்.ம.சித்ரா கண்ணு&தமிழ்த்துறை				
COURSE OBJECTIVES : நாட்டுப்புற இலக்கியத்தைப் பற்றி அறியச் செய்தல்						
COURSE OUTCOMES (COs)						
CO1	தாலாட்டுமற்றும்குழந்தைப்பாடல்கள்பற்றிஅறிவர்					
CO2	தொழிற்பாடல், காதல்பாடல், கொண்டாட்டப்பாடல்கள்பற்றிஅறிவர்					
CO3	சங்ககாலமக்களின்விடுகதை, நம்பிக்கை, சடங்குகள்பற்றிஅறிவர்					
CO4	பழமொழிகள், நாட்டுப்புறமருத்துவம், சமயவழிபாடுகள்பற்றிஅறிவர்					
CO5	நாட்டுப்புற இலக்கிய வரலாறுபற்றிஅறிவர்					
CO6	வாய்மொழிஇலக்கியம்மூலம்சங்ககாலமக்களின்வாழ்வியலைஅறிவர்					
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low						

1	COs/Po s	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	M	M
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
						✓					
4	Approval	Academic Council Meeting									

அலகு1

தாலாட்டுப்பாடல்- குழந்தைப்பாடல்- விளையாட்டுப்பாடல்

9

அலகு2

தொழிற்பாடல்கள் - காதல்பாடல்கள்- கொண்டாட்டப்பாடல்கள்

9

அலகு3

விடுகதைகள் - நம்பிக்கைகள் -சடங்குகள்

9

அலகு4

பழமொழிகள் -நாட்டுப்புறமருத்துவம் - சமயவழிபாடுகள்

9

அலகு5

நாட்டுப்புற இலக்கிய வரலாறு

9

பாடநூல்கள்

1. சு.சக்திவேல், "நாட்டுப்புறஇயல்ஆய்வு", மணிவாசகர்பதிப்பகம், 2015
2. சு.சண்முகசுந்தரம், "நாட்டுப்புறஇலக்கியவரலாறு", காவ்யாபதிப்பகம், 2017
3. நா. வானமாமலை, "தமிழர்நாட்டுப்பாடல்கள்", நியூசெஞ்சரிபுக்ஹவுஸ், 2014

பார்வைநூல்கள்

1. ஆறு.இராமநாதன், "நாட்டுப்புறபாடல்வகைகள்", புலமைவெளியீடு, 1982
2. சரசுவதிவேணுகோபால், "தமிழகநாட்டுப்புறவியல்", தாமரைவெளியீடு, 1981
3. கழனிபூரன், "நாட்டுப்புறவியல்கட்டுரைகள்", காவ்யாபதிப்பகம், 2014

SEMESTER V

BBS501	IMMUNOLOGY	L	T	P	C
	Total Contact Hours – 75	3	2	0	5
	Prerequisite course – Biology at Higher Secondary Education				
	Course Coordinator Name & Department :- Dr.S.Anbuselvi& Biotechnology				

COURSE OBJECTIVES: - Learners will be able to identify the cellular and molecular basis of immune responsiveness. The students will be able to describe the roles of the immune system in both maintaining health and contributing to disease.

COURSE OUTCOMES (COs)

CO1	Recall the basic concept of immunity and cells involved in the immune system
CO2	Understand the immunoglobulin structures and it's diversity, morphology and functions.
CO3	Understand the interaction among immune cells and subsequent immune response
CO4	Apply the basic knowledge on immune response to perform experiments on graft rejection and tumor treatment.
CO5	Apply basic knowledge on antigen and antibody interaction to perform various clinical experiments
CO6	Analyze diagnostic reports to evaluate the prognosis of disease

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	M	M
	CO2	H	M								
	CO3	H	M								

	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval		Academic Council Meeting								

UNIT I

12

Introduction, Immunity, antigens & their classification, complement and their biological functions, types of immune responses, anatomy of immune response.

UNIT II

12

B-lymphocytes and their maturation, activation & differentiation, structure and function of immunoglobulin, immunoglobulin classes, antibody production, mono-clonal antibodies and diagnosis major histocompatibility complex

UNIT III

12

T-Lymphocytes their classification, maturation, activation & differentiation, antigen presenting cells (APC), macrophages, langerhans cells, their origin and function, mechanisms of phagocytosis, Cytokines and their role in immune response, immunosuppression, immune tolerance.

UNIT IV

12

Principle and application: Precipitation- Immuno diffusion & Widal test, Agglutination reactions, Radio immune assay, ELISA, Complement fixation test, Immuno fluorescence technique, Immuno electrophoresis -Hypersensitivity reactions.

UNIT V

12

Graft rejection, evidence and mechanisms of graft rejection, prevention of graft rejection-immunosuppressive drugs, mechanisms of immunity to tumour antigens. Auto antibodies in humans, pathogenic mechanisms -autoimmune diseases- treatment of auto immune disorders.

TEXT BOOKS

1. John W, Kimball Maxwell, Introduction to Immunology, Mac Millan International Edition.
2. Tizard. Introduction to Immunology, Saunders College Publication, 3rd ed., 1992.
3. Abbas. Basic Immunology, W.B. Saunders Company, 2nd ed., 2009.

	CO3	H	M							H	M	
	CO4	H	M									
	CO5	H	M									
	CO6	H	M									
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)		
					✓							
4	Approval		Academic Council Meeting									

UNIT I

12

Gene as a unit of mutation and recombination - **DNA as a genetic material - different types**; RNA as a genetic material - different types-genetic code; Mutation - molecular nature - physical and **chemical mutagens and its applications.**

UNIT II

12

DNA replication - prokaryotic and eukaryotic DNA replication - Mechanisms of DNA replication - **Enzymes and accessory proteins involved in DNA replication** - Bacterial genetic system - transformation, conjugation and transduction.

UNIT III

12

DNA damage - **mechanism of repair** - excision repair, recombination repair, promoter, operator, terminator and attenuator - SOS, and adaptive responses and their regulation - **Heat shock response.**

UNIT IV

12

Genomics and Proteomics: **structural and functional genomics**; proteomics -definition - analysis and characterization - related technologies, and **interrelations with genomics.**

UNIT V

12

Discovery of types and structure of plasmids - **artificial plasmid transfer and their applications** - **Insertion sequence in prokaryotes** - Transposable elements - discovery and characterization.

TEXT BOOKS

1. Watson JD. The Molecular Biology of the Gene, Benjamin Cummings, 1987.
2. Darnell J, Lodish H and Baltimore D. Molecular Cell Biology, 2nd Edition, Scientific American Books, New York, 1990.
3. Tamarin, R H. 2009. Principles of Genetics. McGraw-Hill

4. Lewin B. 2003. Genes VIII. Oxford University Press. Oxford.

REFERENCE BOOKS:

1. Glick, B. R. and Pasternak, J. J. 1994. Molecular Biotechnology: Principles and applications of recombinant DNA. ASM Press, Washington D.C
2. Hartwell, L. H., L. Hood, M. L. Goldberg, A. E. Reynolds, L. M. Silver and R. G. Veres. 2004. Genetics from Genes to Genomes. McGraw Hill.
3. Kreuzer, H. and A. Massey. 2001. Recombinant DNA and Biotechnology. ASM Press, Washington D.C.
4. The Human Genome 2001, Nature Vol. 409.
5. Primrose, S. B., and R. M. Twyman. 2006. Principles of gene manipulation and Genomics, Blackwell Publishing MA. USA.

Course Coordinator

HOD

BBS503	PLANT AND ANIMAL BIOTECHNOLOGY	L	T	P	C
	Total Contact Hours – 75	3	2	0	5
	Prerequisite course – Biology at Higher Secondary Education				
	Course Coordinator Name & Department :- Dr.L.Jeyanthi Rebecca & Biotechnology				

COURSE OBJECTIVES: - Learners will be familiar with plant and animal genetic engineering. Learners will understand the plant tissue culture, genome organization, animal cell culture techniques and their applications in medicine

COURSE OUTCOMES (COs)

CO1	Recall the genome organization in plants and animals
CO2	Understand the concept of tissue and cell culture techniques
CO3	Understand the method and application of genetic engineering tools in the field of crop development and animal breeding.
CO4	Apply different gene transfer methods in crop development
CO5	Apply different gene transfer methods in animal breeding and Gene Therapy
CO6	Analyze the merits and demerits of recombinant plants and animals

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M								

	CO2	H	M								
	CO3	H	M								
	CO4	H	M							M	H
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

UNIT I

12

Plant genomic organization – nuclear, organelle genomes – mitochondria and chloroplast – inheritance pattern. **Arabidopsis thaliana – a model plant for genome analysis** – Genomic studies in rice and maize.

UNIT II

12

Plant tissue culture – basic of plant tissue culture, plant hormones – their role in development of plant – **micropropagation - callus induction, organogenesis, embryogenesis, somatic embryogenesis**, somaclonal variation, artificial seeds and embryo rescue, plant cell suspension culture - secondary metabolites production and uses.

UNIT III

12

Plant genetic engineering – gene transfer methods – **plant cloning vectors**, Agrobacterium technology, **Nitrogen fixation – Molecular biology**, Applications of plant biotechnology- Techniques in crop improvement, molecular breeding, commercialization of plant biotechnology, plant pharmaceuticals, **Plant cell bioreactors – Bt cotton, Bt corn, Golden rice, Genetic Use Restriction Technology – terminator seeds**.

UNIT IV

12

Animal cell culture – basis, materials and methods - animal cell lines, biology of cultured cells – types of culture - Organ culture – **Stem cells - basics of stem cells – ASC, ESC** – applications – transplantation. Pharmaceuticals from animal systems – humanized pharmaceuticals. Animal cell bioreactors, Animal systems as bioreactors.

UNIT V

12

Animal genomes – Animal breeding and molecular farming. Animal transgenesis - methods and applications. **Assisted reproduction techniques** – Artificial insemination, in vitro fertilization and embryo implantation, germplasm preservation, methods of cryopreservation. Animal cloning – case studies, **Applications of animal biotechnology in medicine** - Prenatal diagnosis and gene therapy.

TEXT BOOKS

	CO2	H	M									
	CO3	H	M									
	CO4	H	M							H	M	
	CO5	H	M									
	CO6	H	M									
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)		
					✓							
4	Approval		Academic Council Meeting									

1. Immunodiffusion, Radial immunodiffusion, Immunoelectrophoresis.
2. Testing for typhoid antigens by Widal test.
3. Enzyme Linked Immuno Sorbent Assay (ELISA).
4. Isolation of peripheral blood mononuclear cells.
5. Separation of lymphocytes (lymphoprep/Ficol hypoprep).
6. T & B lymphocytes differentiation-Con- A induced proliferation of thymocytes (by MTT method).
7. Immunoglobulin preparation-Use of sephadex columns for separation of immunoglobulins-development of conjugates.
8. Lymphoid organs and their microscopic organization.
9. Purification of IgG from serum: Western-blotting-Cell hybridization.
10. Hybridoma technology and monoclonal antibody production, Western blotting.

TEXT BOOKS

1. William Paul. Fundamentals of Immunology, (Lippincott Williams & Wilkins), 1999.
2. Ashim K Chakravarty. Immunology, Tata Mc Graw - Hill, 1998.

3. Janeway, C. (Ed), Immunobiology 9 th ed. Garland Publ. 2016

REFERENCE BOOKS

1. Kuby J. Immunology, WH Freeman and Co., 2000
2. Roitt and Ivan. Essential Immunology, 9th ed., Blackwell Scientific, 1997. Kumar HDK. Molecular Biology, Vikas Publishing House Private Ltd, 1994.
3. Coico and Sunshine. Immunology: A short course. 7th ed. Wiley, 2015.
4. Stevens, C. & Miller, L. Clinical Immunology and Serology A Laboratory Perspective. Philadelphia: Davis (2017).

Course Coordinator

HOD

BBS5L2	BIOPROCESS LAB	L	T	P	C
	Total Contact Hours – 30	0	0	4	2
Prerequisite course – Biology at Higher Secondary Education					
Course Coordinator Name & Department Dr.S.Sharmila& Biotechnology					

COURSE OBJECTIVES: - Learners will be familiar with various bioprocess techniques. Learners will understand the different methods used in the production of many beneficial fermented products.

COURSE OUTCOMES (COs)

CO1	Perform the small scale and large scale fermentation process.
CO2	Handle downstream processing in different type of fermentor
CO3	Grasp the techniques such as chromatography and enzyme immobilization for effective downstream process
CO4	Operates the fermentor and other related instruments professionally to increase the yield of fermented products
CO5	Manipulate the obtained values with reference range values.

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M							H	M
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

1. **Growth kinetics**
2. Effect of pH and temperature on enzyme kinetics
3. **Media formulation for an industrial important microbe**
4. Optimization of culture conditions for amylase production
5. Downstream process – purification of any one protein / enzyme from fermented broth using chromatography
6. Cell/Enzyme immobilization
7. Production of cheese/yoghurt
8. **Bread making**
9. Production of wine
10. Production of citric acid
11. **Mushroom cultivation**
12. Colourant production – Serratia
13. **Flavorant production**
14. Identification of food pathogens
15. Qualitative analysis of any one industrial effluent
16. **Adsorption kinetic studies in any one metal removal process**
17. Vermicomposting

18. Demonstration of any one pesticide degradation

TEXT BOOKS:

1. Michael L Shuler and Fikret Kargi. Bioprocess Engineering Basic concepts, Prentice Hall, 1992.
2. Neway JO. Bioprocess Technology Fermentation Process Development of Industrial Organisms, T & F Publisher, 1989.
3. Casida L.E. JR Industrial Microbiology. 3rd Wiley Eastern reprint. John Wiley and Sons Inc. 2 nd ed. 2016.

REFERENCE BOOKS:

1. Jackson AT. Bioprocess Engineering in Biotechnology, Prentice Hall Engelwood Cliffs, 1991.
2. Shuler ML and Kargi F. Bioprocess Engineering: Basic concepts, 2nd Edition, Prentice Hall, Engelwood Cliffs, 2002.
3. Scragg A. Environmental Microbiology 1st ed. Am Society for Microbiology 2005.
4. Ahmed N. Industrial and environmental Biotechnology. Horizon Scientific Press 2001

Course Coordinator

HOD

SEMESTER VI

BBS601	ENVIRONMENTAL BIOTECHNOLOGY	L	T	P	C
	Total Contact Hours – 60	3	1	0	4
	Prerequisite course – Biology at Higher Secondary Education				
	Course Coordinator Name & Department :- Dr.S.Selvakumar & Biotechnology				

COURSE OBJECTIVES: - Learners will be familiar with bioremediation systems. Learners will understand the methods of sewage treatment and biofuel production.

COURSE OUTCOMES (COs)

CO1	Remember the ecosystem, pollution, green-house effect and ozone depletion.
CO2	Understand the basic concept of bioremediation.
CO3	Analyze the different methods for treating sewage water.
CO4	Apply the standards that to be followed in solid and liquid phase bioremediation.
CO5	Apply the importance of microbes in sewage treatment.
CO6	Analyze the potential of engineered microbes for bioremediation and biofuel production.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M				M				
	CO2	H	M				M				

	CO3	H	M				M		H	M	
	CO4	H	M				M				
	CO5	H	M				M				
	CO6	H	M				M				
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)	
					✓						
4	Approval		Academic Council Meeting								

UNIT I

12

Limiting factors, energy transfer and biogeochemical cycling in ecological systems; Response of microbes, plant and animals to environmental stresses; Concept of ecosystems and ecosystem management, Environmental problems- ozone depletion, green- house effect, water, air and soil pollution, land degradation.

UNIT II

12

Introduction, constraints and priorities of Bioremediation, Biostimulation of Naturally occurring microbial activities, Bioaugmentation, in situ, ex situ, intrinsic & engineered bioremediation.

UNIT III

12

Solid phase bioremediation - land farming, prepared beds, soil piles, Phytoremediation. Composting, Bioventing & Biosparging; Liquid phase bioremediation - suspended bioreactors, fixed biofilm reactors. Biological method of sewage treatment, WHO standards

UNIT IV

12

Mining-heavy metals, Microbial transformation, accumulation and concentration of metals, metal leaching, extraction and future prospects.

UNIT V

12

Microorganisms and energy requirements of mankind; Production of nonconventional fuels - Methane (Biogas), Hydrogen, Alcohols and algal hydrocarbons, Use of microorganisms in augmentation of petroleum recovery.

TEXT BOOKS

1. Environmental Biotechnology, Agarwal SK, APH Publishing Corporation, 2001.
2. Biodegradation & Bioremediation, Martin Alexander. Academic Press, 1999.
3. Industrial and Environmental Biotechnology, Nuzhat Ahmed, Fouad M. Qureshi and Obaid Y. Khan, 2006. Horizon Press

REFERENCE BOOKS:

1. General Microbiology, Stanier RY, Ingram JL, Wheelis ML and Painter RR, McMillan Publications, 1989.
2. Biotechnology and Biodegradation, Advances in Applied Biotechnology Series, Karrely D, Chakrabarty K and Omen GS. Gulf Publications Co. London, Volume 4, 1989.
3. Waste water engineering - treatment, disposal and reuse, Metcalf and Eddy Inc., Tata McGraw Hill, New Delhi.
4. Environmental Chemistry, AK. De, Wiley Eastern Ltd, New Delhi.

Course Coordinator

HOD

		NANOBIOTECHNOLOGY	L	T	P	C
BBS602	Total Contact Hours – 60		3	1	0	4
	Prerequisite course – Biology at Higher Secondary Education					
	Course Coordinator Name & Department :- Dr.S.Anbuselvi& Biotechnology					
	COURSE OBJECTIVES: - Learners will be familiar with biocompatible nanomaterials and biopolymers. Learners will understand the various applications of nanoparticles in bioscience field.					
COURSE OUTCOMES (COs)						
CO1	Remember the definition, development, cytotoxic studies related to nanomaterials and carbon nanotube.					
CO2	Understand the concept of targeted drug delivery system					
CO3	Apply the polymer controlled drug delivery for treatment of cancer and other diseases.					
CO4	Apply nanomaterials and biopolymers for controlled delivery of therapeutic nucleic acid					
CO5	Apply quantum dots, and Biodegradable optical nanoparticles for tumor diagnosis and treatment					
CO6	Analyze different nanomaterials for various biomedical applications including tumor diagnosis and treatment.					
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low						

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	L	
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval		Academic Council Meeting								

UNIT I

12

Nanotechnology – definition and scope, nanobiotechnology- recent development and applications, Biocompatibility and cytotoxicity studies of Nanomaterials, carbon nanotubes, Bioconjugation mediated drug delivery. General medicine is changing into personalized nanomedicine.

UNIT II

12

Biopolymer- polymer nanofibers - electrospinning method and their biomedical applications, polymer nanocomposite- bone and dental restorations, polymer controlled drug delivery for the treatment of cancer and other diseases. Biodegradable polymer derived from amino acid.

UNIT III

12

Liposome - liposomes in sensor technology, polymeric Micelles – Production of Lipospheres for Bioactive compound delivery – Melt dispersion technique, Solvent evaporation technique and InVitro drug release - Polymeric biodegradable liposphere for vaccine delivery

UNIT IV

12

Nucleic acid engineered nanomaterials and their applications. Protein patterning for applications in biomaterials. DNA lipoplexes – Lipofection efficiency in Vitro and in Vivo, Polymer controlled delivery of therapeutic nucleic acid

PLA and PLGA Based nanoparticulate delivery system. Metal Microbes interaction, Biological metal nanoparticle synthesis and biomedical application – Dendrimers, quantum dots, Biodegradable optical nanoparticles for tumor diagnosis and treatment

TEXT BOOKS

1. Jain KK. Nanobiotechnology in Molecular Diagnostics: Current Techniques and Application, Horizon Biosciences, 2006.
2. Edelstein AS and Cammearata RC. Nanomaterials: Synthesis, Properties and Applications, Institute of Physics Publishing, Bristol and Philadelphia, 1996.
3. Mark Ratner and Daniel Ratner, Nanotechnology: A Gentle Introduction to Next Big Idea, Low Price edition, Third Impression, Pearson Education

REFERENCE BOOKS:

1. Niemeyer CM and Mirking CA (Eds.). Nano biotechnology Concepts, 2004.
2. Christof M. Niemeyer (Editor), Chad A. Mirkin (Editor) Nano biotechnology: Concepts, Applications and Perspectives, Wiley Publishers, April 2004.
3. Wiley Interdisciplinary Reviews: Nanomedicine and Nanobiotechnology, John Wiley and Sons Inc, 2009.
4. Pradeep T, Nano, The Essentials, Understanding Nanoscience and Nanotechnology, Tata McGraw-Hill Publishing Company Limited, 2007.

Course Coordinator

HOD

	PLANT AND ANIMAL BIOTECHNOLOGY LAB	L	T	P	C
BBS6L1	Total Contact Hours – 30	0	0	4	2
	Prerequisite course – Biology at Higher Secondary Education				
	Course Coordinator Name & Department :- Dr.L.Jeyanthi Rebecca & Biotechnology				
	COURSE OBJECTIVES: - Learners will be familiar with plant tissue culture methods. Learners will understand the applications of genetic engineering in plant and animal biotechnology.				
COURSE OUTCOMES (COs)					
CO1	Performs the plant tissue culture techniques skillfully.				
CO2	Handle the sterilization unit and other sophisticated instruments professionally.				
CO3	Calibrates Evan's blue staining to determine the protoplast viability				
CO4	Manipulate the data obtained from experiments and write interpretation and inferences				
CO5	Sketches the application of protoplast, micro propagation and somatic embryos.				

Mapping of Course Outcomes with Program outcomes (POs)

(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	M	
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval		Academic Council Meeting								

1. **Plant tissue culture: Tissue culture and Sterilization techniques.**
2. Callus induction in *Daucus carota*.
3. Micropropagation in Rose.
4. **Nodal bud culture in *Hibiscus rosasinensis*.**
5. Rooting and hardening of regenerated shoots.
6. Preparation of synthetic seeds using shoot meristems.
7. **Isolation and purification of protoplasts from Asparagus leaf mesophyll cells.**
8. Determination of protoplast viability using Evan's blue staining.
9. **Protoplast culture and regeneration -protoplast fusion using PEG**
10. Isolation of plant genomic DNA from cauliflower-RFLP.
11. Aseptic techniques for animal cell culture-Establishment of a primary cell culture-Resuscitation of frozen cell lines-subculture of adherent cell lines-subculture of suspension cell lines-Quantification of cells- **Cryopreservation of cell lines**-Isolation and propagation of viruses by CAM route-Isolation and propagation by Yolk Sac route- **Isolation of genomic DNA from sheep liver cells.**

TEXT BOOKS

1. Butler M. Animal cell culture and technology: The basics, II Edition, Bios Scientific Publishers, 2004.
2. Reinert J and Bajaj YPS. Applied and Fundamental Aspects of Plant Cell, Tissue and Organ culture, Narosa Publishing House, 1997.
3. Plant Biotechnology: An Introduction to Genetic Engineering by Adrian Slater, Nigel W. Scott, Mark R. Fowler. Oxford University Press, 2008

REFERENCE BOOKS:

1. Slater A, Scott NW and Fowler MR. Plant Biotechnology: The Genetic Manipulation of Plants, Oxford University Press, 2008.
2. Watson JD, Myers RM, Caudy A and Witkowski JK. Recombinant DNA genes and genomes - A short course, III Edition, Freeman and Co, NY, USA, 2007.
3. Phytochemical Methods A Guide to Modern Techniques of Plant Analysis By JB Harborne. Springer, 1998.
4. Plant cell culture, A Practical approach, 2nd Edition, Edited by R.A. Dixon and R.A. Gonzales.

Course Coordinator

HOD

BBS6P1	PROJECT WORK	L	T	P	C
	Total Contact Hours – 45	0	0	12	6
	Prerequisite course – Biology at Higher Secondary Education				
	Course Coordinator Name & Department :- Dr.L.Jeyanthi Rebecca & Biotechnology				

COURSE OBJECTIVES: - To facilitate the students to understand the current scenario in computing technology and present the research report on their findings as per the acceptable format.

COURSE OUTCOMES (COs)

CO1	List out the concept and objectives, nature, types and methods of project.
CO2	Choose the process and steps involved in preparation of project work, research gap
CO3	Practice the research design, and methodology , sampling techniques & sampling design
CO4	Calculate the statistical tools in the project for data analysis

CO5	Measure the major findings, suggestions and conclusion										
CO6	Design the model for project report										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M								H
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
					✓						
4	Approval	Academic Council Meeting									

MAJOR ELECTIVES

BBS551	MAJOR ELECTIVE-I: BIOFERTILIZER TECHNOLOGY	L	T	P	C
	Total Contact Hours – 60	4	0	0	4
	Prerequisite course – Biology at Higher Secondary Education				
	Course Coordinator Name & Department :- Dr.S.Anbuselvi& Biotechnology				
COURSE OBJECTIVES: - Learners will be familiar with the basic concepts of biofertilizer technology. Learners will understand the isolation, culturing methods, enumeration and identification of microbial species.					
COURSE OUTCOMES (COs)					
CO1	Recall the basics of biofertilizer technology				
CO2	Understand the microbial culturing methods				

CO3	Apply the knowledge in inoculums preparation										
CO4	Apply microbes as biofertilizers										
CO5	Analyze distribution, morphological and biochemical characteristics of microbes										
CO6	Analyze the importance, advantages and constraints of biofertilizers										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	M	
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
						✓					
4	Approval	Academic Council Meeting									

UNIT I 9

An introduction to fertilizers, synthetic fertilizers, natural fertilizers, inorganic fertilizers, organic fertilizers, bio-fertilizers - importance, advantages and constraints.

UNIT II 9

Isolation, culturing methods, enumeration and identification of microbial species - Rhizobium, Azospirillum Azotobacters, blue green algae and phosphate solubilisers.

UNIT III 9

Morphology of Rhizobium, Azospirillum, Azotobacters, blue green algae and phosphate solubilisers and maintenance - inoculant preparation.

UNIT IV 9

Preparation of microbial inoculants - large-scale production of microbes - their application as biofertilizers - crop responses to biofertilizers.

UNIT V

9

Azolla - distribution, morphological and biochemical characteristics - cyanobacterial symbionts - azolla biofertilizer technology - organic matter and composting - method of processes, applications and limitations.

TEXT BOOKS

1. N.S.Subba Rao, (2000). Biofertilizers in Agriculture. Oxford & IBH publishing Co., New Delhi.

REFERENCE BOOKS:

1. Daniel Sundararaj, D. and G. Thulasidas. (1993). Botany of Field Crops. (2nd Ed.) Macmilan India Ltd.
2. Jeswani, L.M. and Baldev, B. (1990). Advances in Pulse Production Technology. ICAR, New Delhi
3. . Malsen, L.J.G.V. and S. Somaatmadja, (1993). PROSEA - Plant Resources of South East Asia. No.1. Pulses. International Book Distributors, Dehradun

Course Coordinator

HOD

MAJOR ELECTIVE-I: HERBAL TECHNOLOGY		L	T	P	C
BBS552	Total Contact Hours – 60	4	0	0	4
	Prerequisite course – Biology at Higher Secondary Education				
	Course Coordinator Name & Department :- Dr.L.Jeyanthi Rebecca & Biotechnology				
	COURSE OBJECTIVES: - Learners will be familiar with concepts of Herbal technology. Learners will understand the medicinal uses of herbs.				
COURSE OUTCOMES (COs)					
CO1	Recall the history of herbal medicine.				
CO2	Understand the uses of herbs in curing ailments				
CO3	Apply the medicinal herbs for various ailmernts				
CO4	Analyze the types and methods of druh adulteration				

CO5	Analyze the phytochemical screening tests for secondary metabolites										
CO6	Analyze the role of Plant tissue culture in biomedicine										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	M	
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
						✓					
4	Approval	Academic Council Meeting									

UNIT I

9

Herbal medicines: history and scope - definition of medical terms - **role of medicinal plants in Siddha systems of medicine**; cultivation - harvesting - processing - storage - marketing and utilization of medicinal plants

UNIT II

9

Pharmacognosy - systematic position - chemical constitution and medicinal uses of the following herbs in curing various ailments; Tulsi, Ginger, Fenugreek, Indian Goose berry and Ashoka.

UNIT III

9

Phytochemistry - active principles and methods of their testing - identification and utilization of the medicinal herbs; Catharanthus roseus (cardiotonic), Withania Somnifera (drugs acting on nervous system), **Clerodendron Phlomoides (anti-rheumatic)** and **Centella asiatica (memory booster)**.

UNIT IV

9

Analytical pharmacognosy: Drug adulteration - types, methods of drug evaluation - Biological testing of herbal drugs - Phytochemical screening tests for secondary metabolites (alkaloids, flavonoids, steroids, triterpenoids, phenolic compounds, fatty acids, tannins, glycosides and volatile oils).

.UNIT V

9

Medicinal Plant Biotechnology: Genetics as applied to medicinal herbs - mutation - polyploidy. Plant tissue culture as source of biomedicinals - Historical developments - types of cultures - phytopharmaceuticals in tissue cultures

TEXT BOOKS

1. Herbal plants and Drugs Agnes Arber, 1999. Mangal Deep Publications.

REFERENCE BOOKS:

1. Glossary of Indian medicinal plants, R.N.Chopra, S.L.Nayar and I.C.Chopra, 1956. C.S.I.R, New Delhi.
2. The indigenous drugs of India, Kanny, Lall, Dey and Raj Bahadur, 1984. International Book Distributors.
3. Ayurvedic drugs and their plant source. V.V. Sivarajan and Balachandran Indra 1994. Oxford IBH publishing Co.
4. Pharmacognosy, Dr.C.K.Kokate et al. 1999. Nirali Prakashan

Course Coordinator

HOD

BBS553	MAJOR ELECTIVE-I: VERMICULTURE	L	T	P	C
	Total Contact Hours – 60	4	0	0	4
	Prerequisite course – Biology at Higher Secondary Education				
	Course Coordinator Name & Department :- Dr.S.Selvakumar & Biotechnology				
COURSE OBJECTIVES: - Learners will be familiar the basic concept of vermiculture. Learners will understand the basic components for vermiculture .					
COURSE OUTCOMES (COs)					
CO1	Recall the ecological classification				
CO2	Understand the scope of vermiculture				
CO3	Apply the knowledge of vermiculture in industries				

CO4	Analyze the methods of vermiculture										
CO5	Analyze the optimal conditions for vermiculture										
CO6	Analyze the benefits of vermicomposting.										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	M	
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
						✓					
4	Approval	Academic Council Meeting									

UNIT I 9

Vermicomposting - Definition, introduction and scope: Ecological classification: Humus feeders, Humus formers, leaf mold, top soil and sub soil types

UNIT II 9

Physical, chemical and biological changes brought by earth worm in soil - burrows - drilosphere - earthworm casts

UNIT III 9

Optimal conditions for Vermiculture - temperature, moisture, pH, soil type, organic matter, protection from sunlight, rain, predators - food preference.

UNIT IV 9

Basic components for vermiculture - Culture practices - Home - School - Industries - Vermi wash.

UNIT V

9

Composting - Vermicomposting - Required conditions - Methods - Advantages - Cost-Benefit analysis of Vermicomposting. B.Sc. Biotechnology: Syllabus (CBCS)

TEXT BOOKS

1. Jsmail, S.A., 1970, Vermicology. The biology of earthworms. Orient Longman, London.

REFERENCE BOOKS:

1. Edwards, C.A. and Bohlen, P.J. 1996, Ecology of earthworms-3rd Edition, Chapman and hall.
2. Lee, K.E., 1985. Earthworms - Their ecology and relationship with soil and land use, Academic Press, Sydney.

Course Coordinator

HOD

BBS554	MAJOR ELECTIVE-I: BIOPHARMACEUTICAL TECHNOLOGY	L	T	P	C
	Total Contact Hours – 60	4	0	0	4
	Prerequisite course – Biology at Higher Secondary Education				
	Course Coordinator & Department :- Dr.S.Sharmila& Biotechnology				
COURSE OBJECTIVES: - Learners will be familiar with basic concepts of biopharmaceutical technology. Learners will understand the various applications of biopharmaceutical technology in medical field.					
COURSE OUTCOMES (COs)					
CO1	Recall the basic concepts of biopharmaceutical technology				

CO2	Understand the manufacturing of drugs										
CO3	Apply the knowledge in enhancement of bioavailability										
CO4	Analyze the various route of drug administration										
CO5	Analyze the - factors affecting protein drug binding										
CO6	Analyze the factors affecting biotransformation of drugs										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	P S O 2	PSO3
2	CO1	H	M						H	M	
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)	
						✓					
4	Approval	Academic Council Meeting									

UNIT I

9

Introduction to biopharmaceutics – Various route of drug administration- drug absorption, factors influencing drug absorption from the gastrointestinal tract.

UNIT II

9

Manufacturing Principles - Compressed tablets - wet granulation - Dry granulation or slugging - Direct compression - Tablet presses formulation - Coating - Pills - Capsules - Parental solutions - injections

UNIT III

9

Binding of drugs to blood components - tissue binding of drugs - factors affecting protein drug binding - significance of protein/tissue binding of drugs - kinetics of protein-drug binding

UNIT IV

9

Biotransformation - drug metabolizing enzymes - phase I reactions - phase II reactions - first pass effect - factors affecting biotransformation of drugs - bioactivation and tissue toxicity.

UNIT V

9

Bioprecursor prodrugs - carrier prodrugs - application of prodrug design: - enhancement of bioavailability - site specific drug delivery - limitations of prodrug design

TEXT BOOKS

1. Brahmkar, D.M. "Biopharmaceutical and pharmacokinetics: A Treatise", Vallabh Prakashan, 1995.

REFERENCE BOOKS:

Remington's *Pharmaceutical Sciences*, Mack Publishing

Course Coordinator

HOD

BBS555	MAJOR ELECTIVE-I: DAIRY TECHNOLOGY	L	T	P	C
	Total Contact Hours – 60	4	0	0	4
	Prerequisite course – Biology at Higher Secondary Education				
	Course Coordinator Name & Department :- Dr.S.Anbuselvi& Biotechnology				
COURSE OBJECTIVES: - Learners will be familiar with the basic concepts in dairy technology. Learners will understand the role of dairy technology.					
COURSE OUTCOMES (COs)					

CO1	Recall the concepts in dairy technology.										
CO2	Undertsand the applications of dairy products										
CO3	Apply the knowledge for indigenous milk products and by products										
CO4	Analyze the causes and control measures of milk products										
CO5	Analyze the therapeutic effects of fermented milk products-										
CO6	Analyze the quality control and quality assurance										
Mapping of Course Outcomes with Program outcomes (POs)											
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	M	
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)	
					✓						
4	Approval		Academic Council Meeting								

UNIT I

12

Market milk – market milk industry in India – Collection, Transportation of milk- milk reception – Clarification- Chilling – Homogenisation – Sterilization- Pasteurization – UHT processing of fluid milk – aseptic packaging – Special milk – Clean Milk Production – Grading of Milk

UNIT II

12

Fat rich Dairy products – Cream, preparation, types, defects – Butter preparation, types, defects – Butter Spreads- Preparation of Ghee , defects in ghee- AGMARK standards- Frozen dairy products – Manufacture of Ice Cream: Ingredients and their role, types and defects, Judging and grading of Cream, Butter and Ice Cream.

Concentrated and dried milk Products- Condensed milk – Evaporated milk – BIS standards – defects- Manufacture of milk powder- whole milk, skim milk powder- spray drying – whey powder- whey protein concentrates- biodiesel from whey.

UNIT III

12

Fat rich Dairy products – Cream, preparation, types, defects – Butter preparation, types, defects – Butter Spreads- Preparation of Ghee , defects in ghee- AGMARK standards- Frozen dairy products – Manufacture of Ice Cream: Ingredients and their role, types and defects, Judging and grading of Cream, Butter and Ice Cream.

Concentrated and dried milk Products- Condensed milk – Evaporated milk – BIS standards – defects- Manufacture of milk powder- whole milk, skim milk powder- spray drying – whey powder- whey protein concentrates- biodiesel from whey.

UNIT IV

12

Indigenous milk products and by products – Channa – Chana based products – preparation of Khoa and Khoa based products – peda- Gulab jamun – Rasagolla – preparation of paneer – kulfi – utilization of skim milk – butter milk – whey.

UNIT V

0

12

Introduction- Cleaning and Sanitation – Sterilization agent- Can Washing- Manual & Mechanical washing – Washing treatments – Cleaning in Place Programmes (CIP) – Packaging of milk & Milk Products – Function- Packaging Material – Filling system – Aseptic Packaging

TEXT BOOK

1. Sukumar de, 2000, “Outlines of Dairy Technology” Oxford Univ press
2. Bhattacharya A and Rajan R P , 2002 “ An over view on Yogurt, beverage and food world” .

REFERENCE BOOKS:

1. Andrews,2004, “Biochemistry of Milk Products” Black rabbit books, 2nded.
2. Ananthkrishnan C P., and Padmanabhan “ The technology of milk processing” Shrilakshmi publications

Course Coordinator

HOD

BBS556	MAJOR ELECTIVE-I: CANCER TECHNOLOGY	L	T	P	C
	Total Contact Hours – 60	4	0	0	4
	Prerequisite course – Biology at Higher Secondary Education				
	Course Coordinator Name & Department :- Dr.L.Jeyanthi Rebecca & Biotechnology				
COURSE OBJECTIVES: - Learners will be familiar with basics in cancer biology. Learners will					

understand the features of cancer cells.											
COURSE OUTCOMES (COs)											
CO1	Remember the fundamentals of cancer technology										
CO2	Understand the principles of carcinogenesis										
CO3	Apply the knowledge of cancer in drug development										
CO4	Analyze the epidemiology, causes, mutations and features										
CO5	Analyze the different sites and forms of cancer										
CO6	Analyze the advances in cancer detection and therapy										
Mapping of Course Outcomes with Program outcomes (POs)											
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M						H	M	
	CO2	H	M								
	CO3	H	M								
	CO4	H	M								
	CO5	H	M								
	CO6	H	M								
3	Category	Humanities & Social Studies (HS)	Basic Sciences	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)	
						✓					
4	Approval		Academic Council Meeting								

UNIT I

12

Fundamentals of Cancer Biology- Cell Cycle- regulation of cell cycle, modulation in cell cycle in cancer, **Changes in signaling molecules- Effects on receptors, signal switches**, Classification of stages of cancer- metasis, Metastatic cascade, common features of cancer cells, Tumor suppressor genes, **Cancer genetics**.

UNIT II**12**

Principles of Carcinogenesis- Carcinogens- Targets of carcinogens, Chemical carcinogenesis, Physical carcinogenesis- X-ray radiation and radiation carcinogenesis, Viruses and Cancer, Diet and cancer

UNIT III**12**

Molecular biology of cancer- Oncogenes, Identification of oncogenes, Retroviruses and oncogenes, growth factors and Growth factor receptors as oncogenes..

UNIT IV**12**

Different sites and forms of cancer, Lung, Liver, Breast, Cervical, Blood, Prostrate, Ovarian cancers- Epidemiology, causes, mutations, and features

UNIT V**12**

Cancer therapy- Cancer Immunology, Different forms of cancer therapy- Chemotherapy, radiation, Detection of cancers, advances in cancer detection and therapy, Gene therapy.

TEXT BOOK

1. Lewis J.Kleismith,2006, “Principles of Cancer Biology” Pearson Benjamin Cummings.
2. Raymond W. Ruddon,2007, “Cancer Biology” Oxford University Press, 4th.

REFERENCE BOOKS:

1. G.M. Cooper,2008, “Oncogenes” Jones & barlett Publisher, 1st.
2. ‘Molecular Cell Biology’ Darnell, Lodish & Baltimore, IV Ed,2004
3. An Introduction to cellular and Molecular Oncology- Oxford University Press, 2003
4. Genes VII and VIII – Benjamin Lewin, 2004

Course Coordinator**HOD**

BBS557	MAJOR ELECTIVE-I: WASTE MANAGEMENT TECHNOLOGY	L	T	P	C
	Total Contact Hours –	4	0	0	4
	Prerequisite course – Higher Secondary studies				
	Course Coordinator Name & Department :- Dr.S.Selvakumar & Biotechnology				

COURSE OBJECTIVES: - Learners will be familiar with basics of waste management technology. Learners will understand the waste management strategies.

COURSE OUTCOMES (COs)

CO1	Remember the basic fundamentals of waste management technology
CO2	Understand the agricultural, biomedical and industrial waste management.
CO3	Apply the knowledge for waste management.
CO4	Analyze the classification of wastes
CO5	Analyze the waste generation methodology
CO6	Analyze the remedial measures for waste

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H							H	M	
	CO2				H						
	CO3			H							
	CO4		M								
	CO5	M									
	CO6		H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
						✓					
4	Approval		Academic Council Meeting								

UNIT-I:

9

Introduction: Definition and Classification- Disposal methods: Land fill and Incineration – Recycling methods: biological reprocessing and Energy recovery-. Avoidance and Reduction Methods- Waste handling and Transport – Waste management Concepts

UNIT-II: 9

Introduction- Waste Consistency- Waste Management Function: Production ,Collection, Storage, Treatment , Transfer, Utilization- Waste Management system Design – Waste Management System: Dairy Waste, Beef Waste, Swine Waste, Poultry Waste, Other animal – Municipal and Industrial Sludge- Food Processing – Agri Chemical Waste Management- Handling.

UNIT-III: 9

Introduction- Waste Consistency- Waste Management Function: Production ,Collection, Storage, Treatment , Transfer, Utilization- Waste Management system Design – Waste Management System: Dairy Waste, Beef Waste, Swine Waste, Poultry Waste, Other animal – Municipal and Industrial Sludge- Food Processing – Agri Chemical Waste Management- Handling.

UNIT-IV: 9

Paper and Pulp Industry – Leather Industry – Cement Industry – Chemical Industry – fertilizer Industry – Pharmaceutical Industry – Textile industry – Iron and Steel industry – Mining Industry – Lignite industry – Petroleum Industry – Nuclear Industry

UNIT-V: 9

Bioremediation – Phyto-remediation- Recycling of Plastic and Paper

TEXT BOOK:

1. Wang, Shannmas Hung, 2008, “Advanced hazardous industrial waste treatment” CRC Press.

REFERENCE BOOKS

1. Agricultural Waste Management Hand Book by USDA, III Ed,2005
2. Industrial Biotechnology Problems and Remedies by Indu Shekhar Thakur, VI Ed,2006

Course Coordinator

HOD

BBS558	MAJOR ELECTIVE-I: BIOFUEL TECHNOLOGY	L	T	P	C
	Total Contact Hours – 45	4	0	0	4
	Prerequisite course – Higher Secondary studies				
	Course Coordinator Name & Department :- Dr.S.Sharmila& Biotechnology				

COURSE OBJECTIVES :- Learners will be familiar with basics of biofuel technology. Learners will understand the biofuel policies .

COURSE OUTCOMES (COs)

CO1	Remember the basic fundamentals of biofuel technology
CO2	Understand the methods of biofuel production
CO3	Apply the knowledge for enhanced biofuel production
CO4	Analyze the economy of biofuel
CO5	Analyze the environmental impacts of biofuel
CO6	Analyze the The future of biofuel.

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H		H					H	M	
	CO2	H									
	CO3	H		H							
	CO4		H								
	CO5	H		H							
	CO6		H		M						
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
						✓					
4	Approval	Academic Council Meeting									

UNIT -I

9

Introduction – Potential of biomass – biofuel policies: Policy in EU – Biofuel standardization – International Trade of biofuel-Biofuel Life Cycle – Energy balance -& Efficiency of biofuel – Biofuel emission: Green house gas emission – Vehicle emission standards – other environmental Impacts of Biofuel – economy of biofuel – Consideration of Co-Products

UNIT –II

9

BioEthanol – Feed stock production: sugar Crops, Starch crops , Cellulosic feed stock – Bioethanol Production : Sugar to ethanol Process, Starch to ethanol process, Cellulose to Ethanol Process – Distillation & Dehydration process – Properties – Application –standardisation – Energy balance – Bioethanol Emission : Green house gas emission, toxic exhaust emission – Other environmental impacts: water issues, land use & biodiversity, human Health.

UNIT –III **9**

Lipid derived Biofuel – Feed stock production -: Oil seed crops, Micro algae , Animal fats, waste oils – Fuel production : Oil Extraction , Oil Refining, Transesterification – Properties & Use : Properties of Pure Plant Oil (PPO) , Properties of Biodiesel – Application – Energy balance – Emissions of lipid biofuel – Other Environmental Impacts – Economy

UNIT –IV **9**

BtL Fuel: Feed tock production – BtL production – Gasification, Gas Cleaning – Synthesis process. Biohydrogen: Processing – Use – The Future of Biofuel..

UNIT–V **9**

BioMethane – Feed stock Production- BioMethane Production : Digestion Process- Digester types- biogas Purification – Properties & Use – Application – Standardization – BioMethane Emission – Other Environmental Effects – Economy

TEXT BOOKS:

1. Balasubramaniyan.K, Essence of customers relationship management, learn tech press
2. Jagdish N Sheth, Atul Parvatiyar, G Shainesh - customers relationship management- McGraw Hill Publisher, 2000
3. Roger. J Baran and Robert J. Galka- customers relationship management, Routledge publisher 2013

REFERENCE BOOKS:

1. M. Peeru mohamed, customer relationship management, Vikas publications
2. Kaushik mukerjee, customer relationship management PHI
3. Customer relationship management G Shainesh &. Jagdish N Sheth

Course Coordinator

HOD

BBS651	MAJOR ELECTIVE-II: INDUSTRIAL SAFETY ENGINEERING	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite course – Higher Secondary studies				

Course Coordinator Name & Department :- Dr.S.Selvakumar & Biotechnology

COURSE OBJECTIVES :- Learners will be familiar with basics of industrial safety engineering. Learners will understand the safety measures.

COURSE OUTCOMES (COs)

CO1	Remember the basic fundamentals of industrial safety engineering
CO2	Understand the safety policy
CO3	Apply the knowledge of fire safety in Industry
CO4	Analyze the classification of industrial accidents
CO5	Analyze the personal protective equipment and personal protection
CO6	Analyze the remedial measures for accidents

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	-	-	-	-	-	-	H	M	
	CO2	-	H	-	-	-	M	H			
	CO3	-	H	-	-	-	M	M			
	CO4	M	-	-	-	-	M	M			
	CO5	-	-	-	-	-	-	-			
	CO6	-	-	H	-	-	-	-			
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
						✓					
4	Approval	Academic Council Meeting									

UNIT-I

9

Safety in Process Plants – Hazard Analysis – Types of Hazard – hazard Identification techniques
Hazard Evaluation – Important Factories Act.

UNIT-II

9

Hazards in work place: safety in the use of chemicals at work – Chemical hazard - Air-Borne Contaminants – particulate matter – Hazard and safety methods – hazards and Safety measures in

Refineries , Paper and Pulp Industries- Safety Conditions in tanneries –Hazards of Pesticide – Sugar industry

UNIT-III **9**

Introduction- Safety policy- Safety in electrical installation: Electrical shock and prevention- safety precautions for residential and commercial installation - Case study.

Four stages of Fire- types of Fire Detectors – Fire safety in Industry – chemistry of fire- Types of Combustion- Fire Triangle- Fire extinguishing Technique – Engineering consideration for safety consideration

UNIT – IV **9**

Industrial accidents – Classification – prevention – accident cost – Steps of investigation – Analysis of Accidents – Remedial Measures – Methods of Prevention – Safety Slogans – Case study

UNIT – V **9**

Personal protective Equipment and personal Protection – Aim – Need – Types : Non Respiratory Protective equipments- Respiratory type

First aid – principles and methods – First aid training – Scope of first aid – Golden rules– First aid treatment : for wounds and Hemorrhage , Shock , respiration :Schafer’s Method, Shock. Fractures, Burns and Scalds , Unconsciousness, Heat exhaustion and Stroke– First aid Kit box A and B.

TEXT BOOK :

1. Nicholas , 2008, “Practical Guidance to Industrial Safety” 3rd ed.
2. Prof.M.H.Fulekar, 2007, “Industrial Hygiene & chemical Safety” 2nd ed.

REFERENCE BOOKS:

1. Rudd,2005, “Strategy of process engineering” Willey
2. Wang, Shannmas Hung,2008, “Advanced hazardous industrial waste treatment” CRC Press

Course Coordinator

HOD

BBS652	MAJOR ELECTIVE-II: STEM CELL AND TISSUE ENGINEERING	L	T	P	C
	Total Contact Hours – 60	3	0	0	3
	Prerequisite course – Higher Secondary studies				

Course Coordinator Name & Department :- Dr.L.Jeyanthi Rebecca & Biotechnology

COURSE OBJECTIVES :- Learners will be familiar with basics of stem cells. Learners will understand the applications of stem cell technology.

COURSE OUTCOMES (COs)

CO1	Remember the basic fundamentals of stem cell technology
CO2	Understand the possible sources for human embryonic stem cell
CO3	Apply the knowledge of stem cells in medical field
CO4	Analyze the novel stem cell based therapies
CO5	Analyze the possibilities to overcome immuno-rejection
CO6	Analyze the current advantages and limitations of stem cells

Mapping of Course Outcomes with Program outcomes (POs)
(H/M/L indicates strength of correlation) H-High, M-Medium, L-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	M	-	-	-	-	-	H	M	
	CO2	M	H	-	-	-	-				
	CO3	H	M	-	-	-	-				
	CO4	H	M	-	-	-	-				
	CO5	H	M	-	-	M	-				
	CO6	H	M	-	-	-	-				
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
						✓					
4	Approval	Academic Council Meeting									

UNIT- I:

9

Origin and characteristics of human stem cell, plasticity of human somatic stem cells research, **Novel stem cell based therapies**, Scientific and technical obstacles to overcome before realizing the potential clinical uses of novel human stem cell based therapy, **Cord blood,-Stem cell marker.**

UNIT- II:

9

Possible sources for human embryonic stem cell, growing human ESC in laboratory, Current advantages and limitations of hESC and human somatic cells-Examining the need for new hESC cell lines, Developments regarding establishment of human stem cell banks and registries.

UNIT- III: **9**
 Preparation of complete human neuroculture, Culturing and subculturing human neurospheres, Differentiation of cells from human, neurospheres into neurons, astrocytes and oligodendrocytes; Immunolabelling procedures

UNIT- IV: **9**
 Possibilities to overcome immuno-rejection responses in stem cell therapy, Haematopoietic stem cell transplantation - A new therapy for autoimmune disease, Prenatal diagnosis of genetic abnormalities using fetal CD34+ stem cells, Stem cells in treatment for major diseases and reparative medicine, ESC a promising tool for cell replacement therapy, germ line therapy.

UNIT- V: **9**
 Basic principles and consideration - Cell type and source, Metabolic requirements of cells, Reconstruction of connective tissues, Reconstruction of epithelial or endothelial surfaces - cells embedded in extracellular matrix material, Culture on a single surface and sandwich configuration, Bioreactor design on tissue engineering - Hollow fiber systems, Microcarrier based systems-Tissue engineering of the liver

TEXT BOOK:

1. R.C.Dubey, 2004, "Text book of Biotechnology" 3rd Ed.

REFERENCE BOOKS:

1. Sudha Gangal , 2002, "Principles and Practice of Animal tissue culture", IV Ed
- P. Ramadass , 2008, " Animal Biotechnology" MJP pub

Course Coordinator

HOD

BBS653	MAJOR ELECTIVE-II - GENOMICS AND PROTEOMICS	L	T	P	C
	Total Contact Hours – 60	3	0	0	3

		Prerequisite course – Higher Secondary studies									
		Course Coordinator Name & Department :- Dr.S.Anbuselvi& Biotechnology									
COURSE OBJECTIVES :- Learners will be familiar with basics of genomics and proteomics. Learners will understand the role of proteomics in medicine.											
COURSE OUTCOMES (COs)											
CO1	Remember the basic fundamentals of genomics and proteomics										
CO2	Understand the serial Analysis of gene expression										
CO3	Apply the knowledge of proteomics in medical field										
CO4	Analyze the applications of genomics										
CO5	Analyze the target identification and validation of drug										
CO6	Analyze the microarray image processing and analysis										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1		H						H	M	
	CO2	M	H	M							
	CO3	H			M						
	CO4					M					
	CO5	H		M							
	CO6		H			M					
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
						✓					
4	Approval	Academic Council Meeting									

UNIT-I:

9

Genomic and c DNA sequence: gene prediction rules – gene prediction softwares – human and Arabidopsis genome projects – mutations

Unit – II**9**

Gene therapy - applications of genome – transgenic animals and plants – Pathway regulatory networks

UNIT-III:**9**

Introduction, Serial Analysis of Gene Expression, Microarray, Types of Microarrays, Microarray Fabrication, Microarray hybridization and detection, Microarray Image Processing and analysis, Expression ratios, Transformations of the Expression ratio, Data Normalization

UNIT-IV:**9**

Proteomics – protein separation - 2DE, protein identification – mass spectrometry. Protein chips. Applications of proteomics – Medical proteomics in disease diagnosis, pharmaceutical proteomics in drug development.

UNIT- V:**9**

Discovering a drug - target identification and validation - identifying the lead compound - optimization of lead compound - chemical libraries.

TEXT BOOK:

1. Discovering Genomics, Proteomics and Bioinformatics (2nd Edition) by A. Malcolm Campbell and Laurie J. Heyer , 2009, Pearson Education.

REFERENCE BOOKS

1. Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins by Andreas D. Baxevanis and B. F. Francis Ouellette, 2004-Wiley Interscience
2. Principles of Proteomics by R.M.Twyman, Taylor & Francis group , 2004 BIOS Scientific Publishers.
3. Introduction to Bioinformatics by Arthur M. Lesk ,2008, Oxford University
4. Essential Bioinformatics by Jin Xiong, Cambridge, 2011

Course Coordinator**HOD**

BBS654	MAJOR ELECTIVE-II - BIOSTATISTICS	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite course – Higher Secondary studies				

Course Coordinator Name & Department :- Dr.S.Sharmila& Biotechnology											
COURSE OBJECTIVES :- Learners will be familiar with basics of biostatistics. Learners will understand the significance of biostatistics.											
COURSE OUTCOMES (COs)											
CO1	Remember the basic fundamentals of biostatistics										
CO2	Understand the Measures of central tendency, dispersion and correlation										
CO3	Apply the knowledge biostatistics for research										
CO4	Analyze the methods in correlation										
CO5	Analyze the significance of Students't' test										
CO6	Analyze the variance										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H							H	M	
	CO2				H						
	CO3		H								
	CO4		M								
	CO5			H							
	CO6						H				
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
						✓					
4	Approval	Academic Council Meeting									

Unit I

9

Statistics – definition, functions and its limitations Collection, classification, tabulation of data, diagrammatic and graphical representation of data

Unit II

9

Measures of central tendency - mean, median, mode, geometric mean, harmonic mean - Merits and demerits

Unit III **9**

Measures of dispersion – range, quartile deviation, decile, percentile mean deviation, standard deviation, variance, coefficient of variation, skewness – kurtosis

Unit IV **9**

Correlation - Types, scatter diagram - Karl Pearson's method, Spearman's Rank method, concurrent deviation method, Regression equations and their properties (simple problems)

Unit V **9**

Probability, Definitions of various terms used in probability, Addition and multiplication rule, Conditional probability, Independence of events, Baye's theorem (simple problems)

Test of significance for small samples - Students't' test - to test the significance of sample mean, difference between two sample mean, Analysis of variance –meaning and assumptions - one way and two way classification

TEXT BOOKS:

1. Fundamentals of biostatistics, Khan and Khanum, Ukaaz Publications (2004)
2. Statistical methods, S.P.Gupta, S.Chand & Sons, 1997

REFERENCE BOOKS:

- 1.S.C.Gupta & V.K.Kapoor, Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi, 2003
2. An introduction to biostatistics, N.Gurumani, MJP Publishers-2004
3. Fundamentals of biostatistics , Bernard Rosner-2011
- 4.Stanton A & Clantz, Primer of Biostatistics — The McGraw Hill Inc., New York-2001.
- 5.Arora PN & Malhon PK, (1996) Biostatistics. Imalaya Publishing House, Mumbai.
- 6.Zar, J.H. (1996). Biostatistical analysis. Prentice Hall, Upper saddle River, New Jersey, USA

Course Coordinator

HOD

BBS655	MAJOR ELECTIVE-II - FOOD PROCESS TECHNOLOGY	L	T	P	C
	Total Contact Hours – 45	3	0	0	3
	Prerequisite course – Higher Secondary studies				

Course Coordinator Name & Department :- Dr.S.Selvakumar & Biotechnology											
COURSE OBJECTIVES :- Learners will be familiar with basics of food process technology. Learners will understand the role of significance of biostatistics											
COURSE OUTCOMES (COs)											
CO1	Remember the basic fundamentals of food process technology										
CO2	Understand the physical and chemical factors influencing structure of micro-organisms										
CO3	Apply the knowledge to overcome deterioration of various types of food products										
CO4	Analyze the packaging methods for prevention										
CO5	Analyze the importance and functions of quality control										
CO6	Analyze the food safety and evaluation.										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	M	H						H	M	
	CO2		H	H		M					
	CO3	H					M				
	CO4		H								
	CO5	H	H	M							
	CO6	H	M				M				
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
						✓					
4	Approval		Academic Council Meeting								

UNIT-I

9

History of microbiology of food - microbial growth pattern, physical and chemical factors influencing structure of micro-organisms - types of micro-organism normally associated with food - mold, yeast and bacteria

UNIT-II**9**

Micro-organisms in natural food products and their control - contaminants of foods - stuffs, vegetables, cereals, pulses, oilseeds, milk and meat during handling and processing - biochemical changes caused by micro-organisms - deterioration of various types of food products - food poisoning and microbial toxins.

UNIT-III**9**

Scope and importance of food processing - principles and methods of food preservation - freezing, heating, dehydration, canning, additives, fermentation, irradiation, extrusion cooking, hydrostatic pressure cooking, dielectric heating, microwave processing.

UNIT-IV**9**

Introduction to packaging - packaging principles and operation - package functions and design - deteriorative changes in foodstuff and packaging methods for prevention - shelf life of packaged foodstuffs - methods to extend shelf life.

UNIT-V**9**

Objectives, importance and functions of quality control - methods of quality - assessment of food materials - fruits, vegetables, cereals, dairy products, meat, poultry, egg and processed food products - sampling and specification of raw materials and finished products - statistical quality controls - food regulations, grades and standards - food adulteration, food safety and evaluation

TEXT BOOKS:

1. Der, A.E. 1978. Food Processing and Nutrition. Academic Press, London.
2. Lows, P. and Ellis H. 1990. Food Processing. Prentice Hall, Reston Virginia, USA.

REFERENCE BOOKS:

1. Rsdel W.B., Copley, M.J. and Morgen, A.I. 1973. Food Dehydration, 2nd Edn. (2 Vol. Set). AVI, Westport.
2. Jelen, P. 1985. Introduction to Food Processing. Prentice Hall, Reston Virginia, USA.
3. Branen A.L. and Davidson, P.M. 1983. Antimicrobials in Foods. Marcel Dekker, New York.
4. Charalambous, G. and Inglett, G. 1981. The Quality of Foods and Beverages. (2 vol. set). Academic Press, New York.

Course Coordinator**HOD**

BBS656	MAJOR ELECTIVE-II - FERMENTATION TECHNOLOGY	L	T	P	C
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		Total Contact Hours – 45	3	0	0	3					
		Prerequisite course – Higher Secondary studies									
		Course Coordinator Name & Department :- Dr.L.Jeyanthi Rebecca & Biotechnology									
COURSE OBJECTIVES :- Learners will be familiar with basics of fermentation technology. Learners will understand the significance of fermentation technology in industries											
COURSE OUTCOMES (COs)											
CO1	Remember the basic fundamentals of fermentation technology										
CO2	Understand the preservation methods of microbial culture										
CO3	Apply the knowledge in Production of metabolites										
CO4	Analyze the importance of microorganisms in fermentation technology										
CO5	Analyze the growth paramaters for industrially important microorganisms										
CO6	Analyze the role of microorganisms in waste water treatment										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	H						H	M	
	CO2	H									
	CO3		M								
	CO4	H		M							
	CO5										
	CO6	H	H								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
						✓					
4	Approval	Academic Council Meeting									

UNIT-I

9

History and scope of Microbiology, Identification of Microorganisms, Prokaryotes and Eukaryotes, **Bacterial Taxonomy**, Microscopy, Bright Field, **Phase contrast, Fluorescence** and

Electron Microscope, Specimen Preparation for Microscopy, General Structural organization of Bacteria and other microorganisms, Archaea bacteria.

UNIT-II **9**

Microbial nutrition, Growth of Microorganisms in different Media, Isolation of Pure culture, Growth curve of Microbes, Culture of Microorganisms-continuous and synchronous culture, Enumeration of Microorganisms, Preservation of Microbial Culture, Mode of Nutrition Transport in Microbes, Effect of pH, temperature, osmotic Pressure on Growth of Microbes, antimicrobial agents and disinfectants.

UNIT-III **9**

Historical view of Fermentation Process and products, Outline of various unit operation involved in integrated bioprocesses, Isolation, Preservation and improvement of Industrial Microorganisms, Medium Requirement for Fermentation processes, Carbon, Nitrogen, Minerals, Vitamins and Other Nutrients

UNIT-IV **9**

Production of primary metabolites, organic acids (citric acid, itaconic acid, acetic acid, gluconic acid), Amino acids (glutamic acid, lysine, aspartic acid, phenylalanine), alcohols (Ethanol, 2,3-butanediol). Production of secondary metabolites, antibiotics-betalactams (penicillin, cephalosporin), Aminoglycosides (streptomycin, kanamycin), Macrolides (erythromycin), Vitamins, Production of Vaccines and Recombinant Proteins-Proteases, Amylases, Lipases.

UNIT-V **9**

Microorganisms in waste water treatment, Bio-fertilizers and Bio-Pesticides, Recycling of biomaterials, production of biogas, plant growth factors. Natural Bio preservatives (nisin), Bio-Polymers (Xanthan gum and PHB), Single Cell Protein

TEXT BOOKS:

1. Michael J. Pelezar, J.R.E.C.S Chan, Noel R. Erieg,2005, "Microbiology " TATA McGraw Hill, 5th.

REFERENCE BOOKS:

1. Anantha Narayan, C.K. Jayaram Paniker,2009, "Text Book of Microbiology" Orient Blackswan, 7th.
2. Prescott and Dunn,2006, "Industrial Microbiology" CBS Publishers& Distributors.

Course Coordinator

HOD

BBS657	MEDICAL BIOTECHNOLOGY	L	T	P	C
	Total Contact Hours – 60	3	0	0	3

		Prerequisite course – Higher Secondary studies									
		Course Coordinator Name & Department :- Dr.S.Anbuselvi& Biotechnology									
COURSE OBJECTIVES :-											
Learners will be familiar with basics of medical biotechnology. Learners will understand the significance of medical biotechnology in medicine.											
COURSE OUTCOMES (COs)											
CO1	Remember the basic concepts in medical biotechnology.										
CO2	Understand the diagnostics methods										
CO3	Apply the knowledge in diagnosis of pathogenic microbes.										
CO4	Analyze the importance of vaccines.										
CO5	Analyze the development of microbial resistance to antibiotics										
CO6	Analyze the role of growth hormones.										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	L						H	M	
	CO2	H	L								
	CO3	H	L								
	CO4	H	L								
	CO5	H	L								
	CO6	H	L								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)	
						✓					
4	Approval	Academic Council Meeting									

UNIT I

9

Manipulation of assisted reproductive technology- artificial insemination and storage- isolation and *in vitro* maturation of Oocytes- IVF- Embryo transfer technique- Pregnancy diagnosis -

Animal cell culture-media, maintenance and culture of primary, secondary and continuous cell lines- organ culture- applications- cancer cell lines- apoptosis

UNIT II

9

Chromosomal disorders – Gene controlled diseases –Identification of disease genes-Functional cloning (Haemophilia) – Positional cloning (DMD) – Candidate gene approach (Alzheimer’s) – Molecular basis of human diseases :Pathogenic mutations (Gain of function mutations: Oncogenes - Loss of function - Tumour Suppressor Genes - Immunopathology: Hepatitis, Autoimmune Disorders)

UNIT- III

9

Prenatal diagnosis - Invasive techniques and Non-invasive techniques – Diagnosis of pathogenic microbes: Classical and modern methods- Diagnosis using protein and enzyme markers, monoclonal antibodies.DNA/RNA based diagnosis- Molecular markers- Microarray technology- genomic and cDNA arrays

UNIT IV

9

Vaccines-conventional, recombinant, synthetic peptide, anti-idiotypic, DNA vaccines- Deletion mutant and vaccinia vector vaccine- Prophylaxis - Antibiotics-mode of action- antibacterial, antifungal, antiviral, antitumor antibiotics- synthetic chemotherapeutic agents- development of microbial resistance to antibiotics

UNIT V

9

Hybridoma technique for Monoclonal Ab production and applications- Gene therapy:Ex vivo, In vivo, In situ- Cell and tissue engineering- Stem cell therapy- Nanomedicines- Gene products in medicine – Humulin, Erythropoietin, Growth Hormone/Somatostatin, tPA, Interferon

TEXT BOOK:

1.Jogdand, S. N. 2000. Medical Biotechnology, Himalaya Publishing house, Mumbai.

REFERENCE BOOKS

1. Click, B. R. and Pasternak. 2002. Molecular Biotechnology: Principle and applications of recombinant DNA. ASM Press.
2. Ramasamy, P.2002. Trends in Biotechnology, University of Madras, Pearl press.
3. Trevan. 2001. Biotechnology. Tata McGraw-Hill.
4. Jenkins, N (Ed) 1999. Animal cell biotechnology: Methods and Protocols. Humana press, New Jersey.

Course Coordinator

HOD

BBA011	BUSINESS PROCESS OUTSOURCING - MANAGEMENT	L	T	P	C
	Total Contact Hours – 30	2	0	0	2

		Prerequisite course – +2 studied in Higher Secondary Studies									
		Course Coordinator Name & Department: -Ms.D.K.Sowmiyalakshmi, Business Administration									
COURSE OBJECTIVES: -											
To familiarize the students with the basic fundamentals of BPO.											
To impart knowledge on types of BPO and call centers .											
To enable the students on the concept Health care BPO & Transaction BPO.											
To peep into the concept of Human Resource BPO and the career opportunities in BPO											
COURSE OUTCOMES (COs)											
CO1	Underline the basic fundamentals of BPO.										
CO2	Discuss the awareness about the models of BPO.										
CO3	Initiate the concept of Health Care BPO.										
CO4	Identify the elements of Transaction processing BPO.										
CO5	Evaluate the career opportunities in BPO.										
CO6	Formulate the challenges faced by BPO industry.										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	H						H	M	L
	CO2	M	L								
	CO3	L	H								
	CO4	H	H								
	CO5	H	H								
	CO6	M	L								
3	Category	Part 1 Tamil/Linguistic Study	Part II Linguistic English	Part III Core	Part III Substream	Part IV Basic/ Advanced Tamil/ EVS/VE/ SBE/ Soft Skill	Part III Project	Part V Extension Activity			
						✓					
4	Approval	Academic Council Meeting									

BPO MANAGEMENT

Unit I

Business Process Outsourcing – Basics – Benefits of BPO – Growth Drivers – BPO Models and Types of Vendors – Offshore BPO – Evolution Destinations – Challenges of Off shoring – BPO Companies in India.

Unit II

BPO Industry – Employment Opportunities – Employee Structure – Skill Set Required – Compensation Levels – Contact Centre BPO – Types of Call Centres – Technology – Components and working of a Call center – Issues and Problems – Case Study – Intelenet Global.

Unit III

Healthcare BPO – Structure of the American Healthcare Sector – Activity Profile – Future Trends and Threats – Case Study – Cbay Systems. Transaction Processing BPO - Elements of Back – Office Services – Financial Services – Insurance – Case Studies – Datamatics – Hinjuja TMT. Human Resource BPO – Reasons for outsourcing HR – Activities involved in HR BPO – HR Outsourcing Trends – Career in HR BPO – Emerging BPO Domains – Media and Entertainment BPO – Publishing BPO.

Text Books:-

Business Process Outsourcing Sarika Kulkarni Jaico Publishing House, Delhi 2005

Reference Books:-

BPO DIGEST Deepak Shikapur Ameya (Inspiring Books) 2004.

Course Coordinator

HOD

DESKTOP PUBLISHING

L T P C

BBE002	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – Higher Secondary Level				
	Course Coordinator Name & Department :- N.Mathimagal& BCA				

COURSE OBJECTIVES:-
The learner will have the knowledge about the use of Computer Hardware and basic Software

COURSE OUTCOMES (COs)

CO1	Gain knowledge of basic concepts of Computer Hardware and basic Software
CO2	Analyze the use of Netscape to access the Course Home Page and Tips and Tricks. .
CO3	Discuss the basic Principles and development of publishing and printing .
CO4	Identify the basic Knowledge and operations of a prepress computer system
CO5	Demonstrate the typography.
CO6	Test real time application using a basic concept.

Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO2	PS O3
2	CO1	H	L						H		
	CO2	M	L								
	CO3	H	-								
	CO4	H	L								
	CO5	M	L								
	CO6	H	L								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship(PR)	
									✓		
4	Approval	Academic Council Meeting									

UNIT-1

Classification of Computer Hardware and basic Software. Different Hardware and Software with their uses. Types of Software i.e. System, - Application etc. Different types of Input & Output devices. Workshop safety and environmental awareness - Principles and development of publishing and printing - Desktop publishing.

UNIT-2

Knowledge and operations of a prepress computer system – Typography - Image processing.

UNIT -3

Finished art work - Other related processes – Case Study.

Reference Books:-

G.Dalin. M.Sc software engineering, HSI PUBLICATIONS

Course Coordinator

HOD

BCA001	COMPUTER APPLICATION	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – Higher Secondary Level				
	Course Coordinator Name & Department :- N.Mathimagal& BCA				

COURSE OBJECTIVES:-

The learner will have the knowledge about the basic operations of a computer system, computer applications software, input, and output and storage devices.

COURSE OUTCOMES (COs)

CO1	Define the Characteristics, History, Classification, Personal Computers and Applications.
CO2	Demonstrate understanding of the basic operations of a computer system.
CO3	Explain the principles of operations of computer systems used in a particular application, specifically in terms of the systems' hardware and software components.
CO4	Discuss the various types of Processors, Input and Output devices, OS & DOS command.
CO5	Identify the suitable Storage Devices and Software's to solve the problem.
CO6	Use computer applications software to solve problems.

Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PS O3
2	CO1	H	L						H		
	CO2	H	L								
	CO3	H	-								
	CO4	H	L								
	CO5	M	-								
	CO6	H	L								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship(PR)	
									✓		
4	Approval	Academic Council Meeting									

COMPUTER APPLICATION

UNIT-I:-

Brief History of Development of Computers ,Computer System Concept, Computer System Characteristics ,Capabilities and Limitations, Types of Computers-.,Personal Computer (PCs) - IBM PCs, Types of PCs- Desktop, Laptop, Notebook, Palmtop, etc. Basic Components of a Computer System - Control Unit, ALU, Input/Output semiconductor Memory.Storage fundamentals - Primary Vs Secondary memory.

UNIT-II:-

Input Devices :Keyboard, Mouse, Joystick, Scanners, Digital Camera, MICR,OCR, OMR, , Light pen, Touch Screen. Output Devices Monitors - Characteristics and types of monitor, Size, Resolution, Refresh Rate, Dot Pitch, Video Standard - VGA, SVGA, XGA etc. Printers - Daisy wheel, Dot Matrix, Inkjet, Laser. Plotter, Sound Card and Speakers.

UNIT-III:-

Various Storage Devices - Magnetic Disks, Hard Disk Drives, Floppy, Disks, Optical Disks, Computer Software ,Need, Types of Software's - System software, Application software System Software - Operating System, compiler ,Assemblers, Interpreter .

TEXT & REFERENCE BOOKS:-

1. **COMPUTERS TODAY BY S.K. BASANDRA, GALGOTIA PUBLICATIONS.**
2. **FUNDAMENTALS OF INFORMATION TECHNOLOGY BY ALEXIS LEON & MATHEWS LEON, VIKAS PUBLISHING HOUSE, NEW DELHI.**
3. **DOS QUICK REFERENCE BY RAJEEV MATHUR, GALGOTIA PUBLICATIONS.**

Course Coordinator

HOD

BCA002	GRAPHICAL AND WEB DESIGNING	L	T	P	C						
	Total Contact Hours - 30	2	0	0	2						
	Prerequisite course – Nil										
	Course Coordinator Name & Department :- Jennifer P. & CS										
COURSE OBJECTIVES :- To gain knowledge in basic web designing concepts.											
COURSE OUTCOMES (COs)											
CO1	Remember the web basics and graphic design.										
CO2	Understand the design principle.										
CO3	Analyze the color theory and typography.										
CO4	Apply the basic principle and drawing design.										
CO5	Implement the communication design and layout techniques										
CO6	Illustrate a real time application using image processing concept.										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	P O 1	P O 2	P O 3	P O 4	P O 5	PO6	P O 7	P O 1	P O 2	P O 3
2	CO1	H	L								
	CO2	H	L								
	CO3	H	L								
	CO4	H	-								
	CO5	M	L								
	CO6	H	L								
3	Category	Tamil/Linguistic	Linguistic	Part III Core	Part III Substream	Part III Project	Advanced	Tamil/ EVS/VE/	Part V Extension	Activity	
							✓				
4	Approval	Academic Council Meeting									

GRAPHICAL AND WEB DESIGN

Unit-1:-

Introduction to Graphic Design – Drawing – Design Principle.

Unit -2:-

Color theory – Typography – Idea Generation.

Unit -3:-

Stylisation – Communication Design – Lay outing Techniques – Image Processing – Page Layouting.

Reference Books:-

1. **Computer Graphics: Principles and Practice in C**, by **J. D. Foley, A. Van Dam, S. K. Feiner, J. F. Hughes**. Addison-Wesley, 2nd ed

Course Coordinator

HOD

BCA003	MULTIMEDIA	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – Higher Secondary Level				
	Course Coordinator Name & Department :- N.Mathimagal& BCA				

COURSE OBJECTIVES:-

The learner will have the knowledge about the principles of different types of media and able to identify the proper applications of multimedia, how multimedia can be used in various application areas, and evaluate the appropriate multimedia systems and develop effective multimedia applications.

COURSE OUTCOMES (COs)

CO1	Gain knowledge of basic concepts of multimedia
CO2	Analyze the multimedia application problems.
CO3	Discuss the Video capturing, Sound capturing, editing concepts.
CO4	Identify the basic multimedia design principles.
CO5	Demonstrate the multimedia system and Design Process
CO6	Test real time application using a multimedia concept.

Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PS O3
2	CO1	H	L						H		
	CO2	M	L								
	CO3	H	-								
	CO4	H	L								
	CO5	M	L								
	CO6	H	L								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship(PR)	
									✓		
4	Approval	Academic Council Meeting									

MULTIMEDIA

UNIT-1:-

Multimedia Fundamentals: Define the concept of multimedia, fundamental criteria for the design of a multimedia presentation, multimedia application goals & objectives, opportunities in multimedia production, Role of multimedia development team members, avoiding problems in planning a multimedia application.

UNIT-2:-

Multimedia Building Blocks: Text, Graphics, video capturing, Sound capturing, editing. Basic design principle: proximity, visual hierarchy, Symmetry / Asymmetry, Repetition, unity, Contrast, dynamics, Emphasis, Multimedia Authoring tools.

UNIT-3 :-

Design, Development and evaluation of multimedia a system: The development of user interface design, Design Process,

Reference Books:-

- | | | |
|----|---------------------------------------|--|
| 1. | An introduction to multimedia | John Villamil-Casanova, Louis Molina, |
| 2. | Interactive Multimedia Systems | Mohammad Dastbaz, Desgning |
| 3. | Networking | Bohdan O. Szuprowicz, Multimedia |
| 4. | the web | Stephen McGloughlin, Multimedia on |

Course Coordinator

HOD

BCA004	NETWORKING AND L T P C										
	Total Contact Hours - 30										
	Prerequisite course – Computer Science / Mathematics Studied in Higher Secondary Studies.										
	Course Coordinator Name & Department :- E.Srimathi/CS										
COURSE OBJECTIVES :-											
Learners familiar with the basic concepts of Microprocessor, Controller, Server and to demonstrate the traditional imperative design of CPUs, cards, PCs and BIOS.											
COURSE OUTCOMES (COs)											
CO1	Design the structure of Micro Processor and PCs and CPUs										
CO2	Understand the structure of PC architecture and the study of various PCs										
CO3	Understand the Basics of Processor										
CO4	Study the Computer Organisation & Operating Systems (Windows And Linux) Types Of Computer										
CO5	Working with Background And Number System										
CO6	Used to develop the Backups, Switches Routers, BIOS, Floppy Disk and zip Driver										
Mapping of Course Outcomes with Program outcomes (POs) (H/M/L indicates strength of correlation) H-High, M-Medium, L-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO 1	PSO 2	PSO 3
2	CO1	H	L						H		
	CO2	H	L								
	CO3	H	L								
	CO4	M	L								
	CO5	H	-								
	CO6	H	L								
3	Category	1	Part I Tamil/Linguistic Study	Part II Linguistic English	Part III Core	Part III Substream	Part III Project	Part IV Basic/ Advanced Tamil/ EVS/VE/ SBE/ Soft Skill	Part V Extension Activity		
4	Approval	Academic Council Meeting									

NETWORKING AND MAINTENANCE

UNIT -1 :- COMPUTER HARDWARE

Computer Organizations and Operating Systems(Windows and Linux) , Basic Electrical Engineering and Electronics , Microprocessors , Computer Hardware , Internet and Viruses , Principles of Data Communication & Network Maintenance , Digital Fundamentals , Computer Assembling and Software Installations , Hardware Lab , Project

UNIT -2:- COMPUTER ORGANISATION & OPERATING SYSTEMS(WINDOWS AND LINUX)TYPES OF COMPUTER

Analog, Digital, and Hybrid type, Hardware, Software, System software, Application software, Stored Program Concept and Von Newman Architecture, Firm ware, Human ware, Stored Program Concept, Evolution of computers, Generation of computer.

UNIT-3: - BACKGROUND AND NUMBER SYSTEM

Information Representation and Codes, Data Types, Complements, Addition and Subtraction of Binary Numbers, Fixed Point and Floating Point Representation, Octal and Hexadecimal System , Conversion of Number Systems, Alpha Numeric Codes – ASCII & EBCDIC, Error Detection Codes, Building Blocks of Computers, Combinational Blocks (Gates, Multiplexes, Decoders, Encoders etc.), Sequential Building Blocks (Flip Flops, Registers, Counters, Random Access Memory, etc.)

Reference Books:

1. **IBM PC and CLONES, B.Govindrajalu, Tata McGrawhill Publishers, IBM PC and CLONES**
2. **Computer Installation and Servicing, D.Balasubramanian, Tata McGraw Hill**
3. **Computer Installation and Servicing**
4. **The complete PC upgrade and Maintenance, Mark Minasi, BPB Publication, The complete PC upgrade and Maintenance**

Course Coordinator

HOD

BCA006	WEB DESIGNING	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – Higher Secondary Level				
	Course Coordinator Name & Department:- V.Ramya& BCA				

COURSE OBJECTIVES: -

To gain knowledge in basic web designing concepts.

COURSE OUTCOMES (COs)

CO1	Definethe web basics and server side scripting.
CO2	Execute the HTML coding and linking process.
CO3	Analyze the hyperlinks and special characters.
CO4	Relatethe Embedded Style Sheets & Linking External Style Sheets.
CO5	Use the backgrounds and user style sheets.
CO6	Test real time application using web designing concept.

Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PS O3
2	CO1	H	L							H	
	CO2	M	L								
	CO3	H	-								
	CO4	H	-								
	CO5	H	-								
	CO6	H	-								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship(PR)	
									✓		
4	Approval	Academic Council Meeting									

WEB DESIGNING

UNIT -1

Introduction, Syllabus, Calendar, Terminology, Files and Folders, Purchasing Domain/Hosting, Remote Hosting, FTP, HTML basics, Starting a Website, HTML Coding

UNIT-2

Terminology, Starting a Website, HTML Coding

UNIT-3

HTML Coding, Wireframe, Website Design/Development, FTP, Basics of CSS Coding, CSS Coding, Internal CSS

Reference Books:-

1. **Blanck, Peter. *eQuality: The Struggle for Web Accessibility by Persons with Cognitive Disabilities*, Cambridge Disability Law and Policy Series, 2015.**
2. **Burgstahle, Sheryl. *Universal Design in Higher Education: From Principles to Practice*, Harvard Education Press, 2008.**
3. **Byrne, Jim. *60 hot to touch Accessible Web Design tips – the tips no web developer can live without!*, Jim Byrne, 2006, (ISBN: 978-1-4116-6729-7).**
4. **Chisholm, and May. *Universal Design for Web Applications: Web Applications That Reach Everyone*, O'Reilly Media, 2008.**
5. **Clark, Joe. *Building Accessible Websites*, New Riders Publishing, 2002.**
- 6.

Course Coordinator

HOD

BSC001	ANIMATION	L	T	P	C
	Total Contact Hours – 30	2	0	0	2
	Prerequisite course – Higher Secondary Level				
	Course Coordinator Name & Department :- N.Mathimagal& BCA				

COURSE OBJECTIVES:-

The learner will have the knowledge about the use of animation, digitized sound, video control, and scanned images.

COURSE OUTCOMES (COs)

CO1	Gain knowledge of basic concepts of Animations
CO2	Analyze the use of Netscape to access the Course Home Page and Tips and Tricks. .
CO3	Discuss the basic instructional design principles in the development of stacks..
CO4	Identify the basic Formulate a working definition of interactive multimedia.
CO5	Demonstrate the competence in using the authoring program Hyper Studio.
CO6	Test real time application using a basic concept.

Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low

1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
2	CO1	H	L						H		
	CO2	M	L								
	CO3	H	-								
	CO4	H	L								
	CO5	M	L								
	CO6	H	L								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/Internship(PR)	
									✓		
4	Approval	Academic Council Meeting									

ANIMATION

Unit - 1

INTRODUCTION:

Elements of Information Technology - Introduction to Programming Languages - Basics of Animation.-Foundation Art. -Computer Based 2D Animation. - Multimedia & Computer Graphics. Introduction to 3D Animation & Modeling- Introduction to Mass Communication & Media Literacy

Unit - 2

3-D Animation-I.- Production Process-I. - Multimedia-I. - Composing and Editing. - Color Theory.

Unit- 3

Script Writing-I. - Content Development Direction-I. - Gaming Technology - Digital Editing and Motion Graphics-I. - Visual Effects-I. - V.F.X.-I.

REFERENCE BOOKS :

1. **Introduction to mass Communication :**
Medial Literacy & Culture By Stanley Baran The Tata McGraw Hill
2. **The Media in your life - By Jean**
Folkerts& Stephen Lacy by Pearson Publications.

Course Coordinator

HOD

BSC002	COMPUTER HARDWARE AND NETWORKING						L	T	P	C	
	Total Contact Hours – 30						2	0	0	2	
	Prerequisite course – Higher Secondary Level										
	Course Coordinator Name & Department :- Ms.K.HemaLakshmi / CS										
COURSE OBJECTIVES :-											
Learners familiar with the basic concepts of Microprocessor, Controller, Server and to demonstrate the traditional imperative design of CPUs, cards, PCs and BIOS.											
COURSE OUTCOMES (COs)											
CO1	Define the structure of Micro Processor and PCs and CPUs										
CO2	State the structure of PC architecture and the study of various PCs										
CO3	Describe the basics of Processor										
CO4	Study the CPU, Chips, Processor and Controllers										
CO5	Examine the working of Internal Components cards and Higher Level Processor										
CO6	Relate the Backups, Switches Routers, BIOS, Floppy Disk and zip Driver										
Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low											
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PS O2	PS O3
2	CO1	H	-						H		
	CO2	H	L								
	CO3	H	L								
	CO4	M	-								
	CO5	H	L								
	CO6	M	-								
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Seminar/ Internship (PR)	
									✓		
4	Approval	Academic Council Meeting									

COMPUTER HARDWARE AND NETWORKING

UNIT-1

Microprocessor System Introduction of System overview, Introduction to Processors, Memory Interfacing, Interfacing I/O Devices, Interfacing Data Converters, Display Interface, Serial I/O and Data Communication, Higher level Processors

UNIT - 2

Introduction to PC Architecture Study of PC-AT/ATX System, Pentium, Core, Core 2 CORD, Core 2 Duo, I3, I5, I7 Processor Basics of Processor and CPU Block Diagram of Computer and Computer Generation Motherboards, Chipset and Controllers, BIOS and the Boot Process, Computer Memory.

UNIT-3

Internal Components IDE and SATA Devices: Hard Disk Drive and CD/DVDs Drives, SCSI Devices, Floppy Disk, Zip Drive, Backup Drive, Expansion Cards- LAN Card, IDE Card , VGA and SVGA Cards, Sound Card, Interface Cards, I/O cards, Video Cards, USB Card, Fire-Wire Cards, Internal Ports, Cables and Connector Types. Introduction of Network Cable like UTP, STP, Fiber Optics, Hub, Unmanageable Switch, Manageable Switch, Router, Modem, Wi-Fi, Access Point, PCI Wireless Card, USB Wireless Device, Print Server, USB Network Sharer, Backup Device, Server Hardware etc.

Reference Book:

(1) Microprocessor Architecture Programming and Application with the 8085 Ramesh Gaonkar Penram International Publication.

(2) Electronics and Radio Engineering M.L. Gupta Dhanpatrai & Sons, New Delhi.

(3) PC AND CLONES Hardware, Troubleshooting and Maintenance B. Govindarajalu, Tata Mc-graw-Hill Publication.

(4) PC Troubleshooting and Repair Stephen J. Bigelow Dream tech Press, New Delhi

Course Coordinator

HOD

BSC003	COMPUTER PROGRAMMING		L	T	P	C				
	Total Contact Hours – 30		2	0	0	2				
	Prerequisite course – Higher Secondary Level									
	Course Coordinator Name & Department :- Ms.K.HemaLakshmi/ CS									
COURSE OBJECTIVES :-										
Learners will be familiar with the programming language C, Algorithm, and Design the flowchart and implement the programs using the concept such as Functions, Pointers and Strings.										
COURSE OUTCOMES (COs)										
CO1	Apply and Write the clear, structure and Looping of elementary C programs.									
CO2	Explain algorithmic thinking and apply it to programming.									
CO3	Describe problem-solving techniques.									
CO4	Ability to use C with Various operators Expressions and Decision making control.									
CO5	Write Code using Arrays with single dimensions, Two dimensions and Multidimensional and Various Strings operations									
CO6	Examine programs using Functions, Pointers, Structures and Union									
Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low										
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
2	CO1	H	-						H	
	CO2	H	L							
	CO3	H	L							
	CO4	H	-							
	CO5	M	L							
	CO6	H	-							
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/ Seminar/ Internship (PR)
									✓	
4	Approval	Academic Council Meeting								

COMPUTER PROGRAMMING

UNIT-1:-

INTRODUCTION:-

Generation and Classification of Computers – Basic organization of a Computer – Number System – Binary – Decimal – Conversion – Problems. Need for logical Analysis and thinking algorithm – Pseudo code – Flow Chart.

UNIT-2:-

PROGRAMMING BASICS:-

Problem formulation – Problem solving – introduction to “C” programming – Fundamentals – structure of C Program – compilation and linking processes – Constants, Variables – Data Types – Expressions using operators in C- Managing input and output operations – Decision making and Branching – Looping Statements – Solving simple scientific and statistical problems.

UNIT -3:-

ARRAYS, STRINGS, FUNCTIONS AND STRUCTUES:-

Arrays – Initialization – Declaration – One Dimensional and Two Dimensional Arrays – String – String Operations – String Arrays. Simple programs – sorting – searching – matrix operations. Function – definition of function – declaration of function – Recursion – pointers – pointer and arrays – example problems – need for structure data type – structure definition – structure declaration – structure within a structure – union - storage classes, pre-processor directives.

Text Books:-

1. Anita Goel and Ajay Mittal, “Computer Fundamentals and programming in C”, Dorling Kindersley (India) Pvt Ltd., Pearson Education in South Asia 2011.
2. PradipDey, ManasGhosh, “fundamentals of computing and programming in c”, First edition, Oxford University Press, 2009.
3. Yashavant P. Kanethar, “Let Us C”, BPB Publications, 2011.

Reference Books:-

1. Byron S Gottfried, “ Programming with C”, Schaum’s Outlines, Second Edition, Tata McGraw-Hill 2006.
2. Dromey R.G., How to Solve it by Computer”, Pearson Education, Fourth Reprint, 2007.

Course Coordinator

HOD

BSC004	COMPUTER TECHNOLOGY		L	T	P	C				
	Total Contact Hours – 30		2	0	0	2				
	Prerequisite course – Higher Secondary Level									
	Course Coordinator Name & Department :- Ms.K.HemaLakshmi/ CS									
COURSE OBJECTIVES :-										
Learners will be Explore and demonstrate knowledge of how to maintain computer equipment and solve common hardware problems										
COURSE OUTCOMES (COs)										
CO1	Design, implement and evaluate computer technologies.									
CO2	Think critically, creatively and analytically in developing technological solutions to simple and complex problems. .									
CO3	Plan, analyze, design and construct information systems to identified specifications.									
CO4	Ability to efficient code in the relevant programming language(s). .									
CO5	Evaluate, and use computer software. Use software tools for creating, finding, organizing, and communicating information.									
CO6	Work effectively as a team member to achieve a common stated goal.									
Mapping of Course Outcomes with Program outcomes (POs) (1/2/3 indicates strength of correlation) 3-High, 2-Medium, 1-Low										
1	COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
2	CO1	H	-						H	
	CO2	H	L							
	CO3	H	L							
	CO4	H	-							
	CO5	M	L							
	CO6	H	-							
3	Category	Humanities & Social Studies (HS)	Basic Sciences (BS)	Engg Sciences (ES)	Professional Core (PC)	Core Elective (CE)	Non-Major Elective (NE)	Open Elective (OE)	Any other	Project/Term Paper/Seminar/ Internship (PR)
									✓	
4	Approval	Academic Council Meeting								

COMPUTER TECHNOLOGY

UNIT - 1

Digital Logic: Logic functions, Minimization, Design and synthesis of combinational and sequential circuits; Number representation and computer arithmetic (fixed and floating point). Computer Organization and Architecture: Machine instructions and addressing modes, ALU and data-path, CPU control design, Memory interface, I/O interface (Interrupt and DMA mode), Instruction pipelining, Cache and main memory, Secondary storage. Programming and Data Structures: Programming in C; Functions, Recursion, Parameter passing, Scope, Binding; Abstract data types, Arrays, Stacks, Queues, Linked Lists, Trees, Binary search trees, Binary heaps

UNIT - 2

Algorithms: Analysis, Asymptotic notation, Notions of space and time complexity, Worst and average case analysis; Design: Greedy approach, Dynamic programming, Divide-and-conquer; Tree and graph traversals, Connected components, Spanning trees, Shortest paths; Hashing, Sorting, Searching. Asymptotic analysis (best, worst, average cases) of time and space, upper and lower bounds, Basic concepts of complexity classes – P, NP, NP-hard, NP-complete.

UNIT -3

Theory of Computation: Regular languages and finite automata, Context free languages and Push-down automata, Recursively enumerable sets and Turing machines, Undecidability. Compiler Design: Lexical analysis, Parsing, Syntax directed translation, Runtime environments, Intermediate and target code generation, Basics of code optimization. Operating System: Processes, Threads, Inter-process communication, Concurrency, Synchronization, Deadlock, CPU scheduling, Memory management and virtual memory, File systems, I/O systems, Protection and security. Databases: ER-model, Relational model (relational algebra, tuple calculus), Database design (integrity constraints, normal forms), Query languages (SQL), File structures (sequential files, indexing, B and B+ trees), Transactions and concurrency control.

Reference Books:

- 1. A First Course in Computers” by Sanjay Sexena**
- 2. Computer Organization and Architecture – Carl Hamcher&SafatZaky**
- 3. Computer Architecture and Organization – J. P. Hayes**