ST. MARY'S COLLEGE (Autonomous)

(*Re-accredited with 'A+' Grade by NAAC*) Thoothukudi-628001, Tamil Nadu (Affiliated to Manonmaniam Sundaranar University)



Syllabus

B.Sc. Microbiology

School of Biological Sciences

Outcome Based Curriculum

(W.e.f.2018)

Preamble

Microbiology is the branch of biology dealing with the structure, function, uses, and modes of existence of microscopic organisms. Microbiology is the study of microorganisms such as bacteria, fungi, algae, protozoa and virus. Microbiology encompasses numerous sub-disciplines including virology, parasitology, mycology and bacteriology.

Vision

To make young women as an effective science personalities through experimental scientific education.

Mission

To empower and enrich women with scientific knowledge so that they are skilled to compete in this global sphere of education as an eminent personalities.

Programme	Outcome
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PO.No	Upon completion of B.Sc Degree programme, the graduates will be able to
PO 1	apply the acquired knowledge of fundamental concepts in the field of science and to find solutions to various problems.
PO 2	inculcate innovative skills and team – work among students to meet societal expectations.
PO 3	perform analysis to assess, interpret, and create innovative ideas through practical experiments.
PO 4	facilitate to enter multidisciplinary path to solve day-to-day scientific problems.
PO 5	carry out fieldworks and projects, both independently and in collaboration with others, and to report in a constructive way.
PO 6	improve communication ability and knowledge transfer through ict aided learning integrated with library resources.
PO 7	transfer the knowledge to the other stakeholders through extensive community development programme.
PO 8	attain competency in job market / entrepreneurship.

Part	Components	Sub. Code	ub. CodeTitle of the PaperHrs.		Credits	Max.Marks		
				Week		CIA	ESE	Total
Ι	Tamil /	18ULTA11	இக்கால இலக்கியம்: செய்யுள், இலக்கணம், உரைநடை, சிறுகதை, இலக்கிய வரலாறு	6	4	40	60	100
	French	18ULFA11	Preliminary French Course.					
Π	General English	18UGEN11	Prose, Poetry, Extensive reading & Language Study I	6	4	40	60	100
	Core I	18UMIC11	Introduction to Microbiology	4	4	40	60	100
	Core II	18UMIC12	Microbial Diversity	4	4	40	60	100
III	Core Practical I	18UMICR1	Laboratory in Introduction to Microbiology and Microbial Diversity	2	1	40	60	100
	Allied I	18UMIA11	Dairy Technology	4	3	40	60	100
	Allied Practical I	18UMIAR1	Laboratory in Dairy Technology	2	1			
IV	Ability Enhancement Course	18UAVE11	Value Education	2	2	20	30	50
		Total		30	23			

Course Structure (w.e.f. 2018) Semester –I

Semester II

Part	Components	nents Sub. Code	Title of the Paper	Hrs/	Credits		Max.N	Aarks
				Wee		CIA	ESE	Total
Ι	Tamil /	18ULTA21	சமய இலக்கியங்களும், நீதி இலக்கியங்களும்: செய்யுள், இலக்கணம், உரைநடை, வாழ்க்கை வரலாறு, இலக்கிய வரலாறு Pacie Franch Course	6	4	40	60	100
II	General English	18UGEN21	Prose, Poetry, Extensive reading & Language Study II	6	4	40	60	100
	Core III	18UMIC21	Microbial Metabolism and Physiology	4	4	40	60	100
	Core IV	18UMIC22	Bioinstrumentation	4	4	40	60	100
III	Core Practical II	18UMICR2	Laboratory in Microbial Metabolism Physiology and Bioinstrumentation	2	1	40	60	100
	Allied II	18UMIA21	Biochemistry	4	3	40	60	100
	Allied Practical II	18UMIAR2	Laboratory in Biochemistry	2	1			
IV	Ability Enhancement Course	18UAEV21	Environmental Studies	2	2	20	30	50
Total				30	23			

Semester III

Part	Components	Sub. Code	Title of the Paper	Hrs/	Credits	redits Max.Marks			
				Week		CIA	ESE	Total	
Ι	Tamil /	18ULTA31	காப்பிய இலக்கியம்: செய்யுள், இலக்கணம்,உரைநடை சிறுகதை, இலக்கிய வரலாறு	6	4	40	60	100	
	French	18ULFA31	Advanced French Course						
Π	General English	18UGEN31	Prose, Poetry, Extensive reading & Language Study III	6	4	40	60	100	
	Core V	18UMIC31	Molecular Biology And Microbial Genetics.	4	4	40	60	100	
	Core Practical III	18UMICR3	Laboratory in Molecular Biology And Microbial Genetics	2	1	40	60	100	
III	Allied III	18UMIA31	Genetic	4	3	40	60	100	
	Allied Practical III	18UMIAR3	Engineering. Laboratory in Genetic Engineering	2	1				
	Core Skill Based	18UMIS31	Practicals in Medical laboratory technology	4	4	40	60	100	
	NME I	18UMIN31	Food Microbiology	2	2	20	30	50	
	Ability Enhancement Course	18UAWS31	Women's Synergy		2	20	30	50	
IV	Self Study or On-line Course / Internship (Optional)	18UMISS1	Food Preservation Technology		+2		50	50	
		Total	1	30	25+2				

Semester	IV
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Part	Components	eents Sub. Code Title of the Paper H		Hrs/	Credi		Max.N	Aarks
				Wee		CIA	ESE	Total
Ι	Tamil /	18ULTA41	சங்க இலக்கியம்:: செய்யுள், இலக்கணம், உரைநடை, வாழ்க்கை வரலாறு, இலக்கிய வரலாறு					
	French	18ULFA41	Language through Literature.	6	4	40	60	100
II	General English	18UGEN41	Prose, Poetry, Extensive reading & Language Study IV	6	4	40	60	100
	Core VI	18UMIC41	Agricultural Microbiology	4	4	40	60	100
	Core Practical IV	18UMICR4	Laboratory in Agricultural Microbiology	2	1	40	60	100
ш	Allied IV	18UMIA41	Mushroom Technology	4	3	40	60	100
111	Allied Practical IV	18UMIAR2	Laboratory in Mushroom Technology	2	1			
	Core Skill Based	18UMIS41	Biostatistics	4	4	40	60	100
	NME II	18UMIN41	Clinical Microbiology	2	2	20	30	50
IV	Ability Enhancement Course	18UAYM41	Yoga & Meditation		2	20	30	50
	Self Study / Online Course (Optional)	18UMISS2	Probiotics / Online Course/ Internship		+2		50	50
	NCC, NSS & Sports				1			
V	Extension Activities CDP				+1			
			Total	30	26+3			

Semester	V
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Part	Components	Sub. Code	Title of the Paper	Hrs/	Credits		Max.M	larks
				Week		CIA	ESE	Total
	Core VII (Common Core)	18UBCS51	Psychology and Microbiology for health care	6	4	40	60	100
	Core VIII	18UMIC52	Immunology	5	4	40	60	100
	Core IX	18UMIC53	Clinical Microbiology	5	4	40	60	100
111	Core Integral I	18UMII51	Microbial Nanotechnology	4	4	40	60	100
	Core Integral II	18UMII52	Vermi Technology	4	4	40	60	100
	Core Practical V	18UMICR5	Laboratory in Immunology and Clinical Microbiology	4	2	40	60	100
IV	Common Skill Based	18UCSB51	Computer for Digital Era and Soft skills	2	2	20	30	50
	Self Study or On-line Course (Compulsory)	18UMISS3	Sea Food Processing		2		50	50
		Total	•	30	26			

Semester VI

Part	Components	Sub. Code	Title of the Paper	Hrs/	Hrs/ Credits		Max.Marks		
				Week		CIA	ESE	Total	
	Core X	18UMIC61	Food Microbiology	5	4	40	60	100	
	Core XI	18UMIC62	Industrial Microbiology	5	4	40	60	100	
	Core XII	18UMIC63	Microbial Biotechnology	4	4	40	60	100	
III	Core Integral III	18UMII61	Cosmetic Microbiology	4	4	40	60	100	
	Core Practical VI	18UMICR6	Laboratory in Food Microbiology, Industrial Microbiology and Microbial Biotechnology	4	2	40	60	100	
IV	Project	18UMIP61		8	4	40	60	100	
		Total		30	22				

Semester	Hours	Credits	Extra Credits
Ι	30	23	
II	30	23	
III	30	25	2
IV	30	26	3
V	30	26	
VI	30	22	
Total	180	145	5

Courses	Number of	Hours / week	Credits	Extra Credits
	Courses			
Tamil	4	24	16	
English	4	24	16	
Core	12T+6P	54T+16P	48T+8P	
Core Skill Based	2	8	8	
Core Integral	3	12	12	
Group Project	1	8	4	
Allied	4T+4P	16T+8P	12T+4P	
NME	2	4	4	
Ability Enhancement	4	4 +(4 Extra	8	
Course		Hours)		
Common Skill Based	1	2	2	
NCC, NSS & Sports			1	
Extension Activities				1
Self Study Papers	2			4
(Optional)				
Self Study Papers	1		2	
(Compulsory)				
Total		180	145	5

தமிழ்த் துறை தமிழ் பாடத்திட்டம் 2018 – 2021

பாடத்திட்டத்தின் நோக்கங்கள்

- அனைத்து துறை மாணவர்களும் பயன்பெறும் வகையில் பாடத்திட்டம் வரையறை செய்யப்பட்டுள்ளது.
- தமிழ் இலக்கிய கல்வியை எளிமையுடன் ஆழமாக்கிக் கற்பிக்கும் விதமாகத் தற்கால இலக்கியம் தொடங்கி, சங்க இலக்கியம் வரை கற்பித்தல்.
- தமிழ் மொழியில் பிழையின்றி கற்கும் விதமாக எழுத்து, சொல் , பொருள், யாப்பு, அணி என இலக்கணத்தைக் பயிற்றுவித்தல்.
- மாணவர்களின் நலன் கருதி இலக்கிய வரலாற்றுப் பகுதியானது செய்யுள் அமைப்பிற்கேற்ப வகைப்படுத்தப்பட்டு கற்பிக்கப்படுதல்

பயன்கள்

- காலந்தோறும் வளர்ந்துவரும் தமிழ் கவிதைகளின் வடிவினையும், கருத்தோட்டத்தினையும் மாணவியர் அறிந்து கொள்வர்.
- 2. தமிழ் மொழியைப் பிழையின்றி எழுதவும் பேசவும் முடியும்.
- 3. தன்னம்பிக்கை உருவாகும்.
- 4. தகவல் தொடர்பு சாதனங்கள் தமிழ் வளர்ச்சிக்குப் பயன்படுவதை அறிந்து கொள்வர்.
- 5. படைப்பாற்றலை வளர்த்துக்கொள்வர்.
- 6. தமிழ் இலக்கியங்கள் அன்று முதல் இன்று வரை பெற்றுவரும் சிறப்பை உணர்வர்.
- இலக்கிய வரலாற்றின் வழி, மொழியின் வளர்ச்சியையும் காலந்தோறும் மாறிவரும் இலக்கியங்களின் பல்வேறு வகைகளையும் தெரிந்து கொள்வர்.
- 8. துறைதோறும் தமிழ் மொழியின் வளர்ச்சியை அறிவர்.
- சங்கம் வைத்து தமிழாய்ந்த மன்னர், புலவர், மக்கள் இவர்களின் வாழ்வியல் அறங்களைக் கண்டறிவர்.
- 10. பண்பாட்டுச் சிறப்பினை மொழியின் வழி அறிந்து தம் வாழ்வில் கடைபிடிப்பர்.
- 11. வேலைவாய்ப்பிற்கான தேர்வுகளில் திறமையுடன் பங்கேற்பர்.

SEMESTER - I									
18ULTA11	H	rs / Week:	:6			Hrs / Sem	ester: 90	Crec	lits: 4

Vision: மாணவியருக்கு நல்ல மதிப்பீடுகளைக் கற்பித்து, வாழ்வில் அவற்றைப் பின்பற்ற வழிவகுத்தல்.

Mission: இலக்கிய மாந்தரின் வாழ்க்கை அனுபவங்கள் மூலம் பிரச்சனைகளை எதிர்கொள்ளும் திறம், தன்னம்பிக்கை, ஆளுமைத்திறம், மொழிஅறிவு இவற்றை உருவாக்குதல்.

CO.No.	இப்பாடத்திட்டத்தின் மூலம், மாணவியா	Cognitive Level
CO-1	பெண் சார்ந்த விடுதலை உணர்வை வளர்க்கிறது.	வளர்ச்சி
CO-2	இனம், சாதி குறித்த பாகுபாட்டிலிருந்து விடுதலை பெறும்	நடைமுறைப்படுத்தல்
	வழிவகைகளைக் கற்றுக்கொடுக்கிறது.	
CO-3	இயற்கையைப் பேணுதற்கும் வாழ்வின் வளர்ச்சிநிலையை	நடைமுறைப்படுத்தல்
	மேம்படுத்திக் கொள்ளுதற்கும் உதவுகிறது.	
CO-4	சமயநல்லிணக்கம், ஒற்றுமைஉணர்வு, இறைநம்பிக்கை இவற்றை	உருவாக்கம்
	உருவாக்குகிறது.	
CO-5	மொழியை பிழையின்றி பேசவும் எழுதவும் உதவுகின்றது.	புரிதல்
		திறன் மேம்பாடு
CO-6	தனிமனித வாழ்க்கைச் சிக்கல்களை எதிர்கொள்ளும் நிலையை	நடைமுறைப்படுத்தல்
	உருவாக்குகிறது	
CO-7	சமுதாய பிரச்சினைகளை எதிர்கொள்ளும் திறம் கிடைக்கிறது.	நடைமுறைப்படுத்தல்
CO-8	போட்டித் தேர்வுகளுக்குப் பயன்படும் வகையில் படைப்பாக்கத்	படைப்பாற்றல்
	திறனை வளர்க்க உதவுகிறது.	திறன் மேம்பாடு

SEMESTER – I								
Part – I தமிழ்; Paper – 1 இக்கால இலக்கியம், செய்யுள், இலக்கணம்,								
உரைநடை, சிறுகதை, இலக்கிய வரலாறு								
18ULTA11 Hrs/Week: 6	Hrs / Semester: 90	Credits: 4						
அலகு– 1 செய்யுள் – 1 மணி 1. மனதில் உறுதிவேண்டும் 2. ஒழுக்கம் விழுப்பம் தரும் 3. ஐந்துபெரிது ஆறு சிறிது 4. போட்டி 5. மனிதனும் இயற்கையும் 6. நன்றிக்கடன் 7. மேலாடை 8. கவிஞர்கள் கவனிக்க 9. மாதவம் 10. ஹைக்கூ கவிதைகள் 11. நாட்டார் பாடல்கள் 1. விளையாட்டு 2. உழவும் தொழிலும்	- பாரதியார் - பாரதிதாசன் - வைரமுத்து - அப்துல் ரகுமான் - சிற்பி - பா.விஜய் - சுரதா - ஜெ.செல்வகுமாரி - சக்திஜோதி							
அலகு–2 இலக்கணம் - 1 மணி எழுத்து 1. எழுத்துப் பற்றிய விளக்கம். ஒரெழுத 2. முதலெழுத்துகள். 3. சார்பெழுத்துகள் 4. சுட்டெழுத்துகள், வினாவெழுத்துகள் 5. மொழிமுதல் எழுத்துகள், மொழிஇறுத 6. வல்லினம் மிகும் இடங்கள், வல்லினம்	ந்து ஒருமொழி ெஎழுத்துகள் ம் மிகா இடங்கள்							
அலகு– 3 உரைநடை - 1 மணி இலக்கியச் சாரல் (கட்டுரை எண்கள் - 1, 2, 3, 8, 9, 10)	- ச.பாரிஜாதம்							
அலகு– 4 சிறுகதை - 1 மணி 1. அகிலன் 2. புதுமைப்பித்தன் 3. அண்ணா 4. ஜெயகாந்தன் 5. இரா.கலாராணி 6. ஜெயரதி அகஸ்டின் அலகு –5 இலக்கிய வரலாறு - 2 மணி 1. புதுக்கவிதையின் தோற்றமும் வளர்ச்சி 2. சிறுகதையின் தோற்றமும் வளர்ச்சியும் 3. நாட்டுப்பாப் பாடல்கள்	- தாய்ப்பசு - சாபவிமோசனம் - செவ்வாழை - அக்கினிப்பிரவேசம் - மௌனப்போராளி - ஜோடிப் பொருத்தம்							

- தாடர்ப்புது பாடல்கள்
 தகவல் தொடர்புசாதனங்களும் தமிழ் வளர்ச்சியும்
 மொழிப்பயிற்சி : புதுக்கவிதை,சிறுகதை,பத்திரிகைக்கு செய்தி

SEMESTER – II						
Part-1 Tamil தாள் -2 சமய இலக்கியங்களும் நீதி இலக்கியங்களும்						
	യമ്പപ്പി, ജിലക്കായില്, ഇംഗുട്ടംല്, ബില്ലക്കാക് ബുലില്ല്, ജിലക്കില് ബുലില്ല്					
18ULTA21	Hrs / W	/eek:6	Hrs / Semester: 90	Credits: 4		

Vision:

வாழ்வியல் நன்னெறிகளான மனிதநேயம், சமத்துவம் போன்றவற்றை வளர்த்துக் கொள்ள கற்றுக்கொடுத்தல்

Mission:

அறநெறியைக் கடைபிடிப்பதே நிலையானதும் நீடித்ததுமான நன்மையைத் தருவது என்பதைச் சான்றோரின் வாழ்க்கைநெறிகள் மூலம் உணரச்செய்தல், மொழிஅறிவு, இலக்கியஅறிவு இவற்றை வளர்த்துக் கொள்ளக் கற்றுக்கொடுத்தல்

CO.No.	இப்பாடத்திட்டத்தின் மூலம், மாணவியா்	Cognitive Level
CO-1	இறைஆற்றலை உணர்ந்துகொள்ள உதவுகிறது	மதிப்பீடு
CO-2	நல்லநண்பர்களையும், நல்லமனிதர்களையும்	நடைமுறைப்படுத்தல்
	இனம்கண்டுகொள்ள வழிவகுக்கிறது	
CO-3	அன்பு, இரக்கம், நற்சொல், நற்செயல் போன்ற	மதிப்பீடு
	நற்பண்புகளோடு வாழவழிவகுக்கிறது	
CO-4	மனிதநேய பண்புகளோடு வாழ்ந்த சான்றோரின்	நடைமுறைப்படுத்தல்
	அனுபவங்களைப் பெற்றுக்கொள்ள உதவுகிறது	
CO-5	மொழியை பிழையின்றி பேசவும் எழுதவும் உதவுகின்றது.	புரிதல், திறன்
		மேம்பாடு
CO-6	துனிமனித வாழ்க்கைச் சிக்கல்களையும் பிரச்சினைகளையும்	நடைமுறைப்படுத்தல்,
	எதிர்கொள்ளும் ஆற்றலை உருவாக்குகிறது	திறன் மேம்பாடு
CO-7	இறைவன்முன் அனைவரும் சமம் என்ற சிந்தனையை	மதிப்பீடு
	உருவாக்குகிறது	
CO-8	போட்டித் தேர்வுகளுக்குப் பயன்படும் வகையில் படைப்பாக்கத்	படைப்பாற்றல்
	திறனை வளர்க்க உதவுகிறது	

	S	EMESTER - II	
Part —] செய்ய	[Tamil தாள் – II வ், இலக்கணம், உரைந	சமய இலக்கியங்களும் நீதி இவ டை, வாழ்க்கை வரலாறு, இலக்	லக்கியங்களும் கிய வரலாறு
Code:18ULTA21	Hrs/Week: 6	Hrs / Semester: 90	Credits: 4
அலகு– 1 செய்யுள்	- 2 மணி		
சைவம் 1. தேவா	ரம் - சுந்தரர்		
2. திருவ	ாசகம் - மாணிக்க	வாசகர்	
3. திரும	ந்திரம் - திருமூலர்	T Contraction of the second	
வைணவம் 1. ஆண்ட	_ாள் - நாச்சியார்	ர் திருமொழி	
2. நம்மா	ழ்வார் - திருவாய்(மொழி	
பௌத்தம் : மணிமே	ക്കരാ		
கிறித்துவம் : கிறிஸ்த	ு மொழிக்குறள்		
இசுலாமியம் : பேட்ன	_ஆம்பூர் அப்துல் காதிர்	சாகிபு பாடல்	
நீதி இலக்கியங்கள்			
1. திருக்	தறள்		
2. நாலடி	umit		
3. பழமெ	ாழிநானூறு		
அலகு—2 இலக்கணம் 1. சொல் 2. பெயர் 3. வினை 4. இடை 5. உரிச்(- 1 மண லின் பொது இலக்கணம் ச்சொல் - அறுவகை (ச்சொல் - வகைகள் - செய்வினை, செ சசொல் - ஏகார ஓகார சொல் - வகைகள்	பெயர்கள் · முற்று, எச்சம், ஏவல், வியங்ே சயப்பாட்டுவினை, தன்வினை, பிற உம்மை இடைச்சொற்கள்	காள், 3வினை
அலகு– 3 உரைநடை எண்ணங்க	் - 1 மணி ள் - எம். எஸ். உ	தயமூர்த்தி	
அலகு– 4 வாழ்க்கை அன்னைதெ	வரலாறு - 1 மணி நரேசா-பசுமைக்குமார்		
அலகு–5 இலக்கியவர 1. சைவ இ 2. வைணவ 3. கிறிஸ்து 4. இஸ்லாப	லாறு - 1 மணி லக்கியங்கள் இலக்கியங்கள் வம் தமிழுக்குச் செய்த ியம் தமிழுக்குச் செய்த	தொண்டு தொண்டு	

SEMESTER – III						
P	Part-I Tamil Paper - 3 காப்பிய இலக்கியங்களும் சிற்றிலக்கியங்களும்					
18ULTA31	Hrs / V	Veek:6	Hrs / Semester: 90	Credits: 4		

Vision: மாணவியருக்கு தனது உரிமைகளைப் போராடி பெறுவதற்கும் நல்ல உறவுகளை இனம் கண்டு மதிக்கவும் கற்றுக்கொடுத்தல்.

Mission: காப்பிய மாந்தரின் வாழ்க்கையின் மூலமாக நம்பிக்கை, நல்ல உறவுகள், இயற்கையை நேசித்தல், மொழிஅறிவு போன்றவற்றை வளரச் செய்தல்.

CO.No.	இப்பாடத்திட்டம் மாணவியருக்கு	அறிவுசார் மதிப்பீடு
CO-1	பெண்கள் நீதிக்குப் போராடும் உணர்வை வளர்க்கிறது.	நடைமுறைப்படுத்தல்
CO-2	அரசியல் சூழ்ச்சி, இனம், சாதி குறித்த பாகுபாடு	நடைமுறைப்படுத்தல்
	இவற்றிலிருந்து விடுதலை பெறும் வழிவகைகளைக்	
	கற்றுக்கொடுக்கிறது.	
CO-3	இயற்கையைப் பேணுதற்கு உதவுகிறது.	நடைமுறைப்படுத்தல்
CO-4	சமயநல்லிணக்கம், இறைநம்பிக்கை இவற்றை	உருவாக்கம்
	உருவாக்குகிறது.	
CO-5	மொழியைப் பிழையின்றி பேசவும் எழுதவும்	புரிந்துகொள்ளுதல்,
	உதவுகின்றது.	திறன் மேம்பாடு
CO-6	தனிமனித வாழ்க்கைச் சிக்கல்களை	நடைமுறைப்படுத்தல்
	எதிர்கொள்ளும் நிலையை உருவாக்குகிறது	
CO-7	விவசாயிகளின் வாழ்க்கைப் பிரச்சினை,	நடைமுறைப்படுத்தல்,
	சமுதாயப்பிரச்சினை இவற்றை உணர்ந்து அவற்றை	திறன் மேம்பாடு
	நீக்கும் திறனை உருவாக்குகிறது.	
CO-8	போட்டித் தேர்வுகளுக்குப் பயன்படும் வகையில்	படைப்பாற்றல்,
	படைப்பாக்கத் திறனை வளர்க்க உதவுகிறது.	திறன் மேம்பாடு

SEMESTER – III							
Part-I Tamil Paper - 3 காப்பிய இலக்கியங்களும் சிற்றிலக்கியங்களும்							
18UL'	TA31	Hrs /	Week:6	Hrs / Semester: 90	Credits: 4		
ച്ചപ്പെക	- 1 செய்ய	ഞ് - 2 ഗത്തി					
தாப்பி	பங்கள்						
1.	சிலப்பதிகா	ரம் - வழக்கு	ரைகாதை : 1	– 80 பாடலடிகள்			
2.	மணிமேகன	் ல - பாக்கிரம்	் பெற்ற காகை	, த.: 75— 145 பாடலடிகள்			
3.	சீவகசிந்தா	மணி - கோவி	ந்தையார் இல	 ம்பகம் - பாடல்கள்: 411, 4	421, 430, 437, 440,		
	441, 448, 4	454, 456, 474,	477, 483, 48	4, 488, 489.			
4.	கம்பராமாய	ணம் - நகரப்	படலம் - பாட	ல்கள்: 94, 95, 98, 100, 103	3, 104, 108, 114, 116		
	119, 129,	132, 138, 147,	153, 159, 16	0.			
5.	சீறாப்புரான	ாம் - விடமீட்ட	படலம் - பாட	_ல்கள் : 1, 4, 5, 6, 7, 9,	12, 13, 15, 16, 17,		
	20, 23, 25,	, 27, 29, 32,	33, 34, 36, 37	7, 40, 42, 44.			
6.	6. இயேசுகாவியம் - மலைப்பொழிவு						
7.	பெரியபுரான	னம் - பூசலார்	புராணம்				
சிற்றில	லக்கியங்கள்						
1.	முத்துக்கும	ாரசாமி பிள்ன	ளத்தமிழ் - செ	சங்கீரைப் பருவம் - முதல் ட	பத்து அடிகள்		
2.	முக்கூடற்ப	ள்ளு - நகர்	வளம் 19-வது	பாடல்			
3.	நந்திக் கலம்பகம் - வெற்றிமுரசு சிறப்பு						
	கிருக்குற்றா						

அலகு - 2 இலக்கணம் - 1 மணி

பொருள் இலக்கணம்

- 1. அகப்பொருள் : எழுதிணை விளக்கம் முதல், கரு, உரிப்பொருள்
- 2. புறப்பொருள் : வெட்சிதிணை முதல் பாடாண்திணை வரை விளக்கம் மட்டும்

யாப்பு இலக்கணம்

1. யாப்பு உறுப்புகள்

அலகு - 3 - **உரைநடை** - 1மணி

நீ போகும் பாதைகள் - கீழ்குளம் வில்லவன்

அலகு - 4 புதினம் - 1

பூர்வீக பூமி - சூர்யகாந்தன்

அலகு - 5 இலக்கிய வரலாறு - 1 மணி

- 1. ஐம்பெருங்காப்பிங்கள்
- 2. ஐஞ்சிறுகாப்பியங்கள்
- சிற்றிலக்கியத்தின் தோற்றமும் வளர்ச்சியும், பிள்ளைத்தமிழ், கலம்பகம், குறவஞ்சி, பரணி.

SEMESTER – IV						
Part-1 Tamil Paper – IV சங்க இலக்கியம்						
18ULTA41Hrs / Week:6Hrs / Semester: 90Credits: 4						

Vision: மாணவியருக்கு நல்ல மதிப்பீடுகளைக் கற்பித்து, வாழ்வில் அவற்றைப் பின்பற்ற வழிவகுத்தல்.

Mission: இலக்கிய மாந்தரின் மூலம் நல்லவாழ்க்கை அனுபவங்களைப் பெறச்செய்து தன்னம்பிக்கை, ஆளுமைத் திறம், மொழி அறிவு இவற்றை உருவாக்குதல்.

Course Outcome.								
CO.No.	இப்பாடத்திட்டம் மாணவியருக்கு –	அறிவுசார் மதிப்பீடு						
CO-1	அனுபவ அறிவை வளர்க்கிறது.	நடைமுறைப்படுத்தல்						
CO-2	பழந்தமிழர் வாழ்வியல் முறைகளை கற்று பயனடைய	நடைமுறைப்படுத்தல்						
	உதவுகிறது.							
CO-3	ஆய்வு நோக்கினை வளர்க்கவும் வாழ்வின் வளர்ச்சி	நடைமுறைப்படுத்தல்,						
	நிலையை மேம்படுத்திக் கொள்ளவும் உதவுகிறது.	உருவாக்கம்						
CO-4	மனிதநேயம், இறை நம்பிக்கை இவற்றை உருவாக்குகிறது.	உருவாக்கம்						
CO-5	மொழியைப் பிழையின்றி பேசவும் எழுதவும் உதவுகின்றது.	திறன் மேம்பாடு						
CO-6	தனிமனித வாழ்க்கைச் சிக்கல்களை எதிர்கொள்ளும்	நடைமுறைப்படுத்தல்,						
	நிலையை உருவாக்குகிறது	உருவாக்கம்						
CO-7	சமுதாய பிரச்சினைகளை எதிர்கொள்ளும் திறம்	நடைமுறைப்படுத்தல்,						
	கிடைக்கிறது.	திறன் மேம்பாடு						
CO-8	போட்டித் தேர்வுகளுக்குப் பயன்படும் வகையில்	படைப்பாற்றல்,						
	படைப்பாக்கத் திறனை வளர்க்க உதவுகிறது.	திறன் மேம்பாடு						

SEMESTER – IV						
Part-1 Tamil Paper – IV சங்க இலக்கியம்						
18ULTA41	Hrs / Week:6	Hrs / Semester: 90	Credits: 4			

அலகு - 1 செய்யுள் - 2 மணி எட்டுத்தொகை

1. நற்றிணை - பாடல்கள் : 1, 12

2. குறுந்தொகை - பாடல்கள் : 23, 58, 135

- 3. ஐங்குநுறூறு மஞ்ஞைப்பத்து பாடல்கள் : 294, 296, 297, 299
- 4. பதிற்றுப்பத்து பாடல் : 28 5. கலித்தொகை பாடல் : 27
- 6. அகநானூறு பாடல்கள் : 173, 270
- 7. புறநானூறு பாடல்கள் : 279, 312

பத்துப்பாட்டு

நெடுநல்வாடை - 80 வரிகள்

அலகு - 2 இலக்கணம் - 1 மணி

- 1. பாவகைகள் வெண்பா, ஆசிரியப்பா பொது இலக்கணம்
- 2. அணி இலக்கணம் உவமை, உருவகம், வேற்றுமை, வஞ்சப்புகழ்ச்சி, சிலேடை, தற்குறிப்பேற்றம்
- 3. வாக்கிய வகைகள்
- 4. பிறமொழிச் சொற்களை நீக்கி எழுதுதல்
 - அ. ஆங்கிலச் சொந்கள்
 - அ. வடமொழிச் சொர்கள்
 - இ. தெலுங்குச் சொற்கள்

அலகு - 3 உரைநடை - 1மணி

சிந்தனைக் களஞ்சியம் - தமிழ்த்துறை - கட்டுரைத் தொகுப்பு, தூய மரியன்னை கல்லூரி (தன்னாட்சி), தூத்துக்குடி

அலகு - 4 நாடகம் - 1 மணி தண்ணீர் தண்ணீர் - கோமல் சுவாமிநாதன்

அலகு - 5 இலக்கிய வரலாறு - 1 மணி

- 1. எட்டுத்தொகை நூல்கள்
- 2. பத்துப்பாட்டு நூல்கள்
- 3. சங்க இலக்கியத்தின் தனிச்சிறப்புகள்

Preamble

Acquisition of a foreign language and exposure to a different culture enhances the quality of a person. An understanding of a different civilisation opens vistas in the perception of the learner. Learning a new language is an additional skill and it widens the employability scope of the students, considering the large number of international collaborations in the global market.

Vision:

To impart knowledge and skill in French to enhance employment opportunities of the students

Mission :

To promote an understanding and appreciation of the French language and literature

Part-I Course in French is set to equip the students with an additional qualification, of acquisition of a foreign language, French. Two-year course in French creates

- > Ability to act and respond in specific life-time situations of communication
- > Ability to understand and translate sentences into target language
- Capability to compare and evaluate the life style of the French in contrast with Indians
- Capability to create a text of her own, narrating her day to day life
- Capability to summarize a poem or a dialogue in her own words
- Capability to use the knowledge and skill in diverse professions such as translator, interpreter, editor etc in multinational companies

Criteria of eligibility

Part-I French course is offered to students who have studied French in schools and also to students who have no knowledge of French, beginners.

I B.A., / B.Sc Part I FRENCH

SEMESTER – I					
PART – I French Paper – I Preliminary French Course					
Code : 18ULFA11Hrs/week : 6Hrs/Sem : 90Credits : 4					

:

Vision

To initiate a beginner to the francophonic world and to train them to make their maiden efforts in spoken and written French

Mission:

To create a number of real life situations to make the learner express herself in the target language through experiential teaching method

Course Outcomes :

CO	At end of this Course, the students will be able to	CL
1.	To identify French monuments and celebrities	Kn,Ap
2.	To understand the living style of the French	Un
3.	To know and understand the taste and leisure time activities of the French people	Kn, Un
4.	From the perspective of communication	
5.	To describe a lodging	Cr
6.	To redact an advertisement	Cr
7.	To express her desires and preferences	Cr
8.	To create a blog and to express herself	Cr
9.	To redact a portrait of a personality	Cr

Prescribed Text Book:

Cocton Marie-Noëlle, Heu Elodie, Houssa Catherine, Kasazian Emilie,

Dupleix Dorothée et Ripaud Delphine, Saison 1 Les Editions Didier, Paris, 2015.

Unite I : Mes cinq sens en action

Unite II : S'ouvrir aux autres

Unite III : Partager son lieu de vie

Unite IV : Vivre au quotidien

Unite V : Fêtes et Traditions

Books, Journals and Learning Resources

- le cahier d'activités(CD Audio INCLUS)
- Le manuel numérique premium classe
- Grammaire « Le Nouvel Entrainez-vous avec 450 Nouveaux Exercices » par Evelyne Sirejols, Tempesta Giovanna

:

- Les applis complémentaires
- 450 nouveaux exercices(niveau débutant)par Grand-Clément Odile Clé International, 2003.
- Les 500 exercices de grammaire par Akyuz Anne, Bazelle-Shahmaei
 Bernadette, Bonenfant Joelle, Gliemann Marie-Francoise, Hachette livre, 2005
- > Grammaire Progressive du français par Grégoire Maia, Clé International,2002.
- Grammaire « Le Nouvel Entrainez-vous avec 450 Nouveaux Exercices » par Sirejols Evelyne, Tempesta Giovanna
- www.didierfle.com/saison
- www.facebook.com/SaisonFLE

I B.A., / B.Sc Part I FRENCH

SEMESTER – II				
Paper – II Basic French Course				
Code : 18ULFA21Hrs/week : 6Hrs/Sem : 90Credits : 4				

VISION : To develop and improve upon the acquisition of four competencies of language learning

MISSION : To motivate and to enthuse the learner's mind to life-long learning experience evidenced through various situations of communication

Course Outcomes:

CO	At end of this Course, the students will be able to	CL
1.	To understand the cultural practices of the French	Kn, Un
2.	To know and understand cultural life at Louisiane	Kn, Un
3.	To know the dressing style of the French	Kn
4.	To know the eating habits of the French	Kn, Un
5.	To be exposed to city life and various modes of transport	Kn, Un
6.	To describe a city	Kn, Un
7.	To compare cities	An,
8.	To redact an invitation	Cr
9.	To create a recipe of her own	Ap, Cr
10.	To describe an outfit	Ap, Cr
11.	To narrate an outing	Ap, Cr

Prescribed Text Book: Cocton Marie-Noëlle, Heu Elodie, Houssa Catherine, Kasazian Emilie, Dupleix Dorothée et Ripaud Delphine, *Saison*, Les Editions Didier, Paris, 2015.

- Unite I : S'ouvrir à la culture
- Unite II : La langue française en partage
- Unite II I : Gouter a la campagne

Unite IV : La gastronomie française, une question de gout

Unite V : Voyager dans sa ville, La Belgique, carrefour de l'Europe

Books, Journals and Learning Resources

- 1. le cahier d'activités(CD Audio INCLUS)
- 2. Le manuel numérique premium classe
- 3. Les applis complémentaires
- 4. Grand-Clément Odile, 450 nouveaux exercices (niveau débutant) Clé International, 2003.
- 5. Akyuz Anne, Bazelle-Shahmaei Bernadette, Bonenfant Joelle, Gliemann Marie-Francoise, *Les 500 exercices de grammaire*, Hachette livre, 2005
- 6. Grégoire Maia , Grammaire Progressive du français , Clé International, 2002.
- Sirejols Evelyne, Tempesta Giovanna, Grammaire « Le Nouvel Entrainez-vous avec 450 Nouveaux Exercices

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I B.Com., / BBA / B.Sc (Computer Science) Part I FRENCH

SEMESTER – I				
Paper Title-Basic French and Commercial terms				
Code : 18ULFB11Hrs/week : 6Hrs/Sem : 90Credits : 4				

Vision :

To impart knowledge of the culture of the French and to give training in speaking and writing French to a beginner

Mission :

To provide ample opportunities to induce and ignite the independent learning capacity.

СО	At end of this Course, the students will be able to	CL
1.	To adopt French as the language of the class	Kn, Un
2.	To enrol herself on a social media network	Ap, Cr
3.	To orient herself in a city	Un, Ap
4.	To adapt herself to new habits and rhythm of life	Un, Ap
5.	To invite and to respond to an invitation	Un, Cr, Ap
6.	To prepare a programme of outing	Un, Cr, Ap
7.	To translate the commercial terms from English to	Un, Ap
	French& vice versa	
8.	To know and understand various aspects of cultural	Kn, Un
	life of the French	

Prescribed Text Book:

Girardet Jacky, Pécheur Jacques, Gibbe Colette, Parizet Marie-Louise, *Tendances*, Clé International, 2016.

Prescribed Units:

- Unite 1 : Commencer en français
- Unite 2 : Arriver dans un pays francophone
- Unite 3 : Découvrir une ville
- Unite 4 : Vivre dans une famille, termes commerciaux
- Unite 5 : Participer à une sortie

Books, journals and other references:

- Evelyne Sirejols, Tempesta Giovanna Grammaire « Le Nouvel Entrainez-vous avec 450 Nouveaux Exercices »
- 2. Girardet Jacky, Pécheur Jacques, Cahier d'activités, Clé International ,2016.
- 3. Grand-Clément Odile, 450 nouveaux exercices (niveau débutant) Clé International, 2003
- 4. Akyuz Anne, Bazelle-Shahmaei Bernadette,Bonenfant Joelle, Gliemann Marie-Francoise, Les 500 exercices de grammaire Hachette livre,2005
- 5. Grégoire Maia, Thievenez Odile, *Grammaire Progressive du français*, Clé International, 2002.

I B.Com., / BBA / B.Sc (Computer Science) Part I FRENCH

SEMESTER – II					
Paper Title-Essential French and Commercial correspondance					
Code : 18ULFB21Hrs/week : 6Hrs/Sem : 90Credits : 4					

Vision :

To build upon the language skills acquired to reach a standard level of speaking and writing French

Mission :

To give thrust on the actional approach to motivate the autonomy of the learner.

СО	At end of this Course, the students will be able to	CL
1.	To understand travel documents and to describe a	Kn, Un
	displacement	
2.	To write a post card or mail about a voyage	Ap, Cr
3.	To know and understand the means of payment	Kn, Un
4.	To express her needs	Ap, Cr
5.	To create words of felicitation, thanks, excuse and to	Ap, Cr
	formulate a wish	
6.	To know and understand the cultural life of the	Kn, Un
	French	
7.	To describe an itinerary, to give instructions	Ap, Cr
8.	To redact commercial letters in French	Ap, Cr

Prescribed Text Book:

Girardet Jacky, Pécheur Jacques, Gibbe Colette, Parizet Marie-Louise, *Tendances*, Clé International, 2016.

Prescribed Units:

- Unite 1 : Voyager
- Unite 2 : Faire des achats
- Unite 3 : Se faire des relations
- Unite 4 : Organiser ses loisirs
- Unite 5 : Se loger

Books for reference:

- 1. Girardet Jacky, Pécheur Jacques Cahier d'activités Clé International ,2016.
- 2. Grand-Clément Odile, 450 nouveaux exercices (niveau débutant) Clé International, 2003.
- 3. Akyuz Anne,Bazelle-Shahmaei Bernadette,Bonenfant Joelle, Gliemann Marie-Francoise, *Les 500 exercices de grammaire* Hachette livre,2005.
- 4. Grégoire Maia , Grammaire Progressive du français Clé International, 2002.
- 5. Sirejols Evelyne, Tempesta Giovanna *Grammaire « Le Nouvel Entrainez-vous avec 450 Nouveaux Exercices »*

II B.A., / B.Sc Part I FRENCH

SEMESTER – III				
Paper – III Advanced French Course				
Code : 18ULFA31Hrs/week : 6Hrs/Sem : 90Credits : 4				

Vision : To enhance further the acquisition of four competencies of language learning

Mission : To create the independent capability of the learner to respond and tackle the various situations of communication when the learner is in the native country of the target language

Course	Outcome:
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СО	At end of this Course, the students will be able to	CL
CO-1	describe the souvenirs of the past	Ap, Cr
CO-2	create novel things with ancient objects	Cr
CO-3	attempt business ventures on the internet	Un, Ap
CO-4	understand the expatriate's experience	Un, Ap
CO-5	prepare for study in foreign countries	Ap, Cr
CO-6	speak of the weather	Ap, Cr
CO-7	speak about the system of education in France	Un,Ap
CO-8	become conscious of the environment	Ap, Cr

Prescribed Text Book: Cocton Marie-Noëlle,Heu Elodie, Houssa Catherine, Kasazian Emilie, Dupleix Dorothée et Ripaud Delphine, *Saison*, Les Editions Didier,Paris,2015.

- Unite I : Faire du neuf avec du vieux-Faire revivre les objets-
- Unite II : Exprimer l'accord ou le désaccord-Exprimer l'obligation et l'interdiction
- Unite III : Changer d'air- Demander/donner son opinion-Parler du temps qu'il fait-
- Unite IV : Découvrir-Apprendre-Réussir
- Unite V : Devenir éco-citoyen-Ecrire une biographie-Institutions et femmes d'exception

Books, Journals and Learning Resources

- 1. le cahier d'activités(CD Audio INCLUS)
- 2. Le manuel numérique premium classe
- 3. Les applis complémentaires
- 4. Grand-Clément Odile, 450 nouveaux exercices (niveau débutant) Clé International, 2003.
- 5. Akyuz Anne,Bazelle-Shahmaei Bernadette, Bonenfant Joelle, Gliemann Marie-Francoise, *Les 500 exercices de grammaire*, Hachette livre,2005
- 6. Grégoire Maia , Grammaire Progressive du français , Clé International, 2002.
- 7. Sirejols Evelyne, Tempesta Giovanna, Grammaire « Le Nouvel Entrainez-vous avec 450 Nouveaux Exercices www.didierfle.com/saison www.facebook.com/SaisonFLE

II B.A., / B.Sc Part I FRENCH

SEMESTER – IV				
Paper – IV French Language through Literature				
Code : 18ULFA41Hrs/week : 6Hrs/Sem : 90Credits : 4				

VISION : To initiate the learner to the realm of French Literature

MISSION : To create and develop the taste for literary readings in the target language

СО	At end of this Course, the students will be able to	CL
CO-1	comprehend the French literary background	Un, An
CO-2	imbibe the basic grammatical structures of the language	Un, An
CO-3	inculcate the values imparted through the literary texts	Un, An
CO-4	appreciate the simple literary texts	An, Ap
CO-5	acquire literary knowledge and enhance aesthetic perception	An, Ap
CO-6	explore a literary text, with the perspective of analysing the matter and manner of writing	An, Ap
CO-7	reflect upon the author's ideas and transform her own personality	Ap, Cr
CO-8	discover, interrogate and reflect on the humanistic value	Ap, Cr

II B.A., / B.Sc Part I FRENCH

SEMESTER – IV				
Paper – IV French Language through Literature				
Code : 18ULFA41Hrs/week : 6Hrs/Sem : 90Credits : 4				

Unité 1:	
1. Au soir, auprès d'une chandelle	-Pierre de Ronsard
2.Caractères	-La Bruyère
3.La barbe bleue	-Charles Perrault
Unité 2 ·	
1 La Jeune Tarentine	-André Chénier
2. La Révolution Française	
3.L'impératif	
1	
Unité 3 :	
1.Le Pape est mort	-Guy de Maupassant
2.A l'école des petits dieux	-Bernard Wéber
3.Pronoms Relatifs	
Unite4 ·	
1 Oh voleur 'quelle vie	-Le Clezio
2.L'avalée des avalées	- Ducharme
3.Pronoms Relatifs	
Unité 5 :	
1.L'homme qui plantait des arbres	-Jean Giono
2.Pour toi mon amour	-Jacques Prévert
3.Les indicateurs Temporels	
Books for Reference .	
1 Blondeau Nicole, Allouache Ferroud ià Ne Mar	ie-Françoise, Littérature Progressive du
Français, Cle International, 2004.	
2. Akyuz Anne, Bazelle-Shahmaei Bernadette, Bor	nenfant Joelle, Gliemann Marie-Francoise, Les
500 exercices de grammaire ,Hachette livre,2005	
3. Grégoire Maia , <i>Grammaire Progressive du fran</i>	<i>çais</i> , Clé International,2002.
4.Strejols Evelyne, Tempesta Giovanna, Gramma,	ire « Le Nouvel Entrainez-vous avec 450
5 Auge Helene, Marlhens Claire, Molinos Llucia	Grammaire et Communication Clé
International,2008	Standard of Continuation of Cit

At the end of two-year course, students will be able to

- 1. Develop their communicative skills in English for employment.
- 2. Employ their English proficiency to excel in cultural exchanges and to connect themselves globally.
- 3. Develop their comprehension and analytical skills in order to be innovative in all disciplines.
- 4. Build confidence and helps to maintain cordial relationship with colleagues in their flourishing career.
- 5. Express themselves as skilful English news readers and journalists.
- 6. Convert their passive vocabulary into active one; enhancing their speaking and writing skills.
- 7. Exercise their creativity in writing English.
- 8. Gain proficiency in writing skills and help them to write grammatically correct sentences.
- 9. Tune their soft skills which enable them to maintain good career records.
- 10. Improve their passion for reading literary works.

SEMESTER - I				
Part II English Prose, Poetry, Extensive Reading and Language Study- I				
18UGEN11	Hrs / Week: 6	Hrs / Semester: 90	Credits: 4	

Vision:

To provide adequate exposure and opportunities for students to imbibe, develop, practice and use the LSRW skills with more opportunities to experiment and fine tune their productive skills – speaking and writing.

Mission:

To help students read and comprehend content in English

CO.No.	Upon completion of this course, students will be able to	Cognitive Level
CO-1	Understand the written word in everyday life through the study of basic comprehension skills	Un
CO-2	Apply and incorporate basic grammar, mechanics, and sentence variety in writing.	Ар
CO-3	Label and paraphrase main ideas in readings.	Ар
CO-4	Develop their ability to read and spell words through an analysis of the structure of the English language.	Re
CO-5	Analyse the theme of prescribed texts of literature.	Un
CO-6	Evaluate the parts of speech.	Ev
CO-7	Listen and comprehend speech sounds.	Со
CO-8	Construct simple sentences and short paragraphs in response to reading.	Cr

SEMESTER - I				
Part II English Prose, Poetry, Extensive Reading and Language Study-I			e Study-I	
18UGEN11	Hrs / Week: 6	Hrs / Semester: 90	Credits: 4	

Unit I - Poetry

Sarojini Naidu - Village Song

John Milton - On His Blindness

Robert Frost - The Road Not Taken

Unit II - Prose

Leigh Hunt – Getting Upon Cold Mornings

Robert Lynd - Sweets

Unit III - Short Story

Ernest Hemingway - A Day's Wait

Rabindranath Tagore - Kabuliwala

Unit IV – Grammar & Vocabulary

Parts of Speech, Tenses –Present, Past, Vocabulary of the Specific Domain, Punctuation, Kinds of Sentences

Unit V – Oral & Written Communication

Listening for handling simple situations, Listening Comprehension, Reading- passages from magazines & stories, Speaking – Introduction to body language, Basic interactions, Filling Forms, Developing Hints, Letters – leave letters, permission letters & personal letters

Text Books:

Units I – III – To be compiled by the Research Department of English

Units IV – V – CLIL (Content & Language Integrated Learning) – Module I by TANSCHE (Tamil Nadu State Council for Higher Education)

SEMESTER – II				
Part II English	rt II English Prose, Poetry, Extensive Reading and Language Study- II			
18UGEN21	Hrs / Week: 6	Hrs / Semester: 90	Credits: 4	

Vision: To intensify English language teaching and learning to promote communication skills based on the strengths in specific domains of knowledge that students are already sound in.

Mission: To expose students to language skills through the core subjects.

To help students identify how writers use the creative resources of language-in poetry, nonfiction, and short fiction - to explore the entire range of human experience.

CO.No.	Upon completion of this course, students will be able to	Cognitive Level
CO-1	Classify and develop the skills of interpretation, critical thinking,	An
	and clear writing.	
CO-2	Demonstrate improved oral fluency.	Un
CO-3	Support future academic study by developing a high social,	Cr
	aesthetic and cultural literacy.	
CO-4	Construct parts of a paragraph and essay, through prose writings.	An
CO-5	Build effective communication skills.	Un
CO-6	Make use of context clues and analyse poetic content and correlate to experiences.	An
CO-7	Use vocabulary through the study of word parts.	Ар
CO-8	Comprehend passages	Un

SEMESTER – II				
Part II English	English Prose, Poetry, Extensive Reading and Language Study- II			
18UGEN21	Hrs / Week: 6	Hrs / Semester: 90	Credits: 4	

Unit I - Poetry

Nissim Ezekiel - The Night of the Scorpion

William Wordsworth- The Tables Turned

Walt Whitman - One's Self I Sing

Unit II - Prose

A.J. Cronin - Two Gentlemen of Verona

Robin Sharma - Your Commitment to Self- Mastery: Kaizen

Unit III - Short Story

Khushwant Singh - Karma

Oscar Wilde - The Happy Prince

Unit IV – Grammar & Vocabulary

Present & Past Continuous form, Command form, Will/Going to, Subject - Verb Agreement,

Vocabulary of the Specific Domain, Paragraphing

Unit V – Oral & Written Communication

Listening for handling tough situations, Reading - passages from newspapers, incomplete

stories, Pronunciation, Speaking (Storyline, Telephone Conversation), Key Functions

Text Books :

Units I – III – To be compiled by the Research Department of English

Units IV – V – CLIL (Content & Language Integrated Learning) – Module II by TANSCHE (Tamil Nadu State Council for Higher Education)

	SEMESTER	R – III	
Part II English	lish Prose, Poetry, Extensive Reading and Language Study- III		
18UGEN31	Hrs / Week: 6	Hrs / Semester: 90	Credits: 4

Vision: To teach English based on the strengths in specific domains of knowledge that students are already sound in.

Mission: To expose students to language skills through the core subjects.

To help students explore the creative resources of language-in poetry, nonfiction, and one-act plays to enhance their vocabulary for interpersonal, academic, and real-life situations.

CO.No.	Upon completion of this course, students will be able to	Cognitive Level	
CO-1	Identify the common errors in their day today communication.	Ev	
CO-2	Imbibe the language skills necessary for maintaining cordial relationship.	Ар	
CO-3	Revise, organize and edit their assignments successfully.	Cr	
CO-4	Enhance communicative competence in English.	Cr	
CO-5	Construct sentences in different verb forms.	Ар	
CO-6	Formulate specific questions and key ideas in class discussion.	Ар	
CO-7	Appraise the specific values for life through the literary texts.	Ev	
CO-8	Make use of grammar and vocabulary in practical ways.	Ар	
SEMESTER – III			
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Part II English Prose, Poetry, Extensive Reading and Language Study- III			
18UGEN31 Hrs / Week: 6 Hrs / Semester: 90 Credits		Credits: 4	

Unit I – Poetry

Toru Dutt - Lotus

John Keats - La Belle Dame Sans Merci

Langston Hughes - The Weary Blues

Unit II – Prose

A.G. Gardiner - A Fellow Traveller

G.K. Chesterton - The Fallacy of Success

Unit III - One Act Play

Cedric Mount - The Never Never Nest

Percival Wilde - The Hour of Truth

Unit IV – Grammar & Vocabulary

Present & Past Perfect form, Connectives & Linkers, Vocabulary of the Specific Domain,

Paragraphing

Unit V – Oral & Written Communication

Evaluative Listening, Different Reading Strategies, Pronunciation, Public Speaking, Negotiation

& Turn Taking, Tongue Twisters, Writing – Formal Letters, Emails, One Word Substitutes.

Text Books :

Units I - III - To be compiled by the Research Department of English

Units IV – V – CLIL (Content & Language Integrated Learning) – Module III by TANSCHE (Tamil Nadu State Council for Higher Education)

SEMESTER – IV			
Part II English Prose, Poetry, Extensive Reading and Language Study- IV			
18UGEN41	Hrs / Week: 6	Hrs / Semester: 90	Credits: 4

Vision: To teach English based on the strengths in specific domains of knowledge that students are already sound in.

Mission: To expose students to language skills through the core subjects.

To help students explore the creative resources of language-in poetry, nonfiction, and Shakespearean plays and gain insight into the literary traditions and cultures of the brave new world.

CO.No.	Upon completion of this course, students will be able to	Cognitive
		Level
CO-1	Interpret texts with an awareness of the specific cultural context.	А
CO-2	Improve their communication skills	U
CO-3	Compose and deliver engaging oral presentations.	A
CO-4	Adapt stylistic elements to aid and enhance communication.	Cr
CO-5	Modify their perspectives on the themes of perennial human interest.	Ev
CO-6	Adapt the vocabulary acquired through their reading and to use them in various situations in their everyday lives.	Cr
CO-7	Formulate appropriate writing style.	A
CO-8	Compose essays in a well-developed, academic voice.	Cr

SEMESTER – IV			
Part II English Prose, Poetry, Extensive Reading and Language Study- IV			
18UGEN41	Hrs / Week: 6	Hrs / Semester: 90	Credits: 4

Unit I – Poetry

Rabindranath Tagore - The Lord of My Life

Tennyson - Ulysses

Gabriel Okara - Once Upon a Time

Unit II - Prose

Juliane Koepcke - My First Plane Crash

Frank R. Stockton – The Lady or the Tiger

Unit III – Scenes from Shakespeare

A Midsummer Night's Dream – Act II, Scene ii

Tempest – Act III, Scene i

Unit IV – Grammar & Vocabulary

Modals & Auxiliaries, Active & Passive Voice, Direct & Indirect Speech, Transformation of

Sentences, Vocabulary of the Specific Domain, Homophones & Homonyms

Unit V – Oral & Written Communication

Extensive Reading/ Film (with subtitles) Viewing, Refuting, Arguing & Debating, Defending & Challenging Interviews (face to face, telephone & video conferencing), Making Presentations, Tongue Twisters

Text Books :

Units I – III – To be compiled by the Research Department of English

Units IV – V – CLIL (Content & Language Integrated Learning) – Module IV by TANSCHE (Tamil Nadu State Council for Higher Education)

SEMESTER - I				
	Core – I - Introduction to Microbiology			
Code:18UMIC11	Hrs/ Week: 4	Hrs/ Sem: 60	Credits: 4	

To highlight the basic concepts and principles about the different aspects of microbiology including recent developments in the area

Mission: To inculcate about the techniques involved in culturing microorganisms.

CO No	Upon completion of this course,	PSO	CL
	students will be able to	addressed	
CO-1	get an idea about the historical events in	1	Un
	microbiology.		
CO -2	understand the diversity in microbiology.	1	Un
CO-3	know the scope of microbiology	4	An
CO-4	know parts of microscope, type and its	1, 2	An
	principle		
CO-5	get the theoretical concepts of related stain	2	Un
CO-6	distinguish different methods of staining	2	Ev
	techniques		
CO-7	analyse nutritional requirements of	2	An
	microbes.		
CO-8	understand the techniques involved in	2	Un
	culturing microorganisms.		

SEMESTER - I				
	Core – I - Introduction to Microbiology			
Code:18UMIC11	Hrs/ Week: 4	Hrs/ Sem: 60	Credits: 4	

Unit -I:

The scope of Microbiology - The History and Contributions of Antony Van Leewenhoek, Joseph Lister, Pasteur, Robert Koch, Edward Jenner, Winogradsky and Beijerinck and development of microbiology – Applied fields of Microbiology.

Unit II:

Microscopy – Resolving power, Numerical aperture – Limit of resolution Magnification – Types of Microscopy – Dark field microscopy – Bright field microscopy – Phase contrast microscopy – Electron microscopy.

Unit III:

Microbiological staining – Types – Simple, Differential staining, Gram's staining, Endospore staining, Capsule, Flagella, Cytoplasmic inclusion staining, Giemsa staining and their applications.

Unit IV:

Structure of bacterial cells- Structure and functions of capsule, flagella, Fimbrae or pili: The cell wall- chemical composition , characteristics and functions of cell wall , Plasma membrane (Fluid mosaic model), mesosomes, cytoplasm: Subunits and chemical compositon,Nucleoids:Cytoplasmic inclusions, Spores and cysts.

Unit V:

Sterilization – Principles – Dry heat, Moist heat, Filtration, Pasteurization, Radiation, Disinfectant – Development of Pure culture techniques – Basic component of growth media – Types of growth media, purpose – General, selective&, differential-Nutrient and Mac Conkey agar, enrichment- blood agar, transport and preservation media. Isolation and purification of pure culture.

Text Books:

- Rajan S., Selvi Christy R. 2015, Essentials of Microbiology. CBS Publishers and Distributers
- 2. Rao A.S., 1997 Introduction to Microbiology. PHI Learning PVT Ltd.

Books for Reference:

- Prescott L.M., Harley J.P., and Klein D.A.2008, Microbiology (7th edition) McGraw-Hill Inc, New York.
- Tortora, Funke Case Addison 2001, Microbiology An Introduction (7th edition) Wesley Longman Inc.
- Dubey R.C., and Maheswari, S. 2003. A Text Book of Microbiology, S.Chand & Co, New Delhi.
- Pelczar Jr., M.J. Chan E.C.S., and Kreig N.R. 1993. Microbiology- McGraw- Hill Inc, New York.
- Jogn L. Ingraham & Catherine A 2000, Introduction to Microbiology 2nd Edn, Ingraham, Brooks / Cole, Newyork.
- Jeffrey C. Pommerville., 2010, Alcamo's Fundamentals of Microbiology (Ninth edition). Jones & Bartlett learning.

SEMESTER - I			
Core – II Microbial Diversity			
Code : 18UMIC12Hrs/ Week: 4Hrs/ Sem: 60Credits: 4			

To illustrate the evolutionary approaches and diversified nature of microorganisms

Mission:

To demonstrate the students to be aware of ubiquitous nature of micro organisms and their detailed account on taxonomic approaches and survey of prokaryotic phylogeny and phylogenetic groups of eukaryotes.

CO .No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	list out the general classification of microbes.	1,5	Kn
CO -2	distinguish the taxonomic ranks of micro organisms	2	An
CO-3	illustrate the Bergey's manual classification about bacteria	2,4	Со
CO-4	know the Alexopoulous classification of fungi and their general features	1	Kn
CO-5	interpret the general morphological characteristics and the algal diversity	1,2	Со
CO-6	demonstrates the morphology and genetic material of viruses	2	Со
CO-7	know about diversification of microbes	2	Kn
CO-8	analyse the classification, replication, cytocidal effects of plant and animal viruses	2,5	An

SEMESTER - I					
	Core – II Microbial Diversity				
Code : 18UMIC12	Hrs/ Week: 4	Hrs/ Sem: 60	Credits: 4		

Unit-I

General principles of classification. Evolution methods in classification – International codes of nomenclature – Taxonomic approaches and phylogeny.

Unit-II

Bacteria: –general introduction – type study :gram positive bacteria (Bacillus), Gram negative bacteria (E.coli). Determinative classification of Bergey's manual, cyanobacteria.

Unit-III

Fungi: – General introduction, morphology, Alexopoulous classification and their general features – Life cycle – filamentous fungi (Actinomycetes), molds (Aspergillus), macroscopic fungi (mushroom-Agaricus bisporus) – unicellular fungi (Yeast-Saccharomyces cerevisiae)

Unit- IV

Algae : –general characteristics –algal diversity-morphology –classification- General features and Life cycle –blue green algae (Nostoc) – Red algae (Gracilaria) -**Protozoa** –General introduction –morphology –classification – General features and Life cycle -Sarcodina (Entamoeba histolytica) –Mastigophora (Euglena gracilis)

Unit- V

Viruses : Introduction –structure –classification based on morphology and genetic material. Plant virus (TMV) –Animal virus (Adeno virus) –Bacteriophage (T4 phage).

Text Book:

1. Rajan S., Selvi (2015) Christy R., Essentials of Microbiology. CBS Publishers and Distributors.

Books for Reference :

- 1. Stanier, Y. Roger, John L. Ingrahm, Mark L. Wheelis and Page R. Painter.2003. General Microbiology V Ed. MacMillan Press Ltd. New Jersey.
- 2. R.C. Dubey. Text Book of Microbiology 2004 S. Chand and Company Ltd.,
- 3. Pelczar, Microbiology, (1998) Tata McGraw-Hill Education.
- 4. Lansing M. Prescott, John P. Harley and Donald A. Klein. 1999. Microbiology, 5th edition. WCB/McGraw Hill Company.

SEMESTER - I				
Core Practical –I Laboratory in Introduction to Microbiology & Microbial Diversity				
Code: 18UMICR1	Hrs/ Week: 2	Hrs/ Sem: 30	Credit: 1	
Vision				

To introduce the general public to microbiology and encourage interest in it, stressing its importance and possibilities for man and nature.

Mission:

To impart advanced level information in the field of techniques in general microbiology and diversity.

Course Outcome:

CO No	Upon completion of this course, students	PSO	
	will be able to	addressed	CL
CO-1	know bio-safety procedures in microbiology.	1, 2	Un
CO -2	develop basic skill in aseptic techniques	2	Un
CO-3	perform various staining techniques.	2	Ар
CO-4	cultivate bacteria with different cultivation	1,2	Ар
	techniques.		
CO-5	be acquainted with various sterilization techniques.	2	Ар
CO-6	understand various specialized techniques such as	2	Un
	pasteurization.		
CO-7	isolate bacteria on solid media	2 ,3,4	Ev
CO-8	isolate and characterize bacteria by steak plate	2, 3,4	Ev
	method.		

Practicals:

- 1. Safety guidelines
- 2. Instruments used in Microbiology
- 3. Hay mount to show different types of microbes
- 4. Hanging drop technique
- 5. Simple staining

- 6. Negative Staining
- 7. Gram's staining
- 8. Serial dilution technique
- 9. Plating techniques pour plate, spread plate and streak plate
- 10. Enumeration of bacteria water and soil samples
- 11.Cultural characteristics of microorganisms
- 12. Study of selected group of Actinomycetes
- 13. Study of selected group of Cyanobacteria
- 14. Study of selected group of Fungi&Yeast
- 15. Lactophenol cotton blue staining-Fungi
- 16. Evaluation of total coliforms- MPN Method
- 17. Examination of water borne pathogens
- 18. Isolation of Actinomycetes from marine water & soil sample.

Books for Reference :

- 1. J.G. Cappuccino and N.Sherman 1996 MB A lab manual Benjamin Cummins, New York.
- Kannan, N.(1996). Laboratory Manual in General Microbiology. Palani Paramount Publication, Palani.
- Murray P.R; Baron E.J; Jorgerson J.H; Pfaller M.A. and Yolker R.H 2003. Manual of Clinical Microbiology, 8th edition. Vol. 1 & 2 ASM Poem Washington D.C.
- 4. Sundararaj. T. 2005 MB Lab Manual (1st edition) publications Sundararaj. A.Chennai.
- Gunasekaran, P.(1996) Laboratory Manual in Microbiology. New Age International Ltd., Publishers, New Delhi.
- 6. Jayaraman, J.1985, Laboratory Manual in Biochemistry. Wiley Eastern Ltd., New Delhi.
- Plummer, D.T,1998, An Introduction to Practical Biochemistry. Tata McGraw-Hill. New Delhi.
- Palanivelu. P. 1998 Analytical Biochemistry and Separation Techniques.21st Century Publications.
- Kanai L. Mukherjee, 1998- Medical Laboratory Technology- A procedure Manual for routine diagnosis tests- Tata McGraw-Hill. New Delhi. Vol. I- III.

SEMESTER - I				
Allied – I - Dairy Technology				
Code -18UMIA11Hrs/ Week: 4Hrs/ Sem: 60Credits: 3				

To provide the leadership, voice and programs for a vibrant dairy industry where farm families, dairy businesses and associated organizations can thrive and be profitable.

Mission:

To create a sustainable environmentally and technologically advanced dairy farm.

CO.No.	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	understand the process involved in production of milk and milk products	1,2	Un
CO -2	classify and explain the different types of milk products	2	Un
CO-3	understand purpose and functions of hygiene in dairy industry	2	Un
CO-4	produce flow chart for the production processes of various milk products	1, 2	Ар
CO-5	explain organization and operations involved in milk processing units	2	Со
CO-6	outline precautions when processing milk and dairy products	2	An
CO-7	organize students to processing of milk and its products	2 ,3,4	Sy
CO-8	analyse the importance of quality control in dairy science	2 ,3,4	An

SEMESTER - I				
Allied – I - Dairy Technology				
Code -18UMIA11Hrs/ Week: 4Hrs/ Sem: 60Credits: 3				

Unit I

Clean milk production technique- secretion of milk in the udder- sources of micro organization- cleanliness of the animal- Udder- Utensils- Detergents and Sanitizers-Different micro organisms of milk – Differences between goats, buffaloes and cows milk-Colostrums- Importance of colostrums

Unit II

Importance of milk and its composition properties and nutritive value of milk and milk products- Specific gravity of milk- Lactometer reading- Acidity test estimation of fat, SNF,total solids of milk- Factors that alter the quality and quantities of milk – common adulterants of milk, deduction of adulterants- water adulteration- MBRT- Resazurin Test

Unit III

Chilling – Heat processing – Sterilization pasteurization- test for effective pasteurization – phosphates test – Holding the milk – packing – transport- various types of transports – marketing of fluid milks – special milks- Toned milk, standard milk, UHT milk

Unit IV

Starter culture preparation and their biochemical activities- Methods of manufacture and uses of fermented milk products – Butter, butter milk, curd, yoghurt, ghee, cheese.

Unit V

Methods of manufacture and uses of non-fermented milk products- cream, skim milk, koha, ice cream, ice cream mix powder, condensed milk, powder milk, milk powder.

Text book:

1. Sugumar De. 1997. Outlines of dairy technology, Oxford University press

Books For Reference :

- Clarence Henry, Heckles, 1957 Milk and Milk products 4th edition Tata Mc Graw Hill Publishing company Ltd., New Delhi.
- 2. Sugumar D. 1997. Outlines of dairy technology, Oxford University press

3. Ramasamy1996 Hand book of Dairy technologies, International Book distributing and Company, Lucknow.

SEMESTER - I				
Allied Practical– I - Laboratory in Dairy Technology				
Code - 18UMIAR1Hrs/ Week: 2Hrs/ Sem: 30Credit: 1				

To create the ability to be multi-skilled in the field of dairy microbiology with a good technical knowledge.

Mission:

To educate with the prime intension of providing practical training in the area

of milk processing and preparation of various milk products

CO No	Upon completion of this course,	PSO	C L
	students will be able to	addressed	
CO-1	prepare students to scientifically undertake all operations of dairy technology	1, 2	Ар
CO -2	create entrepreneur in dairying and dairy associated activities	2	Sy
CO-3	organize students to processing of milk and its products	2, 3, 4	Sy
CO-4	develop skill, instill confidence by enhancing life skill	1, 2	Ар
CO-5	establish nutritional status of community through dairy farming.	2	Ар
CO-6	establish income of community through dairy farming.	2	Ар
CO-7	develop organizational capabilities among youth in dairy industry.	2 ,3,4	Ap
CO-8	examine the production in small and large scale production.	2,3,4	An

Practicals:

- 1. Sampling of milk
- 2. Platform test, COB, MBR, acidity test
- 3. Estimation of fat in milk and skim milk
- 4. Estimation of SNF and total solids
- 5. Detection of adulterants and preservatives
- 6. Preparation and judging of cream, yoghurt
- 7. Preparation and judging of butter and ghee
- 8. Preparation and judging of koha
- 9. Preparation and judging of ice cream
- 10. Preparation of flavoured milk
- 11. Visit to important places related to dairy products and dairy federations.

Books for Reference:

- Clarence Henry, Heckles 1957, Milk and Milk products 4th edition Tata Mc Graw Hill Publishing company Ltd., New Delhi.
- 2. Sugumar D. 1997. Outlines of dairy technology, Oxford University press
- 3. Ramasamy. 1996, Hand book of Dairy technologies, International Book distributing and Company, Lucknow.

SEMESTER - I				
Ability Enhancement Course - Value Education				
Code : 18UAVE11Hrs/Week : 2Hrs / Semester: 30Credits : 2				

Unit I : Introduction

Value education and its Relevance to present day - Meaning of Value Education

- Education and its role - Leading a fulfilling life of universal values

Unit II : Cultivation of Personal Values

Personal Values– Truth - Honesty and Integrity – Love –Compassion – Gratitude -Courage – Optimism – Friendship

Unit III : Elimination of Negative Emotions

Overcome fear – Jealousy is harmful – Sources of jealousy - Jealousy and compulsiveness- Be an optimist – Gossip is Dynamite – Anger

Unit IV : Family Values

Familial Responsibilities –Five Basic Functions of a Mother - Fathers' role in the family - Five Duties of Children to Parents - Indian Cultural Values

Unit V: Spiritual Value

Cultivating Good Manners – Being Persuasive – Being authentic – Professional Ethics – Work Culture – Code of Conduct

SEMESTER - II				
Core– III - Microbial metabolism and Physiology				
Code -18UMIC21Hrs/ Week: 4Hrs/ Sem: 60Credits: 4				

To provoke excellence for training and research in the physiologic and metabolic process of micro organisms.

Mission:

To communicate effectively and acquisition of technical methods in specialized area of Microbial metabolism, which has the intention to perform various transport mechanism, respiration cycle, growth characters and the fermentation pathways.

CO No	Upon completion of this course, students will	PSO	C L
	be able to	addressed	
CO-1	know the basic knowledge about Microbial	2	Kn
	metabolism		
CO- 2	know the applications of the various culture and	4	Kn
	their pathways		
CO- 3	know the process of reporting the reportable	5	Kn
	disease		
CO- 4	interpret the techniques used in Clinical	2	Со
	Microbiology		
CO- 5	determine the mechanism of nitrogen fixation by	4	An
	microbes		
CO- 6	demonstrate the mechanism involved in bio-	1	Со
	luminescence		
CO- 7	demonstrate the growth and sporulation process	4	Со
	of microbes		
CO- 8	compare the mechanism of photosystem I & II	2	An

SEMESTER - II				
Core– III - Microbial metabolism and Physiology				
Code -18UMIC21Hrs/ Week: 4Hrs/ Sem: 60Credits: 4				

Unit-I

Basic concept of metabolism – Membrane transport system – Passive and Active transport system – Faciliated diffusion, group Translocation – Iron transport – Requirements of growth-Micro&Macro nutrient elements.

Unit-II

Assimilatory and dissimilatory pathways - Respiratory pathways - Glycolysis, Krebs cycle -

ETS – ATP generation – Chemiosmotic theory-. Fermentation pathways- Homo and Hetero

lactate fermentation- Ethanol Fermentation by bacteria and yeast – Mixed acid fermentation-Butanediol, acetate and propionate.

Unit-III

Anaerobic respiration: Nitrate, sulphur, carbonate and methane – Bioluminescence components in Vibrio sp.

Unit-IV

Growth – Batch, continuous– Growth curve – Factors affecting growth – Physical, chemical and biological factors.Endospore – structure and mechanism of sporulation.

Unit-V

Photosystem I&II- Pigments(Chlorophyll and bacteriorhodopsin) - Nitrogen fixation -

Types(Symbiosis, non-symbiosis) - structure and functions of nitrogenase.

Text Book:

1. Meena Kumari S.,2006, Microbial Physiology.1st edition MJP Publishers

Books for Reference:

- 1. Rajapandian K, 2010. Microbial physiology PBS Book Enterprises India, Chennai.
- Lansing M.Prescott, John.P.Harley and Donald A,Klein, 2003. Microbiology (5th edition). McGraw –Hill Company, Newyork
- 3. Tortora, Funke Case Addison 2001, Microbiology An Introduction (7th edition) Wesley Longman Inc.
- 4. Dubey R.C., and Maheswari, S. 2003. A Text Book of Microbiology, S.Chand& Co, New Delhi.
- 5. Pelczar Jr., M.J. Chan E.C.S., and Kreig N.R. 1993. Microbiology- McGraw-Hill Inc, New York.

SEMESTER - II				
Core – IV - Bioinstrumentation				
Code -18UMIC22Hrs/ Week: 4Hrs/ Sem: 60Credits: 4				

The department strives to enrich professionals of high competency in the area of

instrumentation and mould them to adopt the crux of matter in the field of automation.

Mission:

To aware the basic knowledge about the basic instrumentation and discuss about the principles and applications of various instruments.

CO No	Upon completion of this course,	PSO	CL
	students will be able to	Addressed	
CO-1	Understand the concept about the basic instrumentation.	2	Un
CO -2	Know about pH measurements and important of buffer.	2,3	Un
CO-3	Grasp the principles and applications of various instruments.	2,3	Co
CO-4	Develop a basic principles and application of spectrophotometer.	2	Un
CO-5	Demonstrate an understanding of Electrophoresis.	2	Sy
CO-6	Grasp the knowledge about advanced instrumentation.	2, 4	Co
CO-7	Develop a basic principles and application of colorimetry	2	Un
CO-8	Develop a basic principles and application of centrifuge.	2	Un

SEMESTER - II				
Core – IV - Bioinstrumentation				
Code -18UMIC22Hrs/ Week: 4Hrs/ Sem: 60Credits: 4				

Unit - I

Buffers - Preparation of buffers - Standard buffers - pH meter - pH – titration curve – Techniques of pH measurement.

Unit – II

Principles and application - Colorimetry - Spectrophotometry - (UV, Visible), Centrifuge -

Types of centrifuge.

Unit – III

Paper chromatography – Thin layer chromatography- Column chromatography- Affinity

chromatography - Gel chromatography.

Unit - IV

Electrophoresis - Principles and application - Vertical slab gel - Horizontal - Tube gel types -

Paper electrophoresis.

Unit – V

Advanced instrumentation – Principles and application - X-ray spectroscopy, Atomic Absorption Spectroscopy.

Text Book:

1. Veera Kumari L., 2006 Bioinstrumentation. MJP Publishers

Books for Reference :

- 1. Jayaraman. J. 1985. Laboratory Manual in Biochemistry. Wiley Eastern Ltd., New Delhi
- Plummer. D.T. 1998. An Introduction to Practical Biochemistry. Tata McGraw Hill, New Delhi.
- Palanivelu. P. 1998 Analytical Biochemistry and Separation Techniques.21st Century Publications.
- 4. Keith Wilson and Walker. J. 2003 Practical Biochemistry Cambridge Univ Press.
- 5. Veerakumari. L. 2006. Bioinstrumentation. MJP Publishers, Chennai.
- Gurumani. N. 2006. Research Methodology for Biological Sciences. MJP Publishers, Chennai

SEMESTER – II					
Core Practical-II Laboratory in Microbial Metabolism, Physiology and Bioinstrumentation					
Code -18UMICR2Hrs/ Week: 2Hrs/ Sem: 30Credits: 2					

To create the ability to be multi-skilled in the field of microbiology with good technical and

instrumentation knowledge on various concepts of microbiology and its diversity

Mission:

Microbial Metabolism, Physiology and Bioinstrumentation practicals focuses on research on bacteria as well as metabolism of carbohydrates, fermentation and oxidation of acids.

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	perform IMViC test and identify bacteria of enterobacteriaceae.	1	Sy
CO -2	perform various biochemical test.	1	Sy
CO-3	know the effect of various environmental factors.	1	Kn
CO-4	prepare buffer and determine the pH.	1	Sy
CO-5	perform various hydrolysis for the production of extracellular enzymes.	1	Sy
CO-6	explain the concept of microbial growth, its measurement and growth curve	1	Со
CO-7	know the working principle of spectrophotometer and be able to handle	1	Kn
CO-8	demonstrate the working principle of SDS- PAGE and Agarose gel electrophoresis.	1	Kn

Practicals:

- 1. Construction of growth curve
- 2. IMVIC test
- 3. Carbohydrate fermentation -Glucose.
- 4. TSI test
- 5. Production of extracellular enzyme
 - a) Starch hydrolysis
 - b) Casein hydrolysis
 - c) Lipid hydrolysis
 - d) Gelatin hydrolysis
- 6. Urease test
- 7. Nitrate reduction test
- 8. Catalase test
- 9. Demonstration of SDS PAGE
- 10. Agarose gel electrophoresis- Demo
- 11. Preparation of Buffer and determination of pH using pH meter.
- 12. Verification of Beer-Lambert's Law using Spectrophotometer.

Books for Reference :

- J.G. Cappuccino and N.Sherman 1996 MB A lab manual Benjamin Cummins, New York.
- Kannan, N, 1996. Laboratory Manual in General Microbiology. Paramount Publication, Palani.
- Murray P.R; Baron E.J; Jorgerson J.H; Pfaller M.A. and Yolker R.H 2003. Manual of Clinical microbiology, 8th edition. Vol. 1 & 2 ASM Poem Washington D.C.
- 4. Sundararaj. T. 2005 MB Lab manual (1st edition) publn Sundararaj. A. Chennai.
- Gunasekaran, P.1996 .Laboratory Manual in Microbiology. New Age International Ltd., Publishers, New Delhi.
- 6. Jayaraman, J.1985. Laboratory Manual in Biochemistry. Wiley Eastern Ltd., New Delhi.
- 7. Plummer, D.T.1998. An Introduction to Practical Biochemistry. Tata McGraw-Hill. New Delhi.
- 8. Palanivelu. P. 1998 Analytical Biochemistry and Separation Techniques.21st Century Publications.

SEMESTER - II				
Allied-II Biochemistry				
Code -18UMIA21Hrs/ Week: 4Hrs/ Sem: 60Credits: 3				

To extend the fundamental knowledge of biochemistry and to provide the highest quality

of translational biomedical research, education and service.

Mission:

To enhance the students with knowledge on various biochemical aspects of the biomolecules.

CO No	Upon completion of this course,	PSO	CL
	students will be able to	addressed	
CO-1	develop fundamental knowledge about	2	Un
	various bio-molecules.		
CO -2	learn the element present in biomolecules	2	Sy
CO-3	differentiate between monomers and	2	Un
	polymers		
CO-4	compare and contrast the structure and	2	Ар
	function of the carbohydrates, protein, and		
	lipid.		
CO-5	summarize the functions of carbohydrates,	2	Sy
	proteins, lipids, enzymes and vitamins		
CO-6	compare and contrast saturated, mono-	2	Un
	saturated and poly-saturated fatty acids.		
CO-7	recognize the importance of the three	2	An
	dimensional shape of a protein on its		
	function and its role.		
CO-8	know the working principle of	2,3	Kn
	spectrophotometer and able to handle.		

SEMESTER - II					
Allied-II Biochemistry					
Code -18UMIA21Hrs/ Week: 4Hrs/ Sem: 60Credits: 3					

Unit I

Structure of atom – chemical bonds – principles of bioenergetics Laws of

thermodynamics – Structure and functions of energy rich phosphate ATP, PEP and creatine

phosphate – Role of pH and buffers in biological systems.

Unit II

Biomolecules: Carbohydrates- Mono, Di and Polysaccharides Structure, classification and functions.

Unit III

Biomolecules: Proteins - Amino Acids - Peptides - Types, Structure, classification and

functions. Nucleic acids – structure and forms of DNA and RNA.

Unit IV

Biomolecules - Lipids - Classification - Structure and functions. Enzymes: Classification -

Active site - Allosterism - Determination of Michaelis Menten constant - Factors affecting Km

Value -- Mode of Enzyme action (Lock and Key model and Induced fit model)- coenzymes --

Cofactors – Isozymes and Inhibitors.

Unit V

Vitamins - Introduction - Fat soluble vitamins (A,D,E&K) - Water Soluble vitamins (B-

complex and C) – sources, functions ,deficiency and syndromes.

Text book:

1. Santhyanarayana. U 2002.Essentials of Biochemistry. (1st Edition) Books and Allied

Ltd., Kolkata,

Books for Reference :

- 1. Stryer, L. 1995. Biochemistry. Ed.W.H.Freeman and company, Newyork.
- 2. J.L.Jain, 1999, Fundamental of Biochemistry- S.Chand& company Ltd, , New Delhi.
- 3. A.C.Deb 1999. Concepts of Biochemistry. (7st Education), Books and Allied (P) Ltd., Kolkata
- 4. Hubert, Styer, 1995. Biochemistry Freeman and Company, Newyork.
- 5. Lehninger, 2009. Principle of Biochemistry. 3rd editions by Nelson and Cox (Worth)

SEMESTER – II				
Allied Practical-II Laboratory in Biochemistry				
Code 18UMIAR2Hrs/ Week: 2Hrs/ Sem: 30Credit: 1				

To extend the fundamental knowledge of biochemistry to understand life at molecular level, application of scientific methods in innovative research and provide health care to the community.

Mission:

To promote basic practical skills in conducting and interpreting laboratory investigations.

Course Outcome:

CO No	Upon completion of this course, students will be	PSO	CL
	able to	addressed	
CO-1	know hazards and safety measure in laboratory.	2	Kn
CO -2	perform normality, molarity, percent solution.	2	Sy
CO-3	perform qualitative tests for carbohydrates, lipids,	2	Sy
	and amino acid.		
CO-4	determine saponification and acid values of fats.	2,4	An
CO-5	identify the effect of various factors on enzymes.	2	An
CO-6	know and separate the amino acids by paper	2,4	Kn
	chromatography technique		
CO-7	estimate proteins, carbohydrates, and amino acids.	2	Ev
CO-8	know the working principle of spectrophotometer	2,3	Kn
	and able to handle.		

Practicals:

- 1. Qualitative analysis of Carbohydrates.
- 2. Qualitative analysis of Proteins.
- 3. Qualitative analysis of Urea.
- 4. Qualitative analysis of Creatinine
- 5. Qualitative analysis of Cholesterol.
- 6. Qualitative test for amino acids.
- 7. Qualitative saponification test.
- 8. Determination saponification value of fats.

- 9. Determination of Acid value of fats.
- 10. Effect of pH on activity of enzyme
- 11. Effect of temperature on activity of enzyme
- 12. Estimation of Carbohydrates (Anthrone method) Demonstration.
- 13. Estimation of Proteins (Lowry's method) Demonstration.
- 14.. Separation of amino acids by paper chromatography

Books for Reference :

- 1. Jayaraman, J.1985. Laboratory Manual in Biochemistry. Wiley Eastern Ltd., New Delhi.
- Plummer, D.T.1998. An Introduction to Practical Biochemistry. Tata McGraw-Hill. NewDelhi.
- Palanivelu. P. 1998 Analytical Biochemistry and Separation Techniques.21st Century Publications.
- Keith Wilson.K and Walker.J 2003 Principles of Practical Biochemistry Cambridge Univ Press.

Semester – II					
Environmental Studies					
Code : 18UAEV21	Code : 18UAEV21Hrs/ Week : 2Hrs/Sem:30Credits : 2				

Course Outcomes:

Upon completion of this course, the students will be able to

1 Recognize the biotic and abiotic components of ecosystem and how they function

2 Use natural resources more efficiently and know more sustainable ways of living

3. Acquire an attitude of concern for the environment

4. Participate in improvement and protection of environment

5. Manage unpredictable disasters

6 Create awareness about environmental issues to the public

Unit I Environment and Ecosystem

Aim and need for Environmental Awareness - Components of Environment Ecosystem - Components of Ecosystem: Abiotic and biotic factors (Producer, Consumer and Decomposer) – Food Chain, Tropic Levels - Food Web, Energy flow and Ecological ids

pyramids

Unit II Natural Resources:

Renewable and non-renewable resources – Water Resources: Uses and Conservation of Water – Rain Water Harvesting – Forest Resources: Importance of Forests - Major and Minor forest produces - Conservation of Forest Energy Resources: Solar Fossil Fuel – Wind – Role of individuals in the conservation of natural resources

Unit III Environmental Pollution

Pollutants – Types of pollution: Air, Water, Noise and Plastic Pollution – Causes, effects and Control measures – Solid Waste Management

Unit IV Human Population and Environment

Effect of human population on environment – Population Explosion problems related to population explosion – Involvement of population in conservation of environment – Measures adopted by the Government to control population growth – Environment and human health

Unit V Disaster Management

Floods-Drought-Earthquakes- Cyclones - Landslide-Tsunami-Control measures

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SEMESTER – III				
Core – V– Molecular Biology and Microbial Genetics				
Code : 18UMIC31Hrs/Week- 4Hrs/Sem 60Credit 4				

To provoke excellence about various aspects of microbial genetics and molecular biology of micro organisms.

Mission:

To enhance knowledge about genetic material of microbes and their mutations.

CO. No	Upon completion of this course, students will be	PSO	CL
	able to	addressed	
CO-1	explain the basic knowledge about the microbial		
	genetic material and its functions.	6	U n
CO-2	compare various types of bacterial plasmids, their		
	types, and its functions.	5	U n
CO-3	interpret the role and properties of transposons and		
	IS elements.	7	U n
CO-4	illustrate various mechanisms involved in		
	bacteriophage cycle.	5	U n
CO-5	improve the knowledge about structure and		
	classification of bacteriophage and their mode of	6	Cr
	replication.		
CO-6	classify various mutations takes place in microbial		
	genetics.	8	Un
CO-7	compare various gene transfer mechanisms	7	Un
CO- 8	recall transformation and transduction and their		
	classification	5	Re

SEMESTER – III			
Core – V– Molecular Biology and Microbial Genetics			
Code : 18UMIC31	Hrs/Week- 4	Hrs/Sem: 60	Credit: 4

Unit –I

Genetics- Historical Introduction- experiments of Hershey, Chase and Griffith- DNA structure- - RNA – types, structure. RNA as the genetic material- Genetic code. Replication of DNA and enzymology of DNA replication.

Unit -II

Bacterial plasmids (F-plasmid, R plasmid, col plasmid, degradative plasmid, virulence plasmid) - Structure, types and properties of plasmids- Plasmid replication- Transposons and IS elements- Structure, types and properties.

Unit- III

Transcription – Reverse transcription - Translation - Bacteriophages- Structure-Classification- Lytic cycle and lysogenic cycle (T4 and Lambda phage only).

Unit- IV

Mutations- Spontaneous, induced, base pair changes, frameshift, deletion, insertion, duplications, transversions- Genotypic and phenotypic mutants- Reversion and suppression-Ames test.

Unit -V

Gene transfer mechanisms- Conjugation (Cell transmissible plasmids, F factor and Hfr strains- Transformation (Natural transformation, competence, DNA uptake, role of natural transformation, artificially induced competence and electroporation) - Generalised and specialised transduction.

Text Books:

- 1) Dubey R.C., and Maheswari, S. 2003. *A Text Book of Microbiology*, S.Chand & Co, New Delhi.
- 2) Jeyanthi G.P. 2008. *Molecular biology*, MJP publishers, Chennai.
- 3) Freifelder D., 1991. Molecular Biology, Narosa publishing house, New Delhi

Books for Reference:

- 1. Watson, J.D., Hopkins N.H., Roberts JW., Steitz JA and Weiner A.A.M. 1987. *Molecular Biology of the gene*. The Benjamin cummings publishing company.
- 2. Lewin B. 2007. Genes IX. Oxford University press, UK.
- 3. Talaro, K.P., Andtalaro. A. 1999. *Foundations in Microbiology*. WCP McGraw- Hill, New York.
- 4. Pelczar Jr., M.J. Chan E.C.S., and Kreig N.R. 1993. *Microbiology* McGraw- Hill Inc, New York.
- 5. Prescott L.M., Harley J.P., and Klein D.A. 2008, *Microbiology* (7th edition) McGraw-Hill Inc, New York.

SEMESTER III			
Core Practical III - Laboratory in Molecular Biology and Microbial Genetics			
Code : 18UMICR3Hrs/Week: 2Hrs/Sem : 30Credit : 1			

To impart basic level laboratory training in the subject of Microbial genetics.

Mission:

To extend the fundamental knowledge of molecular biology and to provide the highest quality of genetical studies towards research field.

CO No.	Upon completion of this course, students	PSO	CL
	will be able to	addressed	
CO-1	examine spontaneous mutants.	4	An
CO-2	examine induced mutant by UV	5	An
CO-3	analyze antibiotic resistant mutant by gradient plate technique.	6	An
CO-4	examine UV induced auxotrophic mutants by replica plate technique.	4,5	An
CO-5	demonstrate plasmid DNA from <i>E.coli</i>	8	Un
CO-6	demonstrate AGE	7	Un
CO-7	demonstrate conjugation in bacteria by		Un
	genetic recombination.	8	
CO-8	demonstrate PCR.	7,8	Un

SEMESTER III				
Core Practical III - Laboratory in Molecular Biology and Microbial Genetics				
Code : 18UMICR3	Hrs/Week : 2	Hrs/Sem: 30	Credit : 1	

- 1. Plasmid DNA isolation from E.coli (Demonstration)
- 2. Isolation of spontaneous mutants.
- 3. Isolation of induced mutant by UV
- 4. Isolation of antibiotic resistant mutants by gradient plate technique
- 5. UV induced auxotrophic mutants production and isolation of mutants by replica plating technique
- 6. Screening and isolation of phage from sewage.
- 7. Agarose Gel Electrophoresis (Demonstration)
- 8. Genetic recombination in Bacteria by conjugation (Demonstration)
- 9. Preparation of competent cell (Demonstration)
- 10. Bacterial Transformation (Demonstration).
- 11. Polymerase chain reaction (Demonstration)

Books for Reference:

- Cappuccino.J.G., and Sherman. N. 1996. *Microbiology A Laboratory Manual*. Benjamin Cummins. New York.
- Guansekaran.P. 1996. Laboratory Manual in Microbiology. New Age International Ltd., Publishers, New Delhi.
- 3. Jayaraman, J., 1985. Laboratory Manual in Biochemistry. Wiley Eastern Ltd., New Delhi.
- 4. Kannan. N. 1996. *Laboratory Manual in General Microbiology*. Palani Paramount Publication, Palani.
- Sundararaj, T. 2005, *Microbiology Laboratory Manual.* (1st Edition). Publn. Sundararaj. T, Chennai

SEMESTER – III				
Allied – III – Genetic Engineering				
Code:18UMIA31Hrs/ Week: 4Hrs/ Sem: 60Credit: 3				

To impart basic level information in the novel subject of Genetic Engineering.

Mission:

To enhance the knowledge on the applications of Genetic Engineering in various fields.

CO NO	Upon completion of this course, students will be	PSO	CL
	able to	Addressed	
CO - 1	infer basic knowledge about cloning	2	Un
CO- 2	identify the applications of genetic engineering in various fields	4	Ар
CO -3	explain cloning vectors	2	Un
CO-4	interpret the techniques used in genetic engineering	2	Un
CO -5	compare different types of vectors	4	An
CO- 6	explain Genetically modified food	2	Un
CO- 7	demonstrate the hazardous and potential risk in releasing transgenic into environment	6	Un
CO -8	make use of DNA Libraries	4	Ар

SEMESTER – III				
Allied – III – Genetic Engineering				
Code:18UMIA31Hrs/ Week: 4Hrs/ Sem: 60Credit: 3				

Unit–I

Genetic engineering – History – Tools of Genetic Engineering - Gene cloning- Steps in cloning- Gene transfer methods - Screening of chimeric DNA.

Unit–II

Cloning vectors for rDNA (Plasmids, Phages, Cosmids, Transposons)- Binary and Shuttle vectors.

Unit–III

Techniques in Genetic Engineering - Southern, Western, Northern blotting - PCR and its modification - DNA finger printing - DNA libraries.

Unit-IV

Applications of genetic engineering - Transgenic plants - Development of crops for disease resistance (Bt cotton) - herbicide tolerance- Medicine (Insulin) – Environment - role of superbug in biodegradation.

Unit-V

Genetically modified organisms – Advantages and disadvantages - Ecological impact of transgenic plant – Release of GMO into environment.

Text books:

1. Dr. Verma P.S and Dr. Agarwal. V. K. 2009. *Genetic Engineering* – S. Chand and Company Ltd. New Delhi.

- 2. Dubey R.C. 2014. *A Text Book of Biotechnology*. Fifth revised Edition. S Chand & Co. New Delhi.
- 3. Dr. Prakash. S Lohar 2005. Text Book of Biotechnology MJP Publishers, Chennai.

Books for Reference:

- 1. Glick. B.R. and Pasternak, J.J. 2017. *Molecular Biotechnology Principles and Applications of Recombinant DNA*. ASM Press, Washington D.C.
- 2. Brown, T.A. 2016. *Gene Cloning*. Third Edition. Seventh edition Chapman and Hall Publications, USA.
- 3. Satyanarayana .U. 2013. *Biotechnology*. Books and Allied (P) Ltd.Kolkata.
- 4. Rastogi S.C, 2007. *Biotechnology Principles and applications*. Narosa Publishing House Pvt. Ltd. New Delhi.
- 5. Mohan P.Arora. 2005. *Biotechnology*. Himalaya Publishing House, Mumbai.
- 6. Jogdhand. S.N. *Gene Biotechnology*. 2009. Himalaya Publishing House Pvt.Ltd. Mumbai.

SEMESTER- III					
Allied practical III – Laboratory in Genetic Engineering					
Code : 18UMIAR3Hrs/Week: 2Hrs/Sem: 30Credit: 1					

To impart advanced level of laboratory techniques in the field of Genetic Engineering.

Mission:

To develop skill among students in the recent genetic engineering techniques.

CO NO	Upon completion of this course, students will be	PSO	CL
	able to	addressed	
CO-1	illustrate the principle behind any genetic engineering practical	2	Un
CO-2	develop basic handling skill in genetic engineering practical	2	Ар
CO-3	experiment with isolation of Nucleic acids from different sources	4	Ар
CO-4	interpret Transformation	1	Un
CO -5	test for the quantification of nucleic acids	2	An
CO-6	distinguish the quantification of DNA and RNA	2	An
CO-7	distinguish the isolation of DNA and RNA	4	An
CO-8	compare the theory with the protocol of PCR	2	An

SEMESTER- III					
Allied practical III – Laboratory in Genetic Engineering					
Code : 18UMIAR3Hrs/Week: 2Hrs/Sem: 30Credit: 1					

- 1. Isolation of genomic DNA from bacteria.
- 2. Isolation of genomic DNA from plant source.
- 3. Isolation of DNA from animal source.
- 4. Isolation of RNA from bacteria.
- 5. Isolation of RNA from plant source.
- 6. Isolation of RNA from animal source.
- 7. Polymerase Chain Reaction (Demonstration).
- 8. Quantification of DNA.
- 9. Quantification of RNA.

Books for Reference:

- Janarthanan. S. and Vincent.S. 2007. *Practical Biotechnology*: Methods and Protocols. Universities press (India) private limited. Hyderabad
- 2. JyotiSaxena, Mamta Baunthiyal, Indu Ravi. 2012. *Laboratory manual for Microbiology, Biochemistry and Molecular Biology*. Scientific Publishers, India.
- 3. Sambrook and Russell. *Molecular Cloning A Laboratory Manual*, Vol. 1,2,3. Third Edition. Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York.
- 4. John Vennison. S. 2009. *Laboratory manual for Genetic engineering*. PHI Learning Pvt Ltd, Delhi.

SEMESTER – III				
Core Skill Based- Practicals in Medical Laboratory Technology				
Code: 18UMIS31Hrs/week : 4Hrs/Sem : 60Credit: 4				

The Medical Laboratory Technology graduates excel as innovative practitioners committed to excellence and a collaborative and healthy work environment. These graduates play a vital role in the provision of quality health care and in scholarship for the advancement of self, the profession and society.

Mission:

The mission of the Medical Laboratory Technology is to prepare graduates with the knowledge, skills, and professional behaviors needed to function effectively in a wide range of laboratory settings.

CO NO.	Upon completion of this course, students will be able to	PSO addressed	CL	
CO-1	understand the laboratory practices and know how to maintain the laboratory instruments	1,2	Un	
CO-2	analyze and distinguish various types of blood groups	2,3,4	An	
CO-3	evaluate the culture tests and understand the pathological diseases of humans	2,4	An	
CO-4	analyze the physical, chemical and microscopic analysis of culture samples	2,3	An	
CO-5	perform various techniques on isolation of micro- organisms for various sources	2	Ар	
CO-6	understand the ESR and CRP tests for analysis	1,2	Un	
CO-7	perform the qualitative tests for carbohydrates and proteins	2	Ар	
CO-8	analyze and isolate the microbes from blood	3,4	An	
SEMESTER – III				
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Core Skill Based- Practicals in Medical Laboratory Technology				
Code: 18UMIS31Hrs/week : 4Hrs/Sem : 60Credit : 4				

- 1. Estimation of glucose
- 2. Estimation of cholesterol
- 3. Estimation of iron
- 4. Estimation of haemoglobin
- 5. Estimation of chlorides
- 6. Estimation of triglyceride
- 7. Identification of carbohydrates (Qualitative tests)
- 8. Identification of proteins (Qualitative tests)
- 9. Staining of blood smear
- 10. Blood grouping
- 11. Examination of urine- physical, chemical, & Microscopic
- 12. Urine analysis: Glucose, protein, urea, creatinine and billirubin.
- 13. Culture tests- urine, nasal, throat swab, stool & pus
- 14. Antimicrobial susceptibility testing
- 15. Pregnancy test
- 16. ESR
- 17. CRP- Demonstration
- 18. Testing of malarial parasite
- 19. Testing of stool samples for parasites (ova & cysts)
- 20. Isolation & identification of Mycobacteria- Demo
- 21. Cultivation of viruses: Bacteriophage isolation
- 22. Isolation & identification & identification of fungi
- 23. Cultivation & identification of protozoa
- 24. Identification of Escherichia coli
- 25. Isolation of bacteria from blood.

- 1.Cappucino.J.g., and Sherman. N. 1996. *Microbiology a laboratory manual*. Benjamin Cummins. New York.
- 2.Kannan.N. 1996. *A laboratory manual in general Microbiology*. Palani paramount publication, Palani.
- 3.Gunasekaran. P. 1996. *Laboratory manual in Microbiology*. A new age International Ltd., publishers, New Delhi.
- 4.Sundaraj. T. 2005. *Microbiology A laboratory manual*. 1st Edition Publication. Sundaraj. Chennai.
- 5. Jayaraman. J. 1985. Laboratory manual in Biochemistry. Wiley Eastern Ltd., New Delhi.
- 6.Plummer. D.T. 1998. *An introduction to Practical Biochemistry*. Tata McGraw Hill, New Delhi.
- 7.Benson. 2002. *Microbiological applications A Laboratory Manual in General Microbiology*. International Edition, McGraw hill Higher Eductaion.
- 8.Renganathan. S., Gkul Shankar S., Ranjit.M.S, Pankajalakshmi.V., Sivramakrishnan.M., Selvakumar.B.N., and mohhamedaejaz. 2001. *Fungal Diseases and Diagnosis*. (vol I)
- 9. Kanai Mukerjee L., *Medical Laboratory Technology A procedure manual for routine diagnosis tests-* Tata mc Graw Hill Publishing Co. Ltd., New Delhi. Vol III.
- 10.Rajan S., Selvi Christy R., 2010. *Experimental procedures in Life Sciences*. Anjanaa Publishers, Chennai.

SEMESTER-III				
NME I - Food Microbiology				
Code : 18UMIN31Hrs/Week: 2Hrs/Sem:30Credit: 2				

To highlight student that microorganisms are important for both the environment and human life. They play essential roles in many different processes, such as ecological equilibriums, bioremediation and food production.

Mission:

To be aware on the microbial behaviour in food products during harvesting/slaughtering, processing, storage, distribution and preparation.

CO. N o	Upon completion of this course, students	PSO	CL
	will be able to	addressed	
CO-1	to provide knowledge on the importance of	1,4	Un, An
	food microbiology		
CO-2	acquire a brief knowledge on food microbes	1	Un
	and their importance.		
CO-3	acquire knowledge on various types of	6	Со
	preservation.		
CO-4	provide information about the principles of	1,6	Un
	preservation.		
CO-5	acquire knowledge on contamination and	1,6	Un
	spoilage problems		
CO-6	provide interpretation of laboratory tests in the	2	Со
	diagnosis of infectious diseases.		
CO-7	to understand the mode of transmission of food	6	Со
	poisoning and food infections		
CO-8	provide information about the quality control	1,2	Un
	principles and importance.		

SEMESTER-III				
NME I - Food Microbiology				
Code : 18UMIN31Hrs/Week: 2Hrs/Sem:30Credit: 2				

Unit I:

Food as a substrate for microorganisms- Microorganisms important in food microbiology-Bacteria, Molds and Yeasts- Brief account of each group – General characteristics and importance.

Unit - II:

Principles of food preservation – Asepsis – Removal of microorganisms – Anaerobic conditions.

Unit – III

Food contamination- Sources-Spoilage problems – Control- specific foods- Milk, Meat, Fish, Fruits and Vegetables.

Unit- IV:

Food Borne diseases: Mode of Transmission- Food poisoning-Food infection- Bacterial (*Staphylococcal*), Fungal (*Aspergillus*) and Viral infection (*Hepatitis*).

Unit- V :

Quality Control- Food Laws and Regulations. Export Act- ISI- BIS- AGMARK- FPO, FAO- WHO-HACCP- Principles and Importance.

Text Book:

Vijaya Ramesh, K. 2007. Food Microbiology. MJP Publishers, Chennai.

- 1. Adams, M.R. and Moss, M.O. 1995. *Food Microbiology*. The Royal society of Chemistry, Cambridge.
- 2. Frazier, W.C. and Westhoff, D.C. 2008. *Food Microbiology*. (4th Edition). Tata McGraw Hill publishing Co Ltd., New Delhi.

Semester – III				
Women's Synergy				
Code : 18UAWS31Hrs/ Week : 2Hrs/Sem:30Credits : 2				

Course Outcome

- To know about Women's health issues including menstruation, pregnancy, child birth etc, thereby taking care of themselves.
- Create awareness about their own biases, fears and comfort levels and encourage to dream and fuel their own growth and self development.
- Engage in promoting social justice and women rights
- Create platforms and facilitate the young women to operate symbiotically towards issues affecting their lives and take self initiatives for growth.
- Identify historic and contemporary women of importance as well as crucial moments in Women's history

Unit I - Physical Health

Woman's Structural Organisation – Levels of organisation – Body image - Reproductive health – Hormonal Cycle and its Psycho-somatic implications – Child birth – lactation – Nutritional status of women.

Unit II – Psychological Health

Examining factors determining psychological conditions of women – Depression, anxiety, stress, hysteria – Socio – cultural and familial conditioning of women's minds – Self Image, Discrimination against women.

Unit III – Women and Legal Awareness

Women specific – centered legislations – legal issues – laws to prevent gender based violence National / State Pro-women schemes – educational and Employment schemes. Laws for protection of Women – Women's rights to property – Women's Rights in the Indian Constitution – Maternity benefit act.

Unit IV – Women and Finance

Manager of domestic finance – Budgeting basics – Create a family budget - Set financial goals – Plan for financial emergencies – Budget for travel – Saving strategies – Investment options

Unit V – Women's Empowerment in Various Domain

Introduction - Women created history in sports and music – P. T. Usha, M. S. Subbulakshmi - Women who crossed hurdles in Social Service – Mother Theresa, Muthulakshmi Reddy, Medha Patkar - Role of Women in Indian independence movement and Politics – Indira Gandhi, Aruna Asaf Ali.

- 1. Devi K. Uma. *Women's Equality in India: a Myth or Reality*. New Delhi: Discovery Publishing House, 2000. Print.
- 2. Forbes, Geraldine. *The New Cambridge History of India: Women in Modern India*. Cambridge: Cambridge University Press, 2007. Print
- 3. Gonsalves, Lina. *Women and Human Rights*. New Delhi: APH Publishing House, 2011. Print
- 4. Jeyaraj, Nirmala. (Ed.). *Women and Society*. Delhi, Madurai: ISPCK & Lady Doak College, 2005. Print.
- 5. Tripathi, Prof. Madhusoodan. *Women Rights in India*. New Delhi: Omega Publications, 2011. Print.

SEMESTER – III			
Self Study (Optional)			
Food Preservation Technology			
Code : 18UMISS1Credit : +2			

To highlight the basic concepts and principles about the different aspects of food preservation

technology including recent developments in the area

Mission:

To inculcate about the various technologies involved in food preservation.

CO NO	Upon completion of this course,	PSO	CL
	students will be able to	addressed	
CO-1	explain the process involved in preservation of	1,2	Un
	food and food products		
CO-2	classify and explain the different types	2	Un
	preservation of food based on temperature		
CO-3	understand purpose of drying in food	2	Un
	preservation technology		
CO-4	explain the process of food preservation	5	Un
CO-5	interpret the techniques used in food preservation	2	Un
	by irradiation		
CO-6	estimate the importance of food additives in	2	Ev
	preservation		
CO-7	explain the importance of dryers in food	2	Un
	preservation		
CO-8	explain the process of preservation of fruits and	2	Un
	vegetables.		

SEMESTER – III			
Self Study (Optional)			
Food Preservation Technology			
Code : 18UMISS1	Credit : +2		

Unit-I

Preservation of food by use of high temperature – Pasteurization of milk, Canning.

Unit -II

Preservation of food by use of low temperature – Chilling of fruits and vegetables, Freezing of meat.

Unit -III

Preservation of food by drying – Solar drying – Sun dried raisins, Drying by mechanical dryers – Dried milk.

Unit - IV

Preservation of food by food additives – Sugar (Canned fruits), Salt (Pickles)

Unit - V

Preservation of food by radiation – UV (Fruit juices) - Smoking (Fish).

Text Books:

- 1) Kalaichelvan.P.T ., Arul Pandian. I. 2007. *Bioprocess Technology*. MJP Publishers, Chennai.
- 2) Atlas, R.M. 1989, *Microbiology Fundamentals and Applications*, Macmillian Publishing Company.

- 1. William C. Frazier ., Dennis C. Westhoff ., 1988. *Food Microbiology*. Fourth Edition. Tata McGraw Hill Publishing Company Ltd, New Delhi.
- 2. Adams, M.R. and Moss, M.O. 1995. *Food Microbiology*. The Royal Society of chemistry, Cambridge.
- 3. Jay, J.M. 1987, *Modern Food Microbiology*. CBS Publishers and Distributors, New Delhi.
- 4. Banwart, G.J. 1989. Basic Food Microbiology. Chapman & Hall New York.

SEMESTER- IV				
Core VI - Agricultural Microbiology				
Code : 18UMIC41Hrs/week: 4Hrs/Sem: 60Credit:4				

To enhance knowledge of various microbial activities and its impact on the environment and study about various beneficial aspects of soil microbes.

Mission:

To study the plant diseases and to control the pest using bio pesticide related to bacteria, fungi, and viruses.

CO No	Upon completion of this course, students will	PSO	CL
	be able to	addressed	
CO -1	analyze the soil microorganism and their	1	An
	properties.		
CO- 2	determine the role of microbes on environment.	1	Ev
CO -3	distinguish positive and negative interactions	1	An
CO- 4	outline the interaction between microbes and	4	Un
	soil.		
CO- 5	discuss about the plant diseases such as	6	Cr
	bacterial, fungal and viral disease.		
CO- 6	summarize the causative agents and control	6	Un
	measures of the plant disease.		
CO -7	determine the Biopesticide and Biofertilizer	2	Ev
	development		
CO -8	evaluate the microbes used asBiopesticide and	4	Ev
	Biofertilizer		

SEMESTER- IV				
Core VI - Agricultural Microbiology				
Code : 18UMIC41Hrs/week: 4Hrs/sem: 60Credit:4				

Unit-I

Properties of soil - Physical and Chemical - Microbial flora of soil - Bacteria, Fungi, Algae, Actinomycetes and Nematodes) –Factors affecting microbial population.

Unit-II

Biogeochemical cycle- Carbon, Phosphorus, Nitrogen – Biological Nitrogen Fixation – Symbiotic (*Rhizobium*) and Asymbiotic (*Azotobacter*)– Root nodule formation - and Nitrogenase, Hydrogenase.

Unit-III

Microbial interactions between microbes - Mutualism, Commensalism, Competition, Amensalism, Parasitism and Predation.Interaction of microbes and plants – Rhizosphere and Phyllosphere.

Unit-IV

Plant pathology (Etiology, symptoms, disease cycle and control measures) – Bacterial diseases – Blight of rice, Citrus canker – Fungal disease – Red rot of sugarcane, Tikka leaf spot of groundnut – Viral disease – Bunchy top of Banana, Tobacco mosaic.

Unit-V

Biopesticides - Bacterial (*Bacillus thuringiensis*)- Fungal (*Trichoderma viridae*)- Viral (NPV & CPV). Biofertilizer – *Rhizobium*, *Azotobacter*, Cyanobacteria, Azolla – Mass multiplication and crop response.

Text books:

- 1. Dubey R.C. 2014. *A Text Book of Biotechnology*. Fifth revised Edition. S Chand & Co. New Delhi.
- 2. Dubey R.C. and D.K. Maheshwari. 2013. *A Text Book of Microbiology*. S. Chand & Co. New Delhi.

- 1. Shiva Aithal. C. 2010. *Mordern approaches in Soil, Agricultural and Environmental Microbiology*. Himalaya Publishers, New Delhi.
- 2. Atlas, R.M. and Bartha.M. *Microbial Ecology –Fundamentals and applications*. Fourth edition Benjamin Cummings, Mento Park, California.
- 3. Martin Alexander. 1983. *Introduction to Soil Microbiology*, Wiley eastern Ltd., New Delhi.
- 4. K. VIjaya Ramesh. 2005. Environmental Microbiology MJP Publishers, Chennai
- 5. SubbaRao. N.S. 1995. *Soil Microorganisms and Plant growth*. Ed,Oxford and IBH Publishing Co, Pvt. Ltd, New Delhi
- 6. Ravichandra. N. G. 2013. *Fundamentals of plant pathology* PHI Learning Private Ltd. Delhi.
- 7. Rangaswamy.G. and Bagyaraj.D.J. 1996. *Agricultural Microbiology*. Second Edition Prentice- Hall of India Pvt Ltd., New Delhi.

SEMESTER- IV				
Core practical IV – Laboratory in Agricultural Microbiology				
Code : 18UMICR4Hrs/week: 2Hrs/Sem: 30Credit: 1				

To impart skill on isolation of various microbes from soil and plant.

Mission:

To enhance advanced level laboratory training in Agricultural Microbiology.

Course Outcome:

CO NO	Upon completion of this course, students will	PSO	CL
	be able to	addressed	
CO -1	test for isolation of various soil microbes	5	An
CO- 2	experiment with isolation of microbes from various agro samples.	5	Ар
CO -3	interpret the preparation of Bio fertilizer and its assay	4	Un
CO -4	infer quantitative assay of microbes from various agro samples	2	Un
CO- 5	interpret staining of VAM	5	Un
CO -6	analyse antagonism between microorganisms	2	An
CO -7	demonstrate the isolation of Phosphate solubilizing bacteria	5	Un
CO- 8	identify nitrogen fixing bacteria	5	Ap

1. Determination of Soil pH.

- 2. Determination of Soil temperature.
- 3. Quantitative assay of microbes in soil.
- 4. Quantitative assay of microbes in Rhizosphere.
- 5. Quantitative assay of microbes in Phyllosphere.
- 6. Isolation of phosphate solubilizing bacteria.
- 7. Isolation of Phosphate solubilizing fungi.

- 8. Isolation of *Rhizobium* sp from root nodules of leguminous plants.
- 9. Isolation of Azotobacter sp from soil.
- 10. Isolation of *Azospirillum* sp from soil.
- 11. Identification of Cyanobacteria from soil. (Anabaena and Nostoc).
- 12. Staining of VAM.
- 13. Preparation of biofertilizers.
- Assay of biofertilizer (Seed treatment, Seedling treatment, Soil inoculation, Measurement of root and shoot system.
- 15. Study of antagonism between microorganisms.

- 1. Jyoti Saxena, Mamta Baunthiyal, Indu Ravi. 2012. *Laboratory manual for Microbiology, Biochemistry and Molecular Biology*. Scientific Publishers, India.
- 2. Gunasekaran. P. 2005. *Laboratory Manual in Microbiology*. First edition. New Age InternationalLtd., Publishers, New Delhi.
- Dubey, R.C.and Maheswari, D.K. 2002. *Practical Microbiology*. Second edition. Chand and Company Ltd., India.
- Aneja K.R. 1993. Experiments in Microbiology, Plant Pathology and Biotechnology. Fourth edition. New Age International Publishers, New Delhi.
- 5. Harold J. Benson, Alfred E. Brown 2006. Benson's Microbiological applications: Laboratory manual in General Microbiology. International Edition, McGraw Hill Higher Education.

SEMESTER – IV				
Allied – IV – Mushroom Technology				
Code : 18UMIA41Hrs/Week : 4Hrs/Sem : 60Credit : 3				

To facilitate the students with wide knowledge about the mushroom technology.

Mission:

To inculcate the deep knowledge on mushroom technology.

CO No	Upon completion of this course, students	PSO	CL
	will be able to	addressed	
CO-1	explain about the detailed information of	4	Un
	edible and non – edible mushroom.		
CO-2	compare the cultivation of various types of	5	Un
	mushrooms.		
CO-3	construct the mushroom house.	6	Cr
CO-4	compare different types of mushroom	7	An
	cultivation techniques and pure culture		
	preparation.		
CO-5	explain about economics of mushroom	6	Un
	cultivation and their precaution.		
CO-6	interpret about the different modes of storage	5	Un
	of mushroom.		
CO-7	illustrate about the various nutrition content	4	Un
	present in mushroom.		
CO-8	make use of various types of foods prepared	6	Ар
	from mushroom.		

SEMESTER – IV			
Allied – IV – Mushroom Technology			
Code : 18UMIA41	Hrs/Week : 4	Hrs/Sem: 60	Credit : 3

Unit – I

Nutritional and medicinal value of mushrooms - Historical account, Cultivation of button mushroom (*Agaricus bisporus*), milky mushroom (*Calocybe indica*), oyster mushroom (*Pleurotus sajor-caju*) and paddy straw mushroom (*Volvariella volvcea*)

Unit - II:

Structure and construction of Mushroom House- Layout of traditional and green house method and spawn lab. Preparation of Pure Culture. Cultivation technology - Substrates, bed preparation, spawning, Mushroom production.

Unit - III

Economics of mushroom cultivation – precautions in mushroom cultivation – area selection, spawn preparation, spawn run, harvesting, pest management.

Unit –IV

Storage and nutrition : Short time storage, Long term storage, Drying , Storage in salt solutions. Nutrition – Proteins , Amino acids , Mineral elements nutritions – Carbohydrate , Vitamins , Crude fibre content.

Unit – V

Value added products - Mushroom - Soup, Pickles, Powders, Jams ,Cutlet, Omelette , Samosa , Curry, mushroom biscuits, mushroom ketchup, mushroom chips, mushroom candy.

Text Books:

- 1) Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R, 1991. *Oyster Mushrooms, Department of Plant Pathology,* Tamil Nadu Agricultural University, Coimbatore.
- 2) Swaminathan, M. 1990. *Food and Nutrition*. Bappeo, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore 560018.
- 3) Nita Bahl, 1988. Hand book of Mushrooms, II Edition, Vol. I & Vol. II.

- 1. Biswas S., Datta M. and Ngachan S.V. 2012. *Mushrooms: A Manual for Cultivation,* PHI.
- 2. Zadrazil F. and Grabbe K. 1983. *Edible Mushroom, Biotechnology* Vol. 3, Weinheim: Verlag Chemie, Berlin
- 3. Changs T. and Hayanes W.A. (Ed.) 1978. *Biology and Cultivation of Edible Mushrooms.* Academic Press. New York.
- 4. Tewari, Pankaj Kapoor, S.C., 1988. *Mushroom cultivation*, Mittal Publications, Delhi.

SEMESTER – IV			
Allied Practical – IV – Laboratory In Mushroom Technology			
Code : 18UMIAR2	Hrs/Week : 2	Hrs/Sem : 30	Credit : 1

To provoke excellence for training and practising in the field of mushroom cultivation technology.

Mission:

To promote and encourage the entrepreneurship quality of every students for developing and providing them with a sustainable and profitable environment.

CO No	Upon completion of this course, students will	PSO	
	be able to	addressed	CL
CO-1	give outline about the field of mushroom	1	Un
	technology		
CO -2	explain the cultural characteristics of mushroom	1	Un
CO-3	develop the basic requirements for the high	4	Cr
	production of mushroom		
CO-4	interpret the laboratrical concept of mushroom	2	Un
	technology		
CO-5	to develop the mushroom cultivation skill	2	Cr
CO-6	analyze the nutritional significance of mushroom	2,3,4	An
	in our day to day life		
CO-7	explain the purpose of mushroom of cultivation	1	Un
CO-8	organize students to develop mushroom	2,3,4	Ap
	cultivation farms to encourage their		
	entrepreneurship.		

SEMESTER – IV			
Allied Practical – IV – Laboratory In Mushroom Technology			
Code : 18UMIAR2	Hrs/Week- 2	Hrs/Sem – 30	Credit – 1

- 1. Isolation and purification Tissue Culture Technique
- 2. Mother spawn preparation
- 3. Preparation of first and second generation spawn
- 4. Mushroom spore print and microscopic observation of spore
- 5. Cultivation of mushroom; Tropical and temperate types using compost/ Paddy straw /Agricultural wastes / sugar cane wastes etc., spawn running and harvesting.
- 6. Qualitative analysis of protein in the mushrooms
- 7. Qualitative analysis of sugar in the mushrooms
- 8. Qualitative analysis of lipid in the mushrooms
- 9. Visit to mushroom industry
- 10. Preparation of value added products mushroom soup, pickles

- 1. Biswas S., Datta M. and Ngachan S.V. 2012. *Mushrooms: A Manual for Cultivation*, PHI.
- 2. Zadrazil F. and Grabbe K. 1983. *Edible Mushroom, Biotechnology* Vol. 3, Weinheim: Verlag Chemie, Berlin
- 3. Changs T. and Hayanes W.A. (Ed.) 1978. *Biology and Cultivation of Edible Mushrooms*. Academic Press. New York.
- 4. Tewari, Pankaj Kapoor, S.C., 1988. *Mushroom cultivation*, Mittal Publications, New Delhi.
- 5. Marimuthu, T. Krishnamoorthy, A.S. Sivaprakasam, K. and Jayarajan. R, 1991. *Oyster Mushrooms*, Department of Plant Pathology, Tamil Nadu Agricultural University, Coimbatore.
- 6. Swaminathan, M. 1990 *Food and Nutrition*. Bappeo, The Bangalore Printing and Publishing Co. Ltd., No. 88, Mysore Road, Bangalore 560018.
- 7. Nita Bahl, 1984-1988. Hand book of Mushrooms, II Edition, Vol. I & Vol. II.

SEMESTER – IV				
Core Skill Based - Biostatistics				
Code: 18UMIS41Hrs/Week - 4Hrs/Sem - 60Credit: 4				

To impart advance level information in the subject of Biostatistics.

Mission

To make the students aware of the concepts in Biostatistics.

CO No	Upon completion of this course, students	PSO	CL
	will be able to	addressed	
CO- 1	develop an understanding of the basic concepts of biostatistics	2	Cr
CO -2	explain the statistical methods	4	Un
CO - 3	recall the collection, processing and presentation of data	2	Re
CO -4	explain measures of central tendency	4	Un
CO- 5	examine measures of dispersion	2	An
CO -6	determine the types and measures of correlation	2	Ev
CO- 7	define regression	4	Re
CO -8	interpret statistical inference	4	Ev

SEMESTER – IV				
Core Skill Based - Biostatistics				
Code: 18UMIS41	Hrs/Week:4	Hrs/Sem : 60	Credit: 4	

Unit-I

Biostatistics - Definition - Statistical methods - Basic principles. Variables - Measurements, Functions, Limitations and Uses of statistics.

Unit-II

Collection of data primary and secondary - Types and Methods of data collection procedures - merits and demerits.Classification - Tabulation and Presentation of data - sampling methods.

Unit-III

Mean, Median, Mode, Geometric mean - merits & demerits. Measures of dispersion - Range, Standard deviation, Mean deviation, Quartile deviation - merits and demerits

Unit-IV

Types and Methods of Correlation, Regression, simple regression equation, similarities and dissimilarities of correlation and regression.

Unit-V

Hypothesis - Simple hypothesis - Student's test - Chi square test.

Text Books:

- 1. N. Gurumani. 2005. An introduction to Biostatistics MJP Publishers, Chennai.
- 2. Veer BalaRastogi.2009. *Fundamentals of Biostatistics* Ane Books Pvt. Ltd, New Delhi.
- 3. Dr.Pranab K. Banerjee. 2011. *Introduction to Biostatistics (A Text Book of Biometry)* Revised and Fourth enlarged edition S. Chand & Company LTD, New Delhi.
- 4. A. K. Sharma. 2005. A Text book of Biostatistics Discovery Publishing House.

- 1. Danniel. W.W. 1987. *Biostatistics*. John Wiley Sons, New York.
- 2. Sundar Rao. P.S.S and Richards.J. *An introduction to Biostatistics*. 3rd edition. Christian Medical College, Vellore.
- 3. Selvin, S. 1991. Statistical Analysis of epidemiological data. New York University Press.
- 4. Campbell. R.C. 1998. Statistics for Biologists. Cambridge University Press.

SEMESTER-IV				
NME II - Clinical Microbiology				
Code:18UMIN41	Hrs/Week: 2	Hrs/Sem:30	Credit: 2	

Highlighting the students about diverse microbial pathogens and its effects on human health.

Mission:

To be aware of the diagnosis, treatment and prevention of pathogens and good medical practice.

CO No	Upon completion of this course, students	PSO	C L
	will be able to	addressed	
CO- 1	provide knowledge on the importance of	1,4	Un, An
	clinical microbiology		
CO -2	acquire knowledge on normal flora on human	1	Un
	body.		
CO- 3	acquire knowledge on various types of	6	Со
	diseases.		
CO- 4	provide information about the mechanisms of	1,6	Un
	infectious disease transmission		
CO- 5	acquire knowledge on causative agent,	1,6	Un
	treatment, prevention and control measures.		
CO- 6	provide interpretation of laboratory tests in the	2	Со
	diagnosis of infectious diseases.		
CO- 7	understand the importance of pathogenic	6	Со
	bacteria in human disease with respect to		
	infections of the respiratory tract,		
	gastrointestinal tract, urinary tract, skin and		
	soft tissue.		
CO- 8	develop basic skills necessary to work in the	1,2	Un
	microbiology laboratory.		

SEMESTER-IV				
NME II - Clinical Microbiology				
Code:18UMIN41Hrs/Week: 2Hrs/Sem:30Credit: 2				

Unit - I

Sources of infection - Routes of transmission - control measures - Testing by Koch's postulates - Antibiotic sensitivity testing

Unit - II

Bacterial pathogens - *Streptococcal, Staphylococci, E.coli, Vibrio, Salmonella, Shigella* and *Mycobacterium*

Unit – III

Fungal pathogens - Candida, Aspergillus - Dermatophytes

Unit - IV

Viral pathogens - Pox virus, Mumps virus, Rabies virus and HIV

Unit - V

Protozoan pathogens - Malarial, Amoebic, Giardiasis and Yellow fever

Text Books:

- 1. Ananthanaryanan R and Panikar J, 2000. Text book of Microbiology, Orient Longmans.
- 2. Rajan.S. 2007 . Medical Microbiology, MJP Publisher, Chennai

- Kanika L Mukherjee, *Medical Laboratory Technology*, Mc Graw Hill Publishing Co., Ltd., New Delhi Vol I-III
- Salle, A.J.,1996. Fundamental Principles of Bacteriology. (7th edition), Tata McGraw-Hill Publishing Company Ltd., New Delhi.
- Pelczar Jr., M.J., Chan E.C.S. and Kreig, N.R. 1993. *Microbiology*. McGraw Hill Inc., New York.

SEMESTER- IV				
Ability Enhancement Course: Yoga and Meditation				
Code: 18UAYM41Hrs/Week : 2Hrs/Semester : 30Credits: 2				

Course Outcome:

- To learn and practice various meditation, yoga methods to transform the ordinary life into a healthy, harmonious life leading to holistic wellbeing,
- To create an eco-friendly, loving and compassionate world.
- Acquire knowledge and skill in yoga for youth empowerment.
- Increase their power of concentration
- Learn the causes and ways to overcome fear and sadness.
- Create a ecofriendly, loving and compassionate world

Unit I: Meditation

Meditation - Purposes of meditation- Major types of meditations: Zazen, Mindfulness, Vipasana, Yoga, Self-inquiry, Listening, Qi Gong, Taoist, Tantra- Health benefits of meditation: physical, psychological, spiritual-Meditation and Silence:Silence of the body, mind, heart, and beyond – General methodology of meditation – Tips for better meditation Exercises: Practicing Zazen meditation – Self-enquiry meditation exercises

Unit II: Self-Awareness

Awareness - Self-awareness - Importance of self-awareness - Shades of self-awareness -Difference between Awareness and Concentration - Power of concentration - Levels of concentration - How to increase concentration? - Beauty of living here and now - Ways to develop your presence - Self-awareness and Ecology: interconnectedness **Exercises**: Body Scan exercise – Self-Witnessing exercise – Eating Raisin with full awareness

Unit III: Yoga

Meaning and importance of yoga - Yoga and human physical system - Principles of Yoga -Different types of yoga - Yoga and balanced diet - Yoga and energy balance - Pranayama -Surya namaskaram- Basic asanas for healthy life - Therapeutic benefits of simple yogasanas -Naturopathy for common ailments.

Exercises: Practicing basic Asanas - Doing Sun Salutation

Unit IV: Mindfulness

Definition of mindfulness - Three components of mindfulness - Benefits of mindfulness -Mindfulness and Brainwave patterns - Myths about mindfulness - Scientific Facts about mindfulness - Formal method to practice mindfulness - Qualities of Mindfulness - Obstacles for mindfulness – informal ways of practicing mindfulness – Mindfulness to get rid of addictions **Exercises**: Practice Mindful Walking –Practice Mindful Talking

Unit V: Heartfulness

Attitude to life - Power of positive attitude - Techniques to develop positive attitude - Positive vs negative people - Forms of negative attitude - Heartfulness - Managing fear: Basic 5 fears, Ways to overcome fear-Handling anger: Anger styles, Tips to tame anger - Coping with sadness: Causes and ways to overcome sadness, dealing with depression - Ultimacy of compassion: Compassion to oneself, towards others: Forgiveness, to nature: Seeing God in all

(6 Hrs)

(6 Hrs)

(6 Hrs)

(6 Hrs)

(6 Hrs)

Exercises: Practice Loving-Kindness meditation-Doing compassionate actions

Text Book:

1) Thamburaj Francis. *Meditation and Yoga for Holistic Wellbeing*. Trichy:Grace Publication. 2019.

Books References:

- 1) Osho. *Meditation the Only Way*. New Delhi: Full Circle Publication, 2009.
- 2) Thamburaj Francis. Journey from Excellence to Godliness: Zen Meditation for Transformation. Grace Publication, Trichy, 2017.
- 3) Osho. Awareness: The Key to Living in Balance. New York: St.Martin's Griffin Publication, 2001.
- 4) Tolle Eckart. *The Power of Now: A Guide to Spiritual enlightenment*. New World Library, 2004.
- 5) Swami Gnaneswarananda. Yoga for Beginners. Calcutta: Sri Ramakrishna Math, 2010.
- 6) HanhThichNhat. *The Miracle of Mindfulness: An Introduction to the Practice of Meditation.* Beacon Press, 2016.
- 7) Kamlesh D. Patel and Joshua Pollock. *The Heartfulness Way: Heart-Based Meditations for Spiritual Transformation*. Westland Publications, 2018.

SEMESTER-IV		
Self Study (Optional) -Probiotics		
Code:18UMISS2 Credits: +2		

To provide the learners with the best learning experience in Probiotics by self study education and enabling the students to become entrepreneurs and socially responsible.

Mission:

To develop young students with active and creative minds in the field of microbiology. To motivate learners to contribute to sustainable development of nation through environmental protection and social responsibility

CO. No	Upon completion of this course, students will be	PSO	CL
	able to	addressed	
CO-1	recall the basic knowledge on probiotics	3	Re
CO -2	acquaint with characteristics of probiotics	1,2	Kn
CO-3	analyse the aware the probiotics organisms.	2	Ev
CO-4	interpret the knowledge on the roles of probiotics.	1,2	Ар
CO-5	differentiate the probiotics and prebiotics	1,2	Co
CO-6	explain the concept of mechanisms of probiotics	2	Un, Ap
CO-7	grasp the knowledge about prebiotics.	2,3	An
CO-8	know the wealth of the probiotics and prebioticsm	2	Kn

SEMESTER-IV		
Self Study (Optional) -Probiotics		
Code:18UMISS2 Credits: +2		

Unit : I

Probiotics: Introduction and history of Probiotics, Probiotic microorganisms.

Unit : II

Characteristics of Probiotics for selection: Toleranceto additives, stability during storage, stability maintenance of probiotic microorganisms.

Unit : III

Role of Probiotics in health and disease: prevention and treatment of gastero-intestinal bacterial infection treatment of chronicurinary tract infection, antitumor and cholesterol level

Unit : IV

Mechanism of probiotics: production of antimicrobial substances, modulation of immune system, alteration of intestinal bacterial metabolite action

Unit : V

. Prebiotics: concept, definition, criteria, types and sources of prebiotics, prebiotics and gut microflora - Prebiotics and health benefits: mineral absorption, immune response, cancer prevention, elderly health and infant health, prebiotics in foods.

- 1. Salminen. S and Wright, A. V. 1998. Lactic Acid Bacteria, Marcel Dekker
- 2. Glenn R. G. Marcel R. 2008. Handbook of Prebiotics CRC press
- 3. LeeY K, Salminen S 2009. *Handbook of Probiotics and Prebiotics* . AJohn Willey and Sons Inc. Publication
- 4. SandholmT. M. Saarela M. 2003. *Functional Dairy Products* CRC Woodhead Publishing Limited.

SEMESTER- V					
Common Core VII Psychology and Microbiology for Health care					
Code: 18UBCS51Hrs/Week: 6Hrs/Sem: 90Credit: 4					

To familiarize the concepts of psychological aspects in health.

Mission:

To understand the complex interactions of biological, psychological, social factors of human health and disease.

CO. No	Upon completion of this course, students	PSO	CL
	will be able to	addressed	
CO-1	learn the nature of psychology and microbiology	1	Re
CO-2	understand the importance of human system	1	Re
CO-3	gain knowledge about the acute stressors.	2	Un
CO-4	analyze the various problems in menstrual cycle	5	An
CO-5	develop a proper lifestyle	3	Cr
CO-6	understand about sleep related disorders	6	Un
CO-7	create a depth knowledge about the warning and health	2	Un
	risk		
CO-8	evaluate the concept of health care.	4	Ev

SEMESTER- V				
Common Core VII Psychology and Microbiology for Health care				
Code: 18UBCS51Hrs/Week: 6Hrs/Sem: 90Credit: 4				

Unit – I:

Introduction to Microbiology - The History and Contributions of Microbiology (Antony Van Leeuwenhoek, Joseph Lister, Pasteur, Robert Koch) Classification of microorganisms (Bacteria, fungi, virus), Applied fields of Microbiology.

Psychology as a science - Schools of psychology, Various fields in psychology, Nature and scope of psychology .

Unit – II:

Introduction and historical overview of Immune system, Basic Immunology- Specific immune mechanisms and functions – Immuno mediators: [Immune-specific (e.g., cytokines); Non-immune-specific (e.g., aging, sleep)], Neuro immunology- Lymphocyte neuro hormonal receptors. Human stressor - Laboratory acute stressor effects on immunity.

Unit – III:

Personality disposition. CHD, Asthmatics, Allergy, Eczema, Hiding, Rheumatoid Arthritis, Peptic Ulcer, Diabetes and menstrual disorders.

Unit – IV:

Keeping the motor running -Neurobiological process that govern exercise, related psychological effects, Nutrition, Eating-related process, Overweight and obesity -making changes – Healthy foods-public health-Sleep, Sleep disorders, accidents at work and at home. **Unit – V:**

Recognizing illness symptoms and what needs to be done-recognizing warning and health risks -illness perceptions and beliefs – Relation between patients and the health provider-obtaining health care.

Text books:

- 1. Cacioppo, J.T., Tassinary, L.G., & Berntson, G.G 2007. *Handbook of Psycho physiology*. 3rdedition. Cambridge, UK: Cambridge University Press.
- 2. Marks, D. F., Murray, M., Evans, B., & Estacio, E.V. 2006. *Health Psychology* India; Sage Publication.
- 3. Thomas J. Kindt, Richard A. Goldsby, Barbara A. Osborne. 2007. *Kuby Immunology*. 6th edition. W. H. Freeman and Company, New York.
- 4. Wiley, Sherwood, Woolverton. 2014. *Prescott's Microbiology*. Ninth Edition. McGraw Hill International Edition.

- 1. Sarafino, E.P. 1999. Health Psychology. John Wiley & Sons Inc.
- 2. Hymie Anisman ,2016. Health Psychology. Sage publication Ltd.
- 3. Taylor, S.E. 2014. *Health psychology*. Mc Graw-Hill Education.
- 4. VamanRao. C. 2007. Immunology. 2nd Edition. Narosa Publishing House, New Delhi.

SEMESTER – V				
Core – VIII - Immunology				
Code : 18UMIC52Hrs/Week-5Hrs/Sem-75Credit - 4				

To provoke excellence about various aspects of immune response and cells involved in immunity.

Mission:

To impart basic level information in the subject of Immunology and to study about the various immune responses of the human system towards the pathogens.

CO. No. Upon completion of this course, students will be able to		PSO	CL
		addressed	
CO-1	explain the structural features of the components of the immune system and functions.	4	Un
CO-2	compare humoral and cellular immunity and their relative significance.	4	Un
CO-3	interpret the characteristics of antigen and antibody reactions.	4	Ev
CO-4	influence of the roles of the immune system in both maintaining health and contributing disease.	4	Ev
CO-5	influence the immunological response and how it is triggered and regulated.	4	Ev
CO-6	analyze about the pathogenesis of disease, effect, treatment and maintenance to prevent disease.	4	An
CO-7	compare types of lymphoid organs	5	Un
CO-8	compare various types of hypersensitivity	5	Un

SEMESTER – V				
Core – VIII - Immunology				
Code : 18UMIC52Hrs/Week-5Hrs/Sem-75Credits - 4				

Unit – I

History of immunology (Joseph Lister, Louis Pasteur and Elie Metchnikoff) – Innate and acquired - Structure, functions of the cells in immune system Detailed aspects of T and B cells.

Unit – II

Organs of Immune systems – primary lymphoid organs (thymus, bone marrow) – secondary lymphoid tissues (lymph nodes, spleen and MALT).

Unit - III

Antigens – types – properties – Haptens – adjuvant –immunoglobulins – structure, types, properties and functions – Complements: components and pathways. Major Histo compatibility Complex (MHC)- Human leukocyte antigen (HLA) - Humoral immune response - cell mediated immune response.

Unit – IV

Antigen – antibody reactions – In vivo methods (Precipitation reactions, agglutination and complement fixation) – Immuno-fluorescence – ELISA – RIA –Transplantation immunology.

Unit – V

Hypersensitivity reactions – Antibody mediated – Type I : Anaphylaxis – Type II: Antibody – dependent cell cytotoxicity – Type : III: immune complex reactions –Type IV hypersensitivity reaction – Auto immune disease (Rheumatoid arthritis)

Text Books:

- 1. Rajan, S. 2007. Medical microbiology. MJP Publisher, Chennai.
- 2. Fathimunisa Begum, 2008. *Monoclonal antibodies: The hopeful drugs*. MJP Publisher, Chennai.
- 3. Kannan I, 2007. Immunology. MJP Publisher, Chennai.
- 4. VamanRao. C. 2007. *Immunology*. Second Edition. Narosa Publishing House, New Delhi.

Books for Reference:

- 1. Donald. M. Weir and john Steward. 1993. Immunology (7th Education). ELBS, London.
- 2. Ivan M.Roit. 1998. Essential Immunology- Blackwell Scientific Publications, Oxfored.
- 3. Paul 1998. Essential Immunology, (2nd Education), Raver Press, New York.
- 4. Peter J. Delves and Ivan M. Roit (Eds) 1998. *Encyclopedia of Immunology* (2nd Education) Academic Press.
- 5. Roit, J.M.Brostaff, J.J. and Male, D.K. 1996. *Immunology* (4th Education C.V. Mosby publisher, St.Loius.
- 6. Stewart Sell. 2001. *Immunology, Immunopathology and Immunity*. (6th Education), ASM Press, USA.
- 7. Ananthanrayanan, R., and Panicker, J. 2000. *Text Book of Microbiology*. Orient longmans.
- 8. Wiley, Sherwood, Woolverton. 2014. *Prescott's Microbiology*. Ninth Edition. McGraw Hill

International Edition.

9. Thomas J. Kindt, Richard A. Goldsby, Barbara A. Osborne. 2007. Kuby Immunology. Sixth

Edition. W. H. Freeman and Company, New York.

SEMESTER-V				
Core - IX- Clinical Microbiology				
Code:18UMIC53Hrs/Week: 5Hrs/Sem: 75Credit: 4				

To inculcate knowledge in the field of clinical microbiology and provide the guidelines for improved lab diagnosis.

Mission:

To educate the students to carry out creative, innovative and inventive research, and provide reliable diagnostic services in the field of medical microbiology.

CO No	Upon completion of this course, students will able to	PSO addressed	CL
CO-1	understand the laboratory practices and know how to maintain the laboratory instruments	4	An
CO-2	analyze and distinguish various types of blood cells	2	Un
CO-3	understand the pathological diseases and explain the test for hepatitis, aids, and intestinal parasites.	6	Ev
CO-4	evaluate critical thinking of biochemical test	5	Un
CO-5	demonstrate the proficiency in basic methods of instrumentation and quantitative analytical skills used to conduct biological research.	4	An
CO-6	determines the applied microbiology aspects of clinical technique	1	An
CO-7	interpret different classes of microbes.	3	Cr
CO-8	analyze the level information in the subject of medical microbiology.	6	Ev

SEMESTER-V				
Core - IX- Clinical Microbiology				
Code:18UMIC53	Hrs/Week: 5	Hrs/Sem: 75	Credit: 4	

Unit-I:

Normal microbial flora of the human body- Sources of infection: Food, water, vector and air – Modes of transmission – Koch's postulates– Invasiveness and pathogenicity.

Unit-II

Diagnostic microbiology – Collection and transport of specimen for microbiological examination- General methods for isolation and identification of bacteria – skin,LRT,URT and urinary tract infections.

Unit-III

Clinical symptoms- Epidemiology, pathogenesis, laboratory diagnosis, prevention and treatment of the following bacterial (a) Tuberculosis (b) Leprosy, (c) Gastro intestinal disorders-Typhoid, cholera (d) Sexually transmitted diseases- Syphilis and gonorrhea. (e) Anaerobic wound infection- Tetanus.

Unit-IV

Clinical symptoms- Epidemiology, pathogenesis, laboratory diagnosis, prevention and treatment of the following viral infections (a) Respiratory infections-common cold,influenza, measles, and mumps (b) Liver diseases: Hepatitis A & B (c) Immunodeficiency diseases-AIDS and Herpes Simplex Viruses.

Unit-V:

Clinical symptoms- Epidemiology, pathogenesis, laboratory diagnosis, prevention and treatment of the following fungal and protozoan infections (a) Fungal – Superficial (Tinea nigra), subcutaneous and systemic mycoses (Candidiasis), (b) Protozoan: Amoebiasis and malaria, (c) Helminthes – ascariasis (d) zoonotic diseases – Rabies.

Text books:

1. Anathanarayanan, R., and Panicker, J. 2000. Text book of microbiology. Orient Longmans.

2. S., Rajan, 2007. Medical microbiology. MJP publisher, Chennai.

- 1. L.M., Prescott J.P., Harley and D.A., Klein 2008. *Microbiology*. 7th edition McGraw-Hill Inc, New York.
- 2.J.R Pelczar ., M.J. Chan E.C.S., and Kreig N.R., 1993. *Microbiology*-McGraw-Hill Inc, New York
- 3. Tortora, Funke Case Addison 2001, *Microbiology An Introduction*7th edition Wesley Longman Inc.
- 4. R.C.Dubey and S.,Maheswari, 2003. *A Text Book of Microbiology*, S.Chand & Co, New Delhi.

SEMESTER –V					
Core Integral - I – Microbial Nanotechnology					
Code: 18UMII51Hrs/Week: 4Hrs/Sem: 60Credit: 4					

To create the ability to be multi-skilled in the field of nanotechnology with good technical and instrumentation knowledge on various concepts and providing standard education and enabling the students to become entrepreneurs and socially responsible.

Mission:

To aware the basic knowledge about the basic nanotechnology and developing young students with active and creative minds in the field of nanotechnology.

CO No	Upon completion of this course, students will	PSO	CL
	be able to	addressed	
CO- 1	acquire basic knowledge on nanotechnology	4	Un
CO -2	explain the basics of microbial applications	4	Un
	of nanotechnology.		
CO -3	appreciate the structural and functional	4	An
	principles of nanomatreials.		
CO- 4	grasp the fundamental knowledge about	4	Un
	synthesis of nanomaterials.		
CO- 5	acquire basic knowledge about biosensors and	2	Ар
	types.		
CO- 6	get knowledge about analysis of biomolecular	4,2	Un
	nanostructures.		
CO -7	acquire knowledge on cancer diagnosis and	2,4	Ар
	treatment.		
CO- 8	get knowledge about drug designing and	2,4	Ар
	delivery		

SEMESTER –V					
Core Integral - I – Microbial Nanotechnology					
Code: 18UMII51Hrs/Week: 4Hrs/Sem: 60Credit: 4					

Unit I

Introduction to nanotechnology - Structural and functional principles of nanotechnology - Applications of nanotechnology. Bionanoparticles – Carbon nanotubes, Carbon nanocones.

Unit II

Nanotechnology : Nanoparticle synthesis by plants, bacteria and yeast. Methods of Nanobiotechnology - Analysis of bimolecular Nanostructures by Atomic Force Microscopy, Scanning Probe Electron Microcopy and XRD.

Unit III

Biosensors – optical nanosensors, multi-functional biochip (MFB) and Detection of the *Mycobacterium by MFB*.

Unit IV

Application of Nanobiotechnology in medicine – Cancer diagnosis and treatment, Drug designing and delivery.

Unit V

Nanotechnology and Food safety – Food Packaging and Processing. Nanotechnology in Agriculture – crop improvement and Pest management. Bio security

Text Books:

1. David. S. Goodsell. Jhonwiley 2006. Bionanotechnology: Lessons from Nature.

2. R. K. Rathi, 2009, Nanotechnology 1st Edition. S. Chand & Company Ltd, New Dehli.

- 1. Bernd Rehm, 2006.*Microbial Bionanotechnology: Biological Self-assembly Systems and Biopolymer-based Nanostructures*, Horizon Scientific Press.
- 2. Buddy D. Ratner, Allan S. Hoffman, Frederick J. Schoen and Jack E.Lemons. *Biomaterials Sciences: An Introduction to Materials in Medicine* 2nd Edition.
- 3. Christof M. Niemayer, Chad A. Mirkin, 2004. *Nanobiotechnology:* Concepts, Applications and perspectives, Wiley VCH publishers.
- 4. Fulekar M.H., 2010, *Nanotechnology: Importance and Applications*, I. K. International Pvt Ltd, New Delhi
- 5. JainK.K., Tailor L., Nanobiotechnology: Molecular Diagnosis. Francis Group.

SEMESTER – V				
Core Integral – II- Vermitechnology				
Code:18UMII52	Hrs/ Week: 4	Hrs/ Sem: 60	Credit:4	

To educate the students by ensuring the production of healthy food in a healthy way, we want to contribute to live in a healthy world.

Mission:

To contribute to global ecological economic recovery, profitable and sustainable way to produce high quality organic products and a healthy and positive results in agriculture is to be achieved.

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO- 1	select from, use and interpret results of descriptive vermi technology methods effectively.	6	Ev
CO -2	demonstrate an understanding the scientific and technological benefits to the rural sector by equipping them with the latest technology and to create the model for the nation	6	Ev
CO- 3	gain knowledge about the various morphology of earthworms	1	An
CO -4	communicate the awareness of field sampling using vermi compost	5	Un
CO- 5	make appropriate awareness of parasites and predators in vermi composting	5	Un
CO- 6	understand the awareness among the present status and importance of composting methods and vermi composting	4	An
CO- 7	understand the waste reduction in vermi composting	4	Un
CO -8	explain the nutrient availability in the vermi compost	6	Ev

SEMESTER – V				
Core Integral – II- Vermitechnology				
Code:18UMII52	Hrs/ Week: 4	Hrs/ Sem: 60	Credit:4	

Unit-I:

Earth worm classification – Morphology and Anatomy. Biology of *Lumbricus terrestris*. Vermicomposting - Definition, introduction and scope - The nature of earthworms-soil environment - basic environmental requirements.

Unit-II:

Vermicomposting materials and their classification. Physical, chemical and biological changes brought by earth worm in soil structure-carbon, nitrogen and phosphorous transformations

Unit-III:

Vermicomposting methods - Optimal conditions for Vermiculture - temperature, moisture, pH, soil type, organic matter. Nutrient availability in vermi Compost.

Unit-IV:

Vermicomposting in Homes, Maintenance of vermicomposting beds. Harvesting the worms. Earth worm predators, parasites and pathogens. - Vermi wash. Vermi culture for waste reduction.

Unit-V:

Composting - Vermicomposting - Required conditions - Advantages - Role of vermicompost in plant growth and other applications, Field sampling- passive methods.

Text Book:

Mary Violet Christy. A., 2014, Vermi Technology - MJP Publishers, Chennai.

- 1. Edwards, C.A. and Bohlen, P.J. 1996, *Ecology of earthworms*-3rd Edition, Chapman and hall.
- 2. Jsmail, S.A., 1970, Vermicology. The Biology of Earthworms. Orient Longman, London.
- 3. Lee, K.E., 1985. *Earthworms Their ecology and relationship with soil and land use*, Academic Press, Sydney.
- 4. Ranganathan L.S. 2006. *Vermibiotechnology from soil health to human health*. Agrobios India.
- 5. Gupta P.K. 2008. Vermicomposting for sustainable Agriculture. Agrobios. India.

SEMESTER V			
Core Practical V - Laboratory in Immunology and Clinical Microbiology			
Code : 18UMICR5	Hrs/Week :4	Hrs/Sem : 60	Credit : 2

To impart advanced practical knowledge in Immunology and Clinical Microbiology.

Mission:

To perform highly specific advanced methodologies for the study of human immune system towards the pathogens.

CO No	Upon completion of this course students will	PSO addressed	C L
	be able to		
CO-1	demonstrate various immuno diffusion test.	1,2	Re
CO-2	develop their ability to perform qualitative and quantitative assay of widal test.	2	Un
CO-3	improve their ability to perform rpr test for	3	
	syphilis		Un
CO-4	analyze how to perform latex agglutination and	3	
	blood grouping techniques.		An
CO-5	examine various types of bacterial pathogens	5	Un
CO-6	demonstrate antibiotic susceptibility test	6	An
CO-7	test urine samples	6	An
CO-8	examine stool sample	4,6	An
SEMESTER V

Core Practical V - Laboratory in Immunology and Clinical Microbiology

Code : 18UMICR5	Hrs/Week: 4	Hrs/Sem : 60	Credits 2

- 1. WIDAL test qualitative assay
- 2. Latex agglutination test (ASO)
- 3. Agglutination reaction with reference to blood grouping
- 4. Agglutination reaction with reference to RH typing.
- 5. Demonstration of Antigen Antibody reaction Ouchterlony technique ODD
- 6. Demonstration of Antigen Antibody reaction Single radial immuno diffusion
- 7. Biochemical identification of bacterial pathogens.
 - Following tests to be performed TSI, Indole, MR, VP, Citrate, Urease, Catalase test for
 - a. *Staphylococcus aureus*
 - b. Escherichia coli
- 8. Antibiotic susceptibility testing by Disc diffusion method (*Escherichia coli* and *Staphylococcus aureus*).
- 9. Isolation of normal flora of the skin and throat
- 10. Urine culture and its microbiological analysis (*E.coli*)
- 11. Stool examination by Zinc-sulphate floatation method.

- 1. J.G. Cappuccino and N.Sherman 1996 MB A lab manual Benjamin Cummins, New York.
- Murray P.R; Baron E.J; Jorgerson J.H; Pfaller M.A. and Yolker R.H. 2003. *Manual of Clinical microbiology*, 8th edition. Vol. 1 & 2 ASM Poem Washington D.C.
- 3. Gunasekaran, P. 1996. *Laboratory Manual in Microbiology*. New Age International Ltd., Publishers, New Delhi.
- 4. Dubey, R.C. and Maheswari, D.K. 2002. *Practical Microbiology*, 1st Edition Chand and Company Ltd., India.
- 5. Harley Precott 2002. *Laboratory Exercises in Microbiology*. 5th edition. The Mac Graw Hill companies.
- 6. Myer's and Koshi's *Manual of Diagnostic Procedures in Medical Microbiology and Immunology/Serology*. Published by Department of Clinical Microbiology, CMC and Hospital, Vellore, Tamil Nadu.
- 7. T. Sundaraj, Aswathy Sundararaj, 2002. *Microbiology laboratory manual*, Chennai.
- 8. Kanika L. Mukherjee, *Medical Laboratory Technology* A procedure manual for routine diagnosis tests Tata McGraw Hill Publishing Co., Ltd., New Delhi. Vol.I-III.
- 9. Kannan, N.1996. *Laboratory Manual in General Microbiology*. Palani Paramount Publication, Palani.
- 10. Aneja KR, 2005. *Experiments Microbiology, Plant pathology and Biotechnology*, 4th Edition. New age International publishers, Chennai.

SEMESTER –V	
Self Study – Sea Food Processing	
Code: 18UMISS3 Credits:2	

To understand the different food sources from the sea environment.

Mission:

To gain knowledge in the concept of sea food processing.

CO No	Upon completion of this course, students will	PSO	CL
	be able to	addressed	
CO- 1	build an idea about the sea environmental science.	3,4	Ар
CO -2	elaborate the nutritional benefits of marine resources	3	Cr
CO -3	importance of food processing.	3	Ev
CO- 4	explain the preservation methods- canning, smoking, drying, chilling and freezing.	1	Un
CO -5	demonstrate to handle and store the fish products	3	Un
CO -6	design the fish products	4	Cr
CO- 7	explain packaging and labelling techniques.	3	Un
CO -8	evaluate the methods to extend shelf life.	4	Ev

SEMESTER –V	
Self Study – Sea Food Processing	
Code: 18UMISS3	Credits:2

Unit– I

Sea environmental science: Marine eco system - Nutritional benefits of marine resources – fish, fish oil, seaweeds.

Unit- II

Scope and importance of food processing - principles and methods of food preservation -Sun drying, Smoking, Salt curing, Chilling, Pickling,

Unit- III

Preservation methods: Canning and Frying, irradiation process, value addition.

Unit– IV

Microbiology of fish products - storage and handling, preservation – freezing techniques and, preparation of fish products (Fermented fish, Fish products, Fish soups, Fish powder, Prawn powder and Cutlets)

Unit-V

Introduction to packaging and labelling - packaging principles and operation - packaging materials - deteriorative changes in foodstuff and packaging methods for prevention - shelf life of packaged foodstuffs - methods to extend shelf life, requisites of good packages.

Text book:

1. Bonnell A. D. 1993 - *Quality Assurance in Sea Food Processing:* A practical guide – Chapman and Hall, Inc.

- Linda AnkenmanGranata, George J. Flick, Jr, Roy E. Martin.2012. *The sea food industry* - *Spices, products, processing and safety* - 2nd edition - Wiley Blackwell Publication.
- 2. Hall G. M. 1997 *-Fish Processing Technology* 2nd Edition Blackie academic and Professional publication.
- 3. Ioannis S. Boziaris. 2013. *Sea food processing Technology, Quality and safety –* Wiley Blackwell publication.

SEMESTER- VI			
Core X - Food Microbiology			
Code :18UMIC61	Hrs/Week: 5	Hrs/Sem: 75	Credits: 4

To highlight the basic concepts and principles about the techniques in food microbiology and advanced level information about food microbiology.

Mission:

To enhance the students with the basic knowledge on various techniques involved in food production and preservation.

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	explain food microbiology	1	Un
CO-2	classify food.	1	Un
CO-3	explain food as a substrate for microorganisms.	3	Ev
CO-4	determines microbial contamination of food	3	Ev
CO-5	explain food preservation- physical and chemical methods.	1	Ev
CO-6	evaluate the causes of food spoilage-fruits, vegetables, dairy products, meat and fish.	3	An
CO-7	determine food borne disease and food spoilage.	4	Ev
CO-8	importance of food laws and regulations.	3, 4,5	Ev

SEMESTER- VI			
Core X - Food Microbiology			
Code :18UMIC61	Hrs/Week: 5	Hrs/Sem: 75	Credits: 4

Unit - I

Food as a substrate for microorganisms- Microorganisms important in food microbiology- Bacteria, Molds and Yeasts- Brief account of each group – General characteristics and importance –Microbiological examination of food - Microscopic techniques. Direct microscopic examination, total colony counts and differential enumeration.

Unit- II

Microbial contamination of foods - spoilage of food by microbes in cereals and cereal products- Eggs and poultry – meat – fruits, vegetables and its dried products- pickles- bread – canned foods.

Unit- III

Methods of food preservation: Aseptic handling, removal of microorganisms, anaerobic conditions, heat processing, refrigeration and freezing, drying, osmotic pressure- Chemical preservatives - Radiation- UV light, irradiation - Canning- Food Hygiene and sanitation.

Unit- IV

Food poisoning- Food borne diseases- Food intoxication and Food infection- Bacterial toxins (*Staphylococcus*, *Clostridium*, *Escherichia* and *Salmonella*) – Fungal (Mycotoxins) – Viral (Hepatitis) – Protozoan (*Entamoeba*).

Unit-V

Quality and safety assurance in food industry- - Microbial standards in food *-fssai* - Hazard Analysis Critical Control point (HACCP) - Food laws and Regulations-FAO,FDA,WHO,AGMARK, ISI, ISO. - BIS Laboratory Services, BIS product certification and licensing quality systems.

Text Book:

1. Frazier, W.C. and Westhoff, D.C. 2008. *Food Microbiology*. 4th Edition. Tata McGraw Hill publishing Co Ltd., New Delhi.

- 1. Adams, M.R. and Moss, M.O. 1995. *Food Microbiology*. 4th edition McGraw Hill, New York.
- 2. Jay, J.M. 2006. *Modern Food Microbiology*. CBS Publishers and Distributors, New Delhi.
- 3. Hobbs, B.C. and Roberts, D. 1993. *Food Poisoining and Food Hygiene*, Edward Aarnold (A division of Hodder and Sloughton), London.

SEMESTER-VI				
Core XI- Industrial Microbiology				
Code:18UMIC62Hrs/Week:5Hrs/Sem: 75Credits:4				

To impart the professional information by increasing the global knowledge, understanding, and application of industrial microbiology.

Mission:

Empower our students to address current and future challenges facing humanity using industrial microbiology.

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO -1	revise the idea about the usage of microorganisms in the field of industrial microbiology	3	Ap
CO- 2	analyse the knowledge of various industrial products and its impacts on the society.	4	Un
CO- 3	acquire knowledge in industrial fermentation	3	An
CO -4	have an insight on industrial microbiological techniques	2	Cr
CO- 5	understands the in the field of industrial microbiology	1	Un
CO-6	acquire knowledge of basics and applied microbiological aspects of food industries.	1	Un
CO-7	have knowledge on antibiotic production	2,4	Cr
CO-8	get knowledge about analysis of industrial waste and sewage treatment and disposal	2,4	Cr

SEMESTER-VI				
Core XI- Industrial Microbiology				
Code:18UMIC62Hrs/Week:5Hrs/Sem: 75Credits:4				

Unit-I

Isolation, screening, preservation and improvement of industrially important microorganisms; Raw materials and media design for fermentation processes; Sterilization; Development of inoculums for industrial fermentations; Types of fermentation: Batch, Continous, Dual or Multiple, Surface, Submerged, Aerobic and Anaerobic.

Unit-II

Fermenter- Design and types, Instrumentation and control-aeration and agitation.Recovery and purification of fermentation products. Enzymes and cell immobilization, Production of recombinant proteins having therapeutic and diagnostic applications: Insulin, Interferon, Somatotropin, Single cell protein.

Unit-III

Biology of industrial microorganisms.Streptomyces, Yeasts (*Saccharomyces, Hansenula*) *Spirulina* and *Penicillium*. Mushroom cultivation. Biosensors and Biochips.Biofuels from microbial sources.

Unit-IV

Alcohols (Ethanol and Butanol); Beverages (Beer and Wine); Aminoacids (Glutamic acid and Lysine); Organic acids (Citric acid and acetic acid); Vaccines (Plant – Agrobacterium tumefaciens, Animal – Leptospirosis, Microbes - DPT).

Unit-V

Antibiotics (Penicillin, Cephalosporin and Streptomycin); Vitamins (Riboflavin and Cyanocobalamin); Production of enzymes (Protease, Amylase and Lipase); Biopolymers (Xanthan gum and PHB); Biopreservatives (Nisin); Production of Hormones (Testosterone and Androstenedione).

Text Books:

- 1. Wulf Crueger A., 2000. *A Text Book of IndustrialMicrobiology*. 2nd edition. Panima Publishing Corporation, NewDelhi.
- 2. Peter F.Stanbury., Whittaker, A. and Hali.S.J.1997 *Principles of Fermentation Technology*, 2nd edition., Pergamon Press.
- 3. Patel A.H., 1996. Industrial Microbiology. Macmillan India Limited.

- 1. Prescott & Dunn., 1997. Industrial Microbiology. CBS publishers and Distributors.
- 2. Casida, L.E. 1986. Industrial Microbiology. Eastern Limited, NewYork.
- 3. Michael J., Waites, Neil L., Morgan, John S.Rockey and GrayHigton 2001. *Industrial Microbiology* An Introduction, Replika press Pvt.NewDelhi.
- 4. Purohit, S.S., Kakrani, H.N., Saluja, A.K., 2006 *Pharmaceutical Biotechnology*. Student edition, Jodhpur.
- 5. Satyanarayana. U. 2013. *Biotechnology*. Books and Allied (P) Ltd, Kolkata.

SEMESTER –VI			
Core - XII - Microbial Biotechnology			
Code: 18UMIC63Hrs/Week: 4Hrs/Sem: 60Credits: 4			

To impart advanced level information in the subject of Microbial Biotechnology.

Mission

To give an in-depth knowledge in the various microbial biotechnology process and products of biotechnology.

CO No	Upon completion of this course, students will be able to	PSO	CL
		addressed	
CO-1	define the history & concepts of biotechnology.	2	Re
CO-2	assess the intellectual property right & protection.	2	Ev
CO-3	illustrate the knowledge on the production of	3	Un
	biotechnological products.		
CO-4	interpret about the concepts and applications in enzyme	3	Un
	biotechnology.		
CO-5	assume the mechanisms involved in biodegradation of	6	An
	pollutants.		
CO-6	illustrate the cloning process	2	Un
CO-7	analyse the production of biotechnological products	2,3	An
CO-8	recall the concept of biogas, bioleaching, biodegradation of	4	Re
	petroleum.		

SEMESTER –VI					
Core - XII - Microbial Biotechnology					
Code: 18UMIC63Hrs/Week: 4Hrs/Sem: 60Credits: 4					

Unit-I

Biotechnology - Definition – Concepts - History – Achievements - Milestones in biotechnology - Enzyme biotechnology – enzyme production from microbes – applications – enzyme immobilization.

Unit-II

Cloning - History of cloning – Transgenic Plant (Golden Rice) – Transgenic Animal (Dolly) – Genetically Engineered Microorganism (Super bug).

Unit-III

Production of biotechnological products.Food - SCP (Algae, Yeast, Mushroom). Fuel (Ethanol) – Pharmaceuticals – Interferons, Vaccines, Edible vaccines, Hormones and Gene therapy methods – Hybridoma and Monoclonal antibodies .

Unit- IV

Bioconversions – Lignocellulosic waste to ethanol, Bioleaching – microorganisms involved – Mechanism of Bioleaching – Commercial process - Bioleaching of Copper and Uranium, Bio gas – Microbes involved - Factors influencing methane production – stages of methane generation, Biodegradation of Petroleum, Waste water treatment, Solid waste treatment.

Unit- V

Intellectual Property Rights (IPR) and Protection (IPP) – Forms of protection – Patents (reading a patent – description, claims, patenting strategies) – Copy right, Trade mark, Plant variety protection – WTO, GATT, TRIPs.

Text books:

- 1. Dr. Verma P.S and Dr. Agarwal. V. K. 2009. *Genetic Engineering* S. Chand and Company Ltd. New Delhi.
- 2. Dubey R.C. 2014. *A Text Book of Biotechnology*. 5th revised edition. S Chand & Co. New Delhi.
- 3. Dr. Prakash. S Lohar. 2005. Text Book of Biotechnology MJP Publishers, Chennai.
- 4. Dubey R.C. and D.K. Maheshwari. 2013. *A Text Book of Microbiology*. S. Chand & Co. New Delhi.

- 1. Glick, B.R. and Pasternak, J.J. 1998. *Molecular Biotechnology* Principles and Applications of Recombinant DNA. ASM Press, Washington D.C.
- 2. Satyanarayana, U. 2005. Biotechnology. Books and Allied (P). Ltd. Kolkata.
- 3. Kalaichelvan. P.T., Arul Pandian. I., 2007. *Bioprocess Technology*. MJP Publishers, Chennai.
- 4. Singh.B.D., Biotechnology. 2008. Kalyani Publishers.
- 5. Shiva Aithal, C. 2010. *Modern approaches in Soil, Agricultural and Environmental Microbiology*. Himalaya Publishers, New Delhi.

- 6. Rastogi S.C.2007. *Biotechnology Principles and applications*. Narosa Publishing House Pvt. Ltd. New Delhi.
- 7. Mohan P. Arora. 2005. Biotechnology. Himalaya Publishing House, Mumbai.
- 8. Jogdhand. S.N. *Gene Biotechnology*. 2009. Himalaya Publishing House Pvt. Ltd. Mumbai.

SEMESTER-VI					
Core Integral–III- Cosmetic Microbiology					
Code :18UMII61Hrs/Week:4Hrs/Sem: 60Credit:4					

To impart basic level information in the novel subject of Cosmetic microbiology.

Mission:

To enhance the knowledge on the applications of Cosmetic microbiology in various fields.

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO- 1	recall the history of cosmetic microbiology.	1	Re
CO- 2	explain about sanitary manufacturing in cosmetic manufacturing	2,5	Un
CO -3	infer practical knowledge about the microbiological targets of preservation	1,2,4	Un
CO- 4	explain the recent techniques on good manufacturing techniques in cosmetic microbiology	3,4,6	Un
CO- 5	demonstrate the quality and safety assurance in cosmetic industry and the hazard analysis and critical control point.	2,4,5,6	Un
CO- 6	apply the techniques in preservation of cosmetics	2,4,5,6	Ap
CO-7	have knowledge on cosmetic production	2,4	Cr
CO-8	get knowledge about analysis of cosmetic production	2,4	Cr

SEMESTER-VI			
Core Integral–III- Cosmetic Microbiology			
Code :18UMII61	Hrs/Week:4	Hrs/Sem: 60	Credit:4

Unit I

Introduction to cosmetic microbiology-History of cosmetic microbiology – Biology of microbes-Bacteria, growth, diversity, molds and yeast.

Unit II

Sanitary manufacturing in cosmetic manufacturing – Cleaning (Detergent ingredients & properties, Types of surfactants) – Sanitization(Physical & chemical sanitizers)-Cleaning & sanitizing equipments-Cleaning and sanitization procedures.

Unit III

Hazard Analysis and Critical Control Point (HACCP) protocols in cosmetic microbiology-Apply HACCP to cosmetics-Waste water removal and CIP system-Selecting Critical Control Points – Parameters of an effective HACCP program.

Unit IV

Cosmetic microbiology test methods preservative efficacy methods-CFTA methods-ASTM methods-Test for factors affecting preservative efficacy-Neutralizer evaluation-Rapid methods used in preservative testing-Microbial content testing.

Unit V

Validation methods – Model for validation-Validation of equipment cleaning & sanitization-Validation in microbiology laboratory- Preservation strategies-Scope and microbiological targets of preservation.

Textbook:

1. Daniel. K. Brannan. 1997. Cosmetic Microbiology. A Practical Handbook. CRC press.

- 1. Brannan , D.K., DilleJ.C., and Kaufman, D.J.1987. Correlation of invitro challenge testing with consumer-use testing for cosmetic products, *Appl.Environ.Microbiol.*, *53*.
- 2. Halleck F.E., 1978. Thermal solution sterilization, *Pharm. Technol.*, June.
- 3. Pflug I.J., and G.M.Smith. 1977. "the Use of Biological Indicators for Monitoring Wet-Heat Sterilization Processes.". In *Sterlization of Medical products*. (EDS. E.R.L. Gaughran and K.Kereluk), New Brunswick, N.J., Johnson and Johnson.
- 4. Gardner J.F., and M.M.Peel.1991. *Introduction to Sterilization, Disinfection, and Infection Control.* Second Edition. Churchill Livingstone, Melbourne

SEMESTER –VI			
Core Practical – VI - Laboratory in Food Microbiology, Industrial Microbiology and			
Microbial Biotechnology			
Code : 18UMICR6	Hrs/Week: 4	Hrs/Sem: 60	Credits: 2

To highlight the techniques involved in food and industrial microbiology

Mission:

To expose the students to different processes used in industries, food production and preservation and get information about the spoilage microorganisms.

CO No	Upon completion of this course, students will be able to	PSO addressed	CL
CO-1	explain the importance of food and industrial microbiology	1	Un
CO-2	understand different food microbes and their role.	1	Un
CO-3	explain food as a substrate for microorganisms.	3	Ev
CO-4	exploit microbes in the production of food	3	Ev
CO-5	explain food preservation- physical and chemical methods.	1	Ev
CO-6	evaluate the causes of food spoilage-fruits, vegetables, dairy products, meat and fish.	3	An
CO-7	recall the techniques involved in industries.	1	Re
CO-8	explain the quality and safety assurance in food industry.	2, 4,5	Un

SEMESTER –VI

Core Practical – VI - Laboratory in Food Microbiology, Industrial Microbiology and Microbial Biotechnology

Code : 18UMICR6	Hrs/Week: 4	Hrs/Sem: 60	Credits: 2
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- 1. Evaluation of Milk quality- Methylene blue reduction test.
- 2. Milk testing by Resazurin method.
- 3. Microbiological analysis of food product- Curd.
- 4. Microbial Examination of fruits and vegetables Surface washing and internal tissues-TVC.
- 5. Microbial examination of Meat- Surface washing and internal tissues- TVC.
- 6. Testing of soft drinks.
- 7. Immobilization of bacterial cells (Escherichia coli and Bacillus).
- 8. Preparation of Single cell Protein (Spirulina) Demonstration
- 9. Mushroom cultivation.
- 10. Wine production using yeast .
- 11. Antibiotic production by Bacteria or Actinomycetes- (Demonstration).

- 1. Cappuccino J.G and Sherman N. 1996 *Microbiology A lab manual* Benjamin Cummins, New York.
- 1. Kannan, N., *Laboratory Manual in General Microbiology*.Palani Paramount Publication, Palani.
- David greenwood, Richard. B., Slack & John. F., Peutherer, 2002. *Medical microbiology* 16th edition.
- 3. Murray P.R; Baron E.J; Jorgerson J.H; Pfaller M.A. and Yolker R.H 2003. *Manual of Clinical microbiology*, 8th edition. Vol. 1 & 2 ASM Poem Washington D.C.
- 5. Gunasekaran, P.1996. *Laboratory Manual in Microbiology*. New Age International Ltd., Publishers, New Delhi.
- 6. Jayaraman, J., 1985. *Laboratory Manual in Biochemistry*. Wiley EasternLtd., New Delhi.
- 7. Plummer, D.T.,. An Introduction to Practical Biochemistry. Tata McGraw-Hill. New Delhi.
- 8. Dubey, R.C.and Maheswari, D.K. 2002. *Practical Microbiology*, 1st edition Chand and Company Ltd., India.